Chapter Two

Review of Related Literature

"When I examined myself and my methods of thought, I come to the conclusion that the gift of fantasy has meant more to me than my talent for absorbing positive knowledge."

– Einstein

(as cited in Lewis, 2004)

2.01 : Introduction

Through First Chapter, the researcher has tried to provide the rationale behind this study. She has attempted to express the need of inclusion of creativity in teaching through a programme in B. Ed. course.

In this chapter, a review of literature, related to theoretical aspects of creativity and findings of researches (related to creativity) so far carried out in India and abroad are discussed.

For the ease of presentation, the researcher has divided this chapter into two sections. Section I deals with the theoretical aspects whereas Section II is based on research and findings about creativity.
SECTION – I
Theoretical aspects of Creativity

2.02 : Historical / Traditional view about creativity

According to Hota (1998, P. 20), “Traditionally, creativity was considered as a rare mysterious phenomenon blessed with divine inspiration occurring mainly in a few outstanding geniuses like Da-Vinci, Mozart, Shakespeare and Einstein; although it was realised that many other generally more mediocre artists or scientists produced occasional or minor creative work.

Creativity was also thought of as a divine inspiration, certain reformers, poets, philosophers like Plato, Kalidas, Tagore supported this view. Madness was often associated with creativity. (Believers are Nietschze, Plato, Vangogh, Lambrase).

One more belief was creativity involves only fun, enjoyment and merry making. Therefore creativity can not involve anything of substance or hard work.

It was also regarded as intuitive genius. Kant in his classical work ‘The Critique' of pure research says that 'Creativity is natural and therefore cannot be developed.' One can infer from this that, all these beliefs seem to have become detrimental in scientific enquiry about creativity in earlier days.

2.03 : Asset to Human Kind

But now creativity is treated as the greatest asset to human kind. After the ‘Sputnick' shock in 1957, creativity began to be seen as a way of
achieving world supremacy. Adopting human capital approach, discussions of creativity have since then become prominent in business and manufacturing fields. Industry or business field is far ahead of education in establishing creative problem solving programmes and similar educational efforts towards the development of human capital.

All this discussion may impose a question as to what is creativity? what is its nature?

2.04 : 4 P's of Creativity

After collecting about sixty definitions of creativity Rhodes (1961) (as cited in Puccio, 1999) pointed out "As I inspected my collection, I observed that the definitions are not mutually exclusive. They overlap and intertwine. When analysed, as through a prism, the content of definitions form four strands. Each strand has unique identity academically, being unity do the four strands operate functionally."

The relationship amongst four P's of creativity is presented as in Fig. 2.

![FIGURE 2 : Four P's of Creativity](image-url)
The four strands or approaches to creativity have been described as identifying the qualities of product which make it creative; understanding the traits, characteristics or attributes of creative personality; investigating the nature of environment (or press) which is conducive to or inhibitive of creativity; and describing the stages of thinking or the process creative people use to invent something new and useful.

2.05 : Definitions of Creativity

If we focus our attention to the derivation of the word 'creativity', it shows that it is derived from the latin word 'crea' means to 'create'.

**Dictionary meaning** : "Creativity is the ability or power to bring into existence, to produce through imaginative skill, to make something new."

– Webster's dictionary (as cited in Wilson, 2004)

2.06 : Product-based Definitions

Below are some product based definitions.

"Creativity is that process which results in a novel work that is accepted as tenable or useful or satisfying by a group at some point in time."

– Stein (1963) (as cited in Tripathi, 1996, P. 42)

"Stein's definition emphasises both novelty and utility. Novelty means newness whereas utility/usefulness is not limited to articles of day to day use. It is to be interpreted in a broader sense. Anything that increases the dimensions of our understanding and knowledge is to be considered as creative."
Murray (1959) (as mentioned in Tripathi, 1996, P. 43) has given a definition which is similar to that of Stein. He says, "Creation in many contexts of the present discourse, will refer to the outcome of a composition which is both new and valuable."

Murray elaborates the meaning of 'new' and 'valuable'. New according to him, will mean that, the entity is marketed by more than a certain degree of novelty or originality, relative to sameness or replication, and valuable will mean either intrinsically or extrinsically valuable as such to one or more persons or generative of valuable compositions in the future."

Some more definitions which perceive creativity as a product are –

"The occurrence of a composition (product) which is both new and valuable."

– Henry Miller (writer) (as cited in Wilson, 2004)

"Any thinking process in which original patterns are formed and expressed."

H. H. Fox (scientist) (as cited in Wilson, 2004)

"Creativity is the process of bringing something new into being."

– Rollo May (philosopher) (as cited in Wilson, 2004)

"Bringing into being something that was not there before."

– Edward de Bono (as cited in Wayne, 2004)

The definitions of 'creativity' as a product raise questions about the characteristics of product.

The meaning of 'new' and valuable is given by Murray and Stein.
Cropley (2001, P.6) puts a new dimension about the 'product'. According to him, "novelty, effectiveness and ethicality should be three characteristics of a creative product."

1. **Novelty**: A creative product, course of action, or idea necessarily departs from the familiar.

2. **Effectiveness**: It works, in the sense that it achieves some end. This may be aesthetic, artistic, spiritual, but may also be material such as winning or making a profit.

3. **Ethicality**: The term 'creative' is not usually used to describe selfish or destructive behaviour, crimes, war mongering and the like.

Cropley (2001) sees the third property as a crucial property which arises from the fact that the term 'creativity' has highly positive connotations. It is difficult to think of the effective and relevant novelty of new weapons of mass destruction as creative, even though they might contain all the necessary elements discussed above.

An obvious example would be the creativity displayed by a thief who developed a novel way to embezzle money from a bank. Thus the ethical element takes on a particular importance.

As an effect, creativity is a property of products. These are often tangible and material and frequently take the form of works of art, musical compositions or written documents, on the one hand of machines, buildings or other physical structures such as bridge and the like. They can also be intangible although relatively specific such as plans and strategies for solving problems in business, manufacturing, government and similar areas. Finally,
they can consist of more general thoughts or ideas - systems for conceptualizing the world - as in philosophy, Mathematics or indeed all reflective disciplines as pointed out by Cropley (2001).

2.07 : Process based definitions

Number of psychologists have proposed definitions of creativity which center around the process of creativity. Among these some are Torrance, Khatena, Mednick, Kubie and Koestler.

Torrance (1988) has given three definitions of creativity. The first definition he calls the research definition and the other two - the artistic definition and the survival definition. In research definition, he describes creative thinking as:

"The process of sensing difficulties, problems, gaps in information, missing elements, something askew making guesses and formulating hypotheses about these deficiencies; evaluating and testing these guesses and hypotheses; possibly revising and retesting them and finally communicating the results."

– Torrance (1988)
(as cited in Tripathi, 1996, P.44)

Through the above definition given, Torrance orients us to perceive "creativity as a problem solving process."
This definition can be presented with a Flow Chart 1 giving various stages as below:

FLOW CHART 1: Sequential steps in Creative thinking

Through this definition, Torrance has tried to provide a sequence of mental processes behind the occurrence of a creative product. But it shows that it is beyond only on 'Problem solving'. This may imply that creative thinking consists of problem solving only.

In other definition, called artistic definition, Torrance has given the process of artistic creativity.
The artistic definition given by Torrance (as mentioned in Tripathi, 1996, PP. 44-45) consists of a no. of drawings illustrating the creative process. It is given in Table 2.

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Creativity is</th>
<th>Drawing showing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Curiosity</td>
<td>Wanting to know</td>
<td>open book with a face.</td>
</tr>
<tr>
<td>indepth study through various angles</td>
<td>Digging deeper</td>
<td>A spade and a pit.</td>
</tr>
<tr>
<td></td>
<td>Looking twice</td>
<td>A bespectacled face.</td>
</tr>
<tr>
<td></td>
<td>Listening for smells.</td>
<td>A face with a hand on one ear.</td>
</tr>
<tr>
<td>Efforts attempts</td>
<td>Listening to a cat</td>
<td>Face of cat.</td>
</tr>
<tr>
<td></td>
<td>Getting in</td>
<td>Two fishes inside water.</td>
</tr>
<tr>
<td></td>
<td>Getting out</td>
<td>A closed door.</td>
</tr>
<tr>
<td></td>
<td>Having a ball</td>
<td>A girl with a ball.</td>
</tr>
<tr>
<td>Use of various alternatives</td>
<td>Cutting holes to see</td>
<td>A pair of scissors and paper.</td>
</tr>
<tr>
<td></td>
<td>through</td>
<td>Paper whose four corners have been cut.</td>
</tr>
<tr>
<td></td>
<td>Cutting corners.</td>
<td>Wire whose one end is attached to the sun and the other to a plug.</td>
</tr>
<tr>
<td></td>
<td>Plugging into the sun</td>
<td>A castle with a sand, a bucket &amp; a spade in front of it.</td>
</tr>
<tr>
<td></td>
<td>Building sand castles</td>
<td>A bird like figure singing.</td>
</tr>
<tr>
<td></td>
<td>Singing in your own key</td>
<td>An extended hand.</td>
</tr>
<tr>
<td>Future oriented</td>
<td>Shaking hands with</td>
<td></td>
</tr>
<tr>
<td></td>
<td>tomorrow</td>
<td></td>
</tr>
</tbody>
</table>

The researcher has tried to identify the dimensions behind the creativity acts. These are mentioned in the left side column. What Torrance called an artistic definition is actually a list of activities that characterises a creative worker.

A third definition is what Torrance calls survival definition. Examples of this type of creativity are best seen when a person tries to overcome an
extremely unfavourable situation like shipwreck trying to escape from enemy
territory, facing extreme climate conditions and the like. This type of
creativity in words of Torrance is 'Imaginatively gifted recombination of old
elements into new configurations.'

Another process based definition of creativity is by Khatena (1973)
who has chosen to define originality rather than creativity.

"Originality is the power of imagination to break away the perceptual
set so as to restructure new ideas, thoughts and feelings into novel and
meaningful associative bonds."

– Khatena & Torrance (1973)

(as cited in Tripathi, 1996, PP. 45-46)

Whereas Mednick (1964) emphasising the importance of remote
association says, "Creative thinking consists of forming new combinations of
associative elements, which either meet specified requirements or are in
some way useful. The more mutually remote the elements of new
combination, the more creative is the process of solution.

– Mednick (1964)

(as cited in Tripathi, 1996, P.46)

The main similarity between the above two definitions is to break
the old bonds (patterns) or come out of the old bond.

Kubie's Definition: Kubie (1967) defines creative process as:
"By the creative process we mean the capacity to find new and unexpected
connections to voyage freely over the seas, to happen on America as we
seek a new route to India to find new relationships in time and space and thus new meanings."

– Kubbie (1967) (as cited in Tripathi, 1996, P.47)

Combining the need, process and product; a comprehensive definition of creativity is given by Tripathi (1996, P. 51). It is "creativity arises to fill a sensed gap resulting in a new insight in which ideas, not usually associated together are combined or some ideas are perceived in a new perspective leading to a novel and useful or an aesthetically pleasing product."

All these definitions reveal that:

- Creativity is perceived as a process or a product.
- Formation of new and valuable product (tangible or untangible) and problem solving comprise creativity.
- To come into existence a new and valuable product, previous experiences are manipulated in different/ unusual ways.

**New Attempt**: Dilip Mukerjea (2001) (as cited in Wayne, 2004, P. 6) has described creativity in an innovative way. He describes creativity as the "spark" that ignites new ideas. In his book, "Surfing the intellect" he provides a formula for creativity.

According to him,

\[ C = (ME)^\infty \]

In this formula, \( C = \) creativity, \( M = \) mass of data, information, knowledge and wisdom acquired over life time.
E = The sum of experiences and the enlightenment gained thereby that serves to energize one's life. In that equation, Dilip Mukerjea wants to establish the relationship between process of creativity and then product. According to equation, the quality (novelty, utility) of product is a function of number of experiences received and the knowledge generated thereby and outstanding combination of those.

\[ M \times E \] increases multiplicity of combination of ideas. When a single experience is added, potential connections mentioned by Wayne, (2004) increase exponentially is as shown in table 3:

<table>
<thead>
<tr>
<th>Experience/knowledge</th>
<th>Potential connections</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>:</td>
<td>:</td>
</tr>
<tr>
<td>10</td>
<td>45</td>
</tr>
<tr>
<td>:</td>
<td>:</td>
</tr>
<tr>
<td>50</td>
<td>1225</td>
</tr>
<tr>
<td>:</td>
<td>:</td>
</tr>
<tr>
<td>100</td>
<td>4950</td>
</tr>
<tr>
<td>1000</td>
<td>499500</td>
</tr>
<tr>
<td>:</td>
<td>:</td>
</tr>
<tr>
<td>1,000,000</td>
<td>4,99,999,500,000</td>
</tr>
</tbody>
</table>

* adapted from Wayne, L. (2004). Flicking your creative switch - developing brighter ideas for business. P. 49
This implies that as no. of experiences increase, the potential connections tend to infinity. It is very appropriate for ideas to have an upper limit of \( \infty \) (infinity). It can be said that the amount of variety of experiences and combination of them in number of ways leads to a creative act.

2.08 Creativity as a Person : The other way of looking at creativity is to study the creative person himself. This view starts from the assumption that the creative product is neither a happy accident nor simply the result of a faithful pursuit of proper methodology. On the other hand, creative work is treated as the expression of a creative personality.

- Vernon (1967) considers creativity mainly as 'an ability' and 'a form of cognitive activity' (as cited in Sharma, 1991, P.17).
- Drevdhal (1956) defines creativity as the capacity to produce compositions, products or ideas of any sort which prove new or novel and previously unknown to the producer himself (as cited in Sharma, 1991, P.18).
- Ausubel (1963) (as cited in Sharma, 1991, P. 19) used the term 'creativity' to refer to 'rare and unique talent' in a particular field of behaviour which has the capacity for developing insights, sensitivities and appreciation in areas of intellectual and artistic activity.
- Khandwalla, P. (2003, P. 38) provides a formula relating to creative personality. According to him,

\[
\text{Creative potential} = \text{Creativity traits} + \text{creativity spurring motives}
\]

— mental blocks that impede creativity.
According to him, the key elements of the creative personality are certain traits and motives and the absence of certain mental blocks.

**Personality Traits**: Several comprehensive reviews of research on creativity and personality have appeared over the years including Dellas and Gaier (1970), Farisha (1978), Barron & Harrington (1981), Matamedi (1982), Treffinger, Isaksen & Firestein (1983), Dacey (1989), Albrt & Runco (1989) & Eyesenck (1997). These summaries confirm that a fairly stable set of findings have emerged.

Dellas and Gaier (1970) (as cited in Cropley, 2001) concluded that creative people are characterised by a special pattern of traits that distinguish them from the less creative. They identified eleven typical traits of which nine would generally be regarded as positive.

They are:

- Independence
- Dominance
- Introversion
- **Openness**
- Breadth of interests
- Self acceptance
- Intuitiveness
- Flexibility
- Social poise

The remaining two lack of concern of social norms and antisocial attitudes are less positive.
According to Dacey (1989) (as cited in Cropley 2001, P. 60) there are nine traits that characterize creative people.

- Tolerance of ambiguity
- Stimulus freedom
- Functional freedom
- **Flexibility**
- Risk taking
- Preference for complexity
- Androgyny (possession of both male and female characteristics)
- **Acceptance of being different**
- Positive attitude to work.

Eysenck (1997) (as cited in Cropley, 2000, P. 60) concluded that researchers typically emphasize following characteristics of creative personality.

- Authority
- Non-confirmity
- **Openness to stimulation**
- Flexibility
- Tolerance of ambiguity
- Inner directedness
- Ego-strength

Some common traits of creative personality are evolved from the above three researches. They are **flexibility, openness** and **tolerance of ambiguity**.
All these traits have relation to the environmental setting of the society.

2.09 : Creativity as a Press /Environment

The environment is not simply a passive recipient of whatever creative people offer, but itself determines what kind of novelty is produced. Only creative solutions will be tolerated by a particular environment.

The social setting determines what kinds of new ideas emerge by setting limits to the degree and/or kind of divergence that is seen, by guiding creative thinking into particular channels or by affecting motivation. There is little incentive to produce novelty or surprise that no one else is willing to support. Despite this, exceptional individuals who swim against the current such as Galileo, who was condemned for heresy are still seen.

Simonton (1999) (as cited in Cropley, 2001, P. 7) has shown that “The effects of the environment are not only specific, affecting the creativity of a particular individual, but also general in that they influence the kind of novelty that is produced in the society as a whole.”

Khandwalla (1984) (as cited in Tripathi, 1996, P. 142) provided a list of 10 important environmental factors that foster creativity. These factors are:

1. A stimulating environment in which one has to respond to new tasks and challenges.
2. An environment that encourages and rewards creativity.
3. An environment that does not induce defensiveness.
4. An environment in which one can get critical but constructive evaluation.
5. An environment that provides rigorous technical training.
6. An environment which is rich in diversity and intellectual ferment.
7. An environment that provides freedom along with accountability and effective performance.
8. An environment in which innovators, pioneers and creators are looked up to as role models.
9. An environment which provides reasonable physical facilities for creative work.
10. An environment in which admired or loved high status individuals favour creativity and communicate expectations about creative effort to the individual.

In the above list 3 main points have come forth –
1. Role model should be innovator.
2. High status persons should communicate their expectations about creativity.
3. Rigorous training and accountability should be combined with freedom of action.
The basic principles behind each theory and their applications in teaching is given in appendix B.

2.11 Techniques for creative thinking:

There emerged many techniques and methods which are tested and proved for developing creativity among the individuals. The researcher does not intend to go into details of each.

The most widely used techniques are:

1. Brainstorming (Osoborn)
2. Synectics (Gordon William)
3. Attribute listing (Grawford, Rober)
4. Morphological Analysis (Davis)
5. Bionics (Papanek)
6. Role playing (Moreno)
7. Zaltman Metaphor Technique (ZMET) (Ronald, Leibber)
8. Creative problem solving
   - Devis Method
   - Polya Method
   - Parnes Method
   - Oech Method
   - Wallas Method
9. Six Thinking Hats (Edward DeBono)
10. Lead User Technique: Outside_the_box_Thinking
11. SCAMPER
12. Mind mapping (Buzan).
2.12 : Creativity and Guilford’s Structure of Intellect (SOI) Model

The credit for initiating systematic research in the field of creativity goes to J. P. Guilford. In his presidential address to American psychological Association in 1950, Guilford gave his ideas on creativity. He remarked: Creative acts can therefore be expected, no matter how feeble and how infrequent of almost all individuals (1950). This was a novel view. Till so far it was believed that only a few gifted individuals could be creative.

In 1956, Guilford published a paper ‘Structure of Intellect’ in the psychological Bulletin. He there presented a system through which the various factors of intellect cold be arranged. Under this system only forty factors were identified.

In 1959, again, he presented a revised model of intellect – Three faces of Intellect”. This model was consisting of 120 factors.

Later on one component was split raising the number from 120 to 150. The recent model of SOI by Guilford (as mentioned in Tripathi, 1996, P. 88) is as shown in figure 4.

![Guilford's Structure of Intellect](image)

**FIGURE 4 : Guilford's Structure of Intellect**
According to Guilford any mental activity has three aspects: a mental operation, its content and its product. Under each of these three aspects, there are subcategories. They are:

<table>
<thead>
<tr>
<th>Mental operations</th>
<th>Contents</th>
<th>Products</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>6. Implications - I</td>
<td></td>
</tr>
</tbody>
</table>

**Mental Operations**

1. **Cognition**: Refers to comprehension and recognition.

2. **Memory**: Refers to retention and recall of information.

3. **Divergent Production**: According to Guilford (1959) it is closely related to creative potential.
   
   It is generation of information from given information, where the information is based upon variety and quantity of output from the same source.

4. **Convergent Production**: In convergent production, the problem is such that it leads to any one correct answer.

5. **Evaluation**: Reaching decision for making judgement concerning criterion satisfaction (correctness, suitability, adequacy, desirability etc.) of information.

**Content**: Raw material to which mental process is applied.

1. **Visual**: The visual information can be in concrete form as in objects or in the form of figures.
2. **Auditory** : The information can be in the auditory form. It could be in the form of music or in ordinary signals.

3. **Symbolic** : Symbols which denotes something but have no meaning in themselves.

4. **Semantic** : This type of content is represented by meanings. It commonly finds expression through language. Meaningful pictures also often convey semantic information.

5. **Behavioural** : It is essentially non-verbal information involved in human interaction in terms of needs, attitudes, desires, moods, intentions, perceptions, thoughts etc.

**Product** : When a mental operation takes place with any of the 5 kinds of content, it will give rise to some kind of result. It is called as product.

There are six kinds of product.

1. **Units** : These are relatively segregate or circumscribed items of information. Each unit will represent a product but the products will not be related to each other.

2. **Classes** : These are items of information which are grouped together by virtue of their common attributes.

3. **Relations** : Connections between items of information based upon variables or points of contact that apply to them.

4. **Systems** : These are organised or structured aggregates of items of information. It could be represented by complexes of interrelated or interacting parts. (e.g. a mathematical equation).

5. **Transformations** : Changes of various kinds like redefinition shift or modification of existing information or in its function, it is thus a reinterpretation of an information.
6. Implications: Extrapolation of information, in the form of expectancies, predictions known or suspected antecedants, concomitants and consequences are treated as implications.

Thus, 5 contents x 5 operations x 6 products results into 150 factors of intellect.

According to Guilford (1967) (as cited in Hota, 1998) factors included in divergent thinking which constitute creativity are fluency (word, associational, ideational, expressional) flexibility (semantic, figural, symbolic) originality, elaboration, redefinition (symbolic and semantic).

Later on, he believed that ‘sensitivity to the problems’ falls in the evaluative category is also important for creative activity. For a particular mental operation, i.e. divergent production, each content will produce 6 kinds of products. There are in all 5 contents. So for divergent production there are in all 30 cells. (5 contents x 6 products). Out of which 5 cells are devoted to transformation i.e. redefinition. Rest 25 cells measure fluency, flexibility and originality. Out of these 25, 5 cells are of implications. These are nothing but elaboration. Hence in all there are 20 cells devoted to fluency hence for flexibility and for originality. Guilford pointed out that sensitivity to the problem comes under operation evaluation. Again for evaluation there are 30 cells i.e. for sensitivity to the problem has 30 cells.

Thus, in a structure of intellect of 150 cells, 60 cells (i.e. 40%) are devoted for creative potential according to Guilford. The distribution of cells will be like this:

<table>
<thead>
<tr>
<th>For redefinition</th>
<th>DVT</th>
<th>For elaboration</th>
<th>DVI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DAT</td>
<td></td>
<td>DAI</td>
</tr>
<tr>
<td></td>
<td>DST</td>
<td></td>
<td>DSI</td>
</tr>
<tr>
<td></td>
<td>DMT</td>
<td></td>
<td>DMI</td>
</tr>
<tr>
<td><strong>Total (5)</strong></td>
<td>DBT</td>
<td><strong>Total (5)</strong></td>
<td>DBI</td>
</tr>
</tbody>
</table>
D - divergent production.  
V, A, S, M, B - contents

T - Transformation  
I - Implications

This is presented in figure

**FIGURE 5: Cells of redefinition and elaboration**

For sensitivity to problem: Distribution of cells for sensitivity to the problem

is as follows. They are represented further in figure 6.

<table>
<thead>
<tr>
<th>EVU</th>
<th>EVC</th>
<th>EVR</th>
<th>EVS</th>
<th>EVT</th>
<th>EVI</th>
</tr>
</thead>
<tbody>
<tr>
<td>EAU</td>
<td>EAC</td>
<td>EAR</td>
<td>EAS</td>
<td>EAT</td>
<td>EAI</td>
</tr>
<tr>
<td>ESU</td>
<td>ESC</td>
<td>ESR</td>
<td>ESS</td>
<td>EST</td>
<td>ESI</td>
</tr>
<tr>
<td>EMU</td>
<td>EMC</td>
<td>EMR</td>
<td>EMS</td>
<td>EMT</td>
<td>EMI</td>
</tr>
<tr>
<td>EBU</td>
<td>EBC</td>
<td>EBR</td>
<td>EBS</td>
<td>EBT</td>
<td>EBI</td>
</tr>
</tbody>
</table>

(Total 30)
Sensitivity to the problem (30)

**FIGURE 6 : Cells of sensitivity to the problem**

For fluency (hence for flexibility and originality): Cells of distribution for fluency, flexibility and originality are as follows and represented further in figure 7.

<table>
<thead>
<tr>
<th>DVU</th>
<th>DVC</th>
<th>DVR</th>
<th>DVS</th>
</tr>
</thead>
<tbody>
<tr>
<td>DAU</td>
<td>DAC</td>
<td>DAR</td>
<td>DAS</td>
</tr>
<tr>
<td>DSU</td>
<td>DSC</td>
<td>DSR</td>
<td>DSS</td>
</tr>
<tr>
<td>DMU</td>
<td>DMC</td>
<td>DMR</td>
<td>DMS</td>
</tr>
<tr>
<td>DBU</td>
<td>DBC</td>
<td>DBR</td>
<td>DBS</td>
</tr>
</tbody>
</table>

(Total 20)
Hence, there are in all 60 cells devoted to creative potential.

2.13: Brain and Creativity

Human brain is divided into two parts: Left hemisphere and right hemisphere. These two are connected together by carpuscallosum. Functions of our right side of the body are controlled by left brain whereas functions of left part of the body are controlled by right brain.

Many biologists have studied the brain functions. But the work of Roger Sperry, an American neurologist on split brain subjects has greatly contributed, in the understanding of the functions of two hemispheres. According to him, the left and right hemispheric style is as shown in the table 4.
TABLE 4

<table>
<thead>
<tr>
<th>Functions of L - R brain hemisphere*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Right hemisphere style</strong></td>
</tr>
<tr>
<td>• Intuitive</td>
</tr>
<tr>
<td>• Responds to demonstrated</td>
</tr>
<tr>
<td>instructions</td>
</tr>
<tr>
<td>• Problem solves with hunches,</td>
</tr>
<tr>
<td>looking for patterns and</td>
</tr>
<tr>
<td>configurations.</td>
</tr>
<tr>
<td>• Looks at similarities.</td>
</tr>
<tr>
<td>• Is fluid and spontaneous.</td>
</tr>
<tr>
<td>• Prefers elusive and uncertain</td>
</tr>
<tr>
<td>information</td>
</tr>
<tr>
<td>• Prefers drawing &amp; manipulating</td>
</tr>
<tr>
<td>objects.</td>
</tr>
<tr>
<td>• Prefers open ended questions.</td>
</tr>
<tr>
<td>• Free with feelings.</td>
</tr>
<tr>
<td>• Prefers collegial authority</td>
</tr>
<tr>
<td>structures</td>
</tr>
<tr>
<td><strong>Simultaneous</strong></td>
</tr>
<tr>
<td>• Is a lumpier, connectedness is</td>
</tr>
<tr>
<td>important</td>
</tr>
<tr>
<td>• Is analog, sees correspondences,</td>
</tr>
<tr>
<td>esemblances.</td>
</tr>
<tr>
<td>Draws on unbounded qualitative</td>
</tr>
<tr>
<td>patterns that are not organized into</td>
</tr>
<tr>
<td>sequence, but that cluster around</td>
</tr>
<tr>
<td>images.</td>
</tr>
</tbody>
</table>

* Adapted from http://brain.web.us.com/brain/right_left_brain_characteristics.htm

Figure 8 depicted below will help visualise the L-R brain functions.

![Left and Right Brain Functions](image)

* Adapted from http://encarta.msn.com/media_461516672/Left_Right_Brain_Functions.html

**FIGURE 8 :** L - R brain hemispheres, what do they do ?*
2.14 : Relationship between Divergent thinking, lateral thinking and creativity.

- Divergent and convergent thinking are the terms used by Guilford (1967). Vertical and lateral thinking introduced by De Bono (1996). Their meanings are not the same.
- Creativity has a very wide meaning. According to De Bono (1996) there are elements of new and elements of bringing something into being and even elements of value.
- Lateral thinking is directly concerned with changing concepts and perceptions. It is always finding out alternatives.
- Without changing concepts and perceptions, one can be creative but not thinking laterally.
- When one thinks laterally, it is not necessary that he is creative.
- Divergent thinking is interested in multiple/many answers whereas lateral thinking is not.
- Divergent thinking is opposite to logical thinking but lateral thinking is not. Sometimes it may be logical or sometimes it may not be.

The only common thing is all of them result into new ideas.

FIGURE 9 : Creativity and lateral thinking
De Bono (1992) expressed the relation between creativity and lateral thinking. The common portion in them is shaded. This relation is presented in figure 9.

![Diagram showing the relationship between Creativity, Lateral Thinking, and Divergent Thinking]

**FIGURE 10 : Creativity, lateral thinking and divergent thinking**

The relationship between creativity, lateral thinking and divergent thinking is depicted through figure 10.

**2.15 : A conceptual framework for creativity in teaching**

As mentioned in operational definition "*Creativity In Teaching is : There is a presence of creativity in teaching, when a teacher makes use of his competencies such as – openness, sensitivity to problem, fluency, flexibility, originality, elaboration, redefinition and resourcefulness while discharging his duties as a facilitator of learning process.*" In other words, these competencies on the part of a teacher represent his creativity in teaching. The researcher has decided in all 8 factors of creativity in teaching. Six out of them are from Guilford’s structure of intellect. They are fluency, flexibility, originality, elaboration, sensitivity to the problem and redefinition.
Rest two are included by the researcher. Additional two factors have the following rationale for their inclusion in the operational definition of creativity in teaching.

2.16 : Rationale for openness – when the researcher went through the personal characteristics of a creative person, found by various researchers, she came to know that ‘openness’ is one of the common characteristics. (P.54-55) Words may be different; but the meaning is same.

To initiate the process of creative thinking, openness is necessary. The researcher is dealing with the student-teachers of B. Ed. Course. They have a dual responsibility. To think creatively while teaching and to facilitate their student’s creative thinking also.

For both these functions it is necessary to be open-minded. It is necessary to remove the ‘mental blocks’ which do not allow new things to come in, which do not allow to think other than their routine way of thinking. Hence the researcher decided to include ‘openness’ as a fundamental/basic factor of creativity in teaching as one in the presence of which creative thinking takes places.

In Physics, there is a concept of latent heat. It is the amount of heat required to change the state of matter without changing its temperature. Similarly to initiate the process of creative thinking in teaching, the change in (traditional/stereotyped) mind set is necessary. The factor ‘openness’ can be treated as a ‘latent heat’ for this change of mindset to take place.
2.17 : *Rationale for Resourcefulness* : Hobelman, Barkan and Wessel have (as mentioned in Torrance, 1962) found out core common characteristics among creative teachers. All of them are highly sensitive, resourceful, flexible and willing to 'get off the beaten tracks'. So resourcefulness is included as a factor of creativity in teaching. Rest of the three are already there.

2.18 : *Details about factors of creativity in teaching*

1. **Fluency** : It is the ability to generate many ideas, responses, solutions, questions or suggestions. (Verbal and non-verbal)
   - Flow of ideas/thoughts
   - It is the number or quantity of relevant responses/ideas.

2. **Flexibility** :
   - It is the ability to generate variety of ideas, questions, causes and solutions etc.
   - It is the number of quantity of variety of responses/various classes/categories of responses.
   - Flexibility of thinking consisting of two factors, namely spontaneous flexibility (defined as ability or disposition to produce a great variety of ideas with freedom from inertia and from preservation) and adaptive flexibility which facilitates the production of a most unusual type of solution.

3. **Originality** :
   - It is the ability to generate unusual, uncommon, novel, off-the-beaten track ideas, questions, suggestions or ways of doing things.
• A response which is statistically uncommon.

2.18(a) : Relationship among fluency, flexibility and originality

• Fluency, flexibility and originality are quite related to each other.

• Suppose that ‘A’ be a set of responses which is

\[ \text{Flu} = \{x_1, x_2, \ldots, x_n\} \]

Where \( x_1, x_2, \ldots, x_n \) are the number of responses.

Hence fluency score is \( = n \) (as mentioned in the description of fluency)

Now if these \( n \) responses are classified and if we find that there are suppose some \( K \) no. of groups / classes. Then \( \text{flex} = Y = \{Y_1, Y_2, \ldots, Y_k\} \)

Where, \( Y_1 = \{x_1, x_2, x_4\} \)

\( Y_2 = \{x_3, x_5, x_8\} \)

\[ \vdots \]

\( Y_k = \{x_9, x_{10}, x_{11} - x_n\} \)

Then the flexibility scores is \( = K \) (as mentioned in the description of flexibility)

Then according to the definition, there may be any response which comes under any of the class, regarded as unusual. Hence originality response is a subset of fluency.

\[ \therefore \text{originality say } Z \in A \]

Maximum score of flexibility will be equal to the score of fluency i.e. \( k = n \)

Hence upper limit of score of flexibility is \( n \) (i.e. score of fluency)

Minimum score of flexibility will be one. Here basic assumption is that when flexibility / originality exist there exists fluency response also. Rather ‘fluency’ is the basic factor among them. Hence lower limit of flexibility is one while upper limit is the score of fluency.
Lower limit of fluency is also one but fluency has no upper limit. When fluency increases, there is a chance of increase in flexibility. When flexibility increases, there is a chance of existence of originality.

Now let us consider two cases:

**Case 1.** Suppose,

Fluency score is high and flexibility score is 1

Or

Fluency score is one and flexibility score is 1

⇒ There is more emphasis on convergent thinking.

**Case 2.** Suppose,

Fluency score is high and flexibility score is high

⇒ Creative thinking takes place.

Fluency and flexibility are the scores of the individual. They do not change with respect to group. But originality score is ‘relative’. It is judged with reference to others. Originality score has a meaning in the context of a group.

4. **Elaboration**

- The number of details supplied beyond those necessary to communicate a basic idea, a figure or an object.

- Looking into the implications of ideas (extrapolation of ideas)

5. **Sensitivity to problem**

- Ability to notice, sense defects, subtle anomalies, gaps, contradictions, paradoxes.
• Seeing defects, need deficiencies, seeing the odd, the unusual.

• Establishing the relationship among the parts of the problem.

• Anticipating the future outcome, if the problem continues.

6. **Redefinition**

• Ability to improvise operations in situations where a familiar object may be used for unfamiliar functions.

• Ability to give up old interpretation of familiar objects.

• Different from the usual, established or intended way.

• It may be either figural or symbolic or semantic.

7. **Openness** : Following are the traits of an open-minded person.

• Accessible to new ideas unprejudiced.

• Having number of interests in various fields.

• Democratic in nature.

• Values all emotions.

• Open to re-examining values.

8. **Resourcefulness**

• Resourcefulness is more of how.

• To be resourceful is the ability to overcome difficulties by using unique and clear strategies.

The relationship between the factors of creativity in teaching as perceived by the researcher is given in the figure 11.
FIGURE 11: Relationship among factors of creativity in teaching

It shows that ‘openness’ is the fundamental or basic factor of creativity in teaching. Openness and exposure are interdependent factors. Increase in one increases the another. Exposure to various experiences helps a person to be open-minded whereas an open minded person is always eager to have new experiences. So these two factors are mutually related.

In the left side of openness are the product factors of creativity in teaching i.e. fluency, flexibility, elaboration, and they ultimately contribute to originality. On the right side of openness are the process factors and they also ultimately contribute to originality.

Fluency increases because of large amount of experiences. When the number of fluency is large, there is high possibility to classify them in various
groups. This ultimately increases the probability of occurrence of originality. Due to openness only, one can become sensitive to the problems. This leads further either to redefine the problem or to find out the weakness in variable relationship and work accordingly. The unique solution to the problem also contributes to the ‘originality’. The process of creative thinking has no end in originality. It perpetuates.

The innovation, new contribution provides energy to the individual to be more and more open and curious, providing a further momentum to the process. Hence it is a cyclic-spiral process, widening the sphere of experiences.

Conceptual summing up of this section is given in figure 12 on next page.
PAGE MAKER CHART LANDSCAPE (28.3)
SECTION – II
Review of Related Literature

2.19 : Introduction

Discussion on conceptual aspects of creativity is a major part of Section I. Section II is devoted to the review of researches carried out on various aspects of creativity. For this review, the researcher could gather total 127 studies in all. While collecting the previous studies she faced some limitations. Throughout the study, she could refer the journals and books from libraries of following institutions only.

1. Indian Institute of Education, Pune.
2. Department of Education, University of Pune
3. S. N. D. T. University, Pune.
4. Pradnya Manas Sanshodhika, Jnanaprabodhini, Pune
5. SCERT, Pune and

The researcher had received some 25 researches taken place out of India through Internet service. The researcher is staying in a Taluka place in Maharashtra. Power crisis and time to time failure in connectivity, had put some limitations on her web-search which is resulted into a small number.

So the researcher is quite aware that the uniqueness of the present study is in the realm of reviewed researches only. An overall picture of areas of researches in creativity and various sources of previous researches is given in Table 5 on next page.
2.20(a) : Areas of researches related to creativity:

The following figure shows the major areas of researches in creativity and a place of present research topic in that. It also gives its relation to the field of teacher education.

![Diagram showing major areas of research in creativity and the present topic](image)

**FIGURE 13** : Major areas of research in creativity and the present topic
2.20 (b) : Organisation of related literature

The researcher has arranged the related literature in each area mentioned above in the sequence given in flow chart 2:

FLOW CHART 2 : Organisation of researches related to creativity

2.21 : Area A – Nature of Creativity :

This seems to be a less attractive area in case of creativity research in India. As it is mentioned in the trend report of 4th survey by Raina (1991) that very few researches have been carried out so far in this category in India. From all the 5 surveys of Researches in Education, the researcher could get only two abstracts of studies related to this area.

Gupta (1984) had tried to find that whether the dimensions of fluency, flexibility, originality, elaboration, problem inquisitiveness and persistency are fundamental dimensions of creativity or not. He had also tried to find out
whether the above mentioned dimensions ran common through or not by the tests in which they were utilized as measuring scales.

The tests used were Torrance Test of Creative Thinking (TTCT) and tests of Wallach and Kogan, Baquer Mehdi, Passi B. K. and Char K. R. which measure creativity. These tests were administered on two hundred first-year graduate class students from ten affiliated colleges of Avadh University.

He found that there was a general factor of creativity as in intelligence. He also found that the tests were separate identities almost as whole and their dimensions (fluency, flexibility etc.) had a different and separate factorial nature depending upon their nature and product. Through the factor loading, he found out five factors. He named them as ‘diversifying responses to figural stimuli, situational involvement, ideational fluency, capacity for production of associative content, capacity for highly original innovation.’

Sharma, P. (1991) had attempted to study the nature of creativity in philosophical psychological and social domains in order to explore the intrinsic nature of creativity with respect to certain issues of prime importance of education.

He had drawn his conclusions based on the study of review of literature available to him.

According to him, philosophical approaches render an explanation for casual aspects of creativity and explore the metaphysical and cosmological nature of the process of creation.
He further concluded that the psychological theories are having major concern with measures of creative potential, where as social theories are concerned with an account of creative achievement.

While stating a ‘rare possibility of rational kind of expression of creativity, he added creativity is merely a possibility under a certain set of constraints and not a necessity. According to him, the goals for the process of education are well defined, where as creative process is free and diffuses the person along with it as it proceeds. While pointing out the difference between education and creativity he inferred that education is a rational and intelligent process where as creative process need not be rational and may even possess elements of serendipity in it.

In a journal of National Academy of Psychology, through an article, ‘Implicit Creativity Theories in India’, Panda, M. and Yadav, R. (2005) have pointed out that perception of a creative personality is a culture and gender specific also. They had conducted a study to understand the nature of creativity in the Indian context. Students (N = 290, Graduate & P. G. students from Allahabad University) were asked to list behaviours that describe an ideal creative person.

On the basis of these descriptions, a check list of creative behaviours was prepared and the same was rated by a sample of 205 students. Factor analysis, of these ratings yielded four interpretable factors, tentatively labeled as ‘sociability and social responsibility’, ‘leadership’, unconventional personality orientation and task persistence. This clearly showed that emphasis was on relational, social and interpersonal aspects rather than
cognitive, analytical and utilitarian aspects of creativity. The result also indicated gender differences. The findings suggest certain degree of cultural continuity in implicit creativity theories in the Indian context.

**Criticism**

The review for area A points out mainly that:

- Perception of personality characteristics of creative individual are culture specific.
- Openness comes out as a major characteristic of creative personality.
- Creativity may have a general factor like intelligence.
- Creativity has some element of serendipity and hence can not be associated with education.
- From the responses for personality characteristics, there is a place to doubt that students may not be able to differentiate between ideal creative person and ideal person.

Further the sample taken was only from Allahabad (U.P.). India being a multicultural society, it would not be appropriate to generalize from this data only.

- Sharma (1991) concluded that the process of creativity and education are totally different. He indirectly indicates that creativity and education can not be associated therefore.

But to keep aside creativity from education is nothing but to go away from the chief goal of education (to draw out what is within). If there is no creativity will the education be relevant?
2.22 : Area B – Correlates of Creativity


**TABLE 6**

Classification of doctoral researches on creativity in major fields

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Major fields</th>
<th>No. of studies</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Theoretical / philosophical aspects of creativity</td>
<td>1</td>
<td>0.73</td>
</tr>
<tr>
<td>2.</td>
<td>Identification and measurement of creativity</td>
<td>15</td>
<td>11.02</td>
</tr>
<tr>
<td>3.</td>
<td>Intelligence, achievement and creativity</td>
<td>13</td>
<td>9.55</td>
</tr>
<tr>
<td>4.</td>
<td>Personality correlates of creativity</td>
<td>68</td>
<td>50.00</td>
</tr>
<tr>
<td>5.</td>
<td>Socio-cultural factors and creativity</td>
<td>23</td>
<td>16.91</td>
</tr>
<tr>
<td>6.</td>
<td>Nurturance of creativity</td>
<td>16</td>
<td>11.76</td>
</tr>
</tbody>
</table>

If the cells of 3, 4 and 5 are cominelly treated as ‘correlates of creativity’, then it shows that they occupy 76.56% part of total researches in creativity. (Same thing is reflected in the tables, where majority portion is occupied by correlates of creativity.)
Table 7 can be treated as an overview of review of correlates of creativity in case of school students and student teachers.

**TABLE 7**

Overview of researches related to correlates of creativity in case of school students and student teachers

<table>
<thead>
<tr>
<th>Correlates of creativity in</th>
<th>No. of reviewed studies</th>
<th>Duration</th>
<th>Standard</th>
<th>Sample range</th>
<th>Tests used</th>
</tr>
</thead>
<tbody>
<tr>
<td>school students</td>
<td>43</td>
<td>1968-2002</td>
<td>from Std. VIII&lt;sup&gt;th&lt;/sup&gt; to Std. XII</td>
<td>150-1300</td>
<td>Bager Mehdi’s test for creative thinking (verbal) – 7</td>
</tr>
</tbody>
</table>

- Bager Mehdi’s test for creative thinking Non-verbal – 3
- Torrance test of creative thinking (verbal) – 5
- Torrance test of creative thinking Non-verbal – 2
- Torrance test of creative thinking (verbal) – Hindi version – 1
- Torrance test of creative thinking (verbal) – Telgu – 1
- Passi test of creativity – 2
- Wallach & Kogan battery of creativity Oriya version – 4
- Scientific creativity test by Kalra – 1
- Acharyulu’s Think creatively test – 1
- Creativity test by Chauhan & Tiwari – 2
- Creative expression test
| by Janakray Dave – 1 | Battery of creativity tests by Venkata Rami Reddy – 1 |
| Tests for mental ability and intelligence | 1. Raven’s std. progressive matrices – 8  
2. Kulhman Anderson intelligence test – 1  
3. Jalota’s general mental ability test – 5  
4. Bihar test of general intelligence - 1 |
| Tests for SES | 1. Tondon Group test of general mental ability – 2 |
| SES inventory by Patel – 1  
Nair’s SES scale – 1  
SES scale by Jalota – 3  
SES scale by Rao – 1  
Kuppu Swamy’s SES scale – 2  
SES by Patel & Vora – 2  
SES by Venkat Rami Reddy – 2 |
| Tests of Personality factors | Socio-economic status scale by Jalota – 1 |
| Related to personality factors | 1. Extroversion – introversion scale by Neymann-Kohlsted – 1  
2. Jalota’s general mental ability test – 4  
Hindi version – 1  
3. Eysenck’s Maudsley personality inventory – 3  
4. Sarason’s test anxiety scale for children – 1  
5. McClelland’s test of achievement motivation – 1  
6. Non-violent attitude scale – 1  
7. Reaction to authority scale by M. V. Reddy (Hindi) – 1  
8. Rotter’s locus of control scale – 1  
9. Locus of control scale by Pal – 1  
10. Self concept questionnaire by Saraswat - 1  
11. Edwards personal preferences schedule - 1 |
| Related to teaching aptitude | 1. General teaching competency scale by Passi & Lalita – 1  
2. Secondary teacher aptitude test by M. M. Shah – 1  
3. Minnesota teacher attitude inventory – 1  
4. Introversion, extraversion inventory by Kundu – 1  
5. Teaching aptitude test by Prakash & Srivastava – 1  
6. Teacher effectiveness scale by Pramod Kumar & D. N. Mutha – 1 |
The above table shows that correlational studies between creativity and various social, personality factors, achievement and intelligence have been done so far.

The tests used for measuring these variables were standardized most of the time. It is seen that very few researchers have attempted to prepare a test of creativity on their own. When the researcher went through all these studies, she came to know that variables that are correlated with creativity can be classified into 4 groups – they are social factors, personality factors, academic factors and factors related to student teachers.
The various variables that come under these factors are as shown in figure 14.

FIGURE 14 : Correlates of Creativity

2.22(a) : Creativity and Social factors

When the researcher studied the relationship between social factors and creativity it is found that there is no consistency in the results. Following tables will explain it.
Creativity correlates: Social factors:

**Gender** - The relationship between creativity and gender in case of school students and student teachers both is given in table 8.

**TABLE 8**

Creativity and gender

<table>
<thead>
<tr>
<th>Boys more creative than girls</th>
<th>Girls more creative than boys</th>
<th>No difference in creativity on the basis of sex</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ganeja (1972)*</td>
<td>Hussain (1974)*</td>
<td>Vora (1975)*</td>
</tr>
<tr>
<td>Chandrakant (1987)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trimmerthy (1987)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bhogayata (1986)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sumangala (1990)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Andal K. (1996)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kumar, N. (1990)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


**SES** - Socio-economic Status in case of school students and student teachers both. The relationship between creativity and SES is given in table 9.
TABLE 9

Creativity and SES

<table>
<thead>
<tr>
<th>SES positively correlated with creativity</th>
<th>SES negatively correlated with creativity</th>
<th>No relation between SES and creativity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pandit &amp; Katiyar (1976)*</td>
<td>--</td>
<td>Badrinath and Satyanarayan (1979)*</td>
</tr>
<tr>
<td>Awasthy (1979)*</td>
<td></td>
<td>Seetharam Vedanayagam (1979)*</td>
</tr>
<tr>
<td>Jarilal (1979)*</td>
<td>Trimurthy (1987)</td>
<td></td>
</tr>
</tbody>
</table>


Bhargava, S. (1992) found that the socio-cultural deprivation plays a significant role in creativity in case of adolescents.

Locale / Locality : The relationship between locale and creativity from various researches is given in table 10.

TABLE 10

Creativity and Locale

<table>
<thead>
<tr>
<th>Rural students more creative than urban</th>
<th>Urban students more creative than rural</th>
<th>No difference on the basis of rural and urban</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sharma (1972)*</td>
<td>Shrivastav (1978)*</td>
<td>Joshi (1982)*</td>
</tr>
</tbody>
</table>

Caste: Table 11 gives research findings about effect of caste on creativity.

TABLE 11

Creativity and Caste

<table>
<thead>
<tr>
<th>No caste effect on creativity</th>
<th>Caste affects creativity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gautam, R. (1990)</td>
<td>high caste students were superior to scheduled tribes in case of creativity.</td>
</tr>
<tr>
<td></td>
<td>James, A. (2001)</td>
</tr>
<tr>
<td></td>
<td>SC students found low on creative thinking in comparison with forward caste students.</td>
</tr>
</tbody>
</table>

Religion: Table 12 gives the relationship between religion and its effect on creativity.

TABLE 12: Creativity and Religion

<table>
<thead>
<tr>
<th>No religion effect on creativity</th>
<th>Religion affects creativity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Singh, R. (1977)</td>
<td>Muslims more creative than Hindus</td>
</tr>
</tbody>
</table>

Birth order: Table 13 gives relationship between creativity and birth order.

TABLE 13: Creativity and birth order

<table>
<thead>
<tr>
<th>First born more creative than later born</th>
<th>No effect of birth order on creativity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jarilal (1979)</td>
<td>Badrinath &amp; Satyanarayan (1979)</td>
</tr>
</tbody>
</table>

2.22(b) : Area B : Correlates of Creativity (Study abroad)

**Gender** : Table 14 gives findings of researches relating to creativity and gender.

**TABLE 14**

Creativity and Gender (abroad study)

<table>
<thead>
<tr>
<th>Female more creative than male</th>
<th>Male more creative female</th>
<th>No difference in creativity on the basis of gender</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yammamoto (1960)</td>
<td>Klausmier (1965)</td>
<td>Olshin (1964)</td>
</tr>
<tr>
<td>Getzel &amp; Jackson (1962)</td>
<td>Kelly (1965)</td>
<td>Pogue (1964)</td>
</tr>
<tr>
<td>Newfeld (1964)</td>
<td>Strauss and Strauss (1968)</td>
<td>Simscins and Eisenman (1968)</td>
</tr>
<tr>
<td>Ogletree (1968)</td>
<td></td>
<td>Kalt Sounis (1971)</td>
</tr>
<tr>
<td>Soloman (1968)</td>
<td></td>
<td>Philips and Torrance (1971)</td>
</tr>
<tr>
<td>Cacha (1971)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* referred from Reddy (2003). Creativity in college students. PP. 8-9

**SES and creativity (Study abroad)**

Table 15 gives research findings about creativity and SES.

**TABLE 15**

Creativity and SES (Study abroad)

<table>
<thead>
<tr>
<th>High SES, high creativity</th>
<th>(SES negatively correlated with creativity) low SES high creativity</th>
<th>No relation between SES and creativity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Muttel (1971)*</td>
<td>Torrance (1978, 79)*</td>
<td>Dent (1971)*</td>
</tr>
<tr>
<td>Mc Daniel (1974)*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cantey (1974)*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* referred from Reddy (2003). Creativity in college students. PP. 24
Birth order and creativity (study abroad)

Table 16 gives relationship between birth order and creativity.

**TABLE 16**

<table>
<thead>
<tr>
<th>Birth order and creativity (study abroad)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st born more creative</td>
</tr>
<tr>
<td>Eiduson (1962)*</td>
</tr>
<tr>
<td>Comeau (1980)*</td>
</tr>
</tbody>
</table>

* referred from Reddy (2003). Creativity in college students. P. 30

- Jenkins, Jeanne E. (1987) had investigated the relationship of creativity to single parent family structure. Total 116 third, fourth and fifth graders from seven rural public schools in central New York state was the sample. Half of them were from single parent family and half were intact families.

  Tests of group inventory for finding creative talent, family environment scale were applied. The findings did not support the hypothesis. However, children having single parent scored significantly higher on the variables originality, achievement orientation and intellectual-cultural orientation.

- Relationship among adolescent creativity, cognitive development, intelligence and age was studied by Edmunds, Alan J. (1990)

  The study of 218 adolescents found no significant differences in creativity subvariates between the developmental stages of concrete and formal operations.
Significant relationships were found between age and creativity. Figural flexibility, originality and elaboration decreased as age increased from 13 to 16 years.

It is evident from above tables and research abstracts that there are contradictory findings in case of each and every variable which comes under 'social factors' in case of Indian as well as abroad studies. The variation in findings may be because of diversity in Indian society i.e. the findings depend on the from where the sample is. i.e. when the sample is from Kerala, it is appropriate to find that female are more creative than male and the like. So these findings have the meaning in their context only. This has tended the researcher to think about a fundamental variable which is related to each and every social variable. Basically creativity is a function of number of variety experiences. In Indian society, opportunities for enrichment through varied experiences depend upon socio-economic status, family background, rural\urban upbringing, sex etc. i.e. on various social variables.

In other words, chance for enrichment through various experiences i.e. exposure is a core part of each and every social variable which has a relation to creativity.

Thus, the review of this part of area B have prompted the researcher to find the relationship between creativity in teaching and yet non tested variable i.e. exposure. (Operational definition of exposure on P.29)
2.23: Creativity and Personality Factors

Personality factors that were related to creativity are intelligence, autonomy, dominance, endurance, anxiety, ego strength, self concept, emotional stability and so on.

Creativity and intelligence: Number of researches had been done to investigate the relationship between creativity and intelligence. Whether intelligence increases with creativity? Whether they are negatively correlated? Is it necessary to have minimum intelligence to be creative? Are some questions yet to be answered satisfactorily.

The threshold theory regarding creativity and intelligence - An empirical test with gifted and non-gifted children was studied by Runco, Mark A, Albert Rober (1986). According to the findings, results of divergent thinking tests (administered to 228 intermediate school students, of whom about 43% were gifted) and calculated correlations between creativity and intelligence measures did not support the threshold theory which posits that creativity and intelligence are related only up to an intelligence quotient about 120.

Marjori Banks, Kevin (1976) had examined the relationship between academic achievement, creativity and intelligence by a regression surface analysis. Findings indicate that for certain academic subjects creativity is related to achievement up to a threshold level of intelligence, but after the threshold has been reached creativity is not associated with further increments in achievements.

It seems that the correlation between creativity and intelligence is a disputed issue. The researcher is not intended to go deeper into it.
If the other personality factors are considered, Chauhan (1979), Kumar (1981), Srivastava (1978), Gulati (1979), Verma (1980) found that highly creative persons are introverts whereas Bhargava (1979) and Kumar (1981) concluded that highly creatives are extroverts.

Raina (1968), Verma (1973), Vasesi (1985) inferred that 'Autonomy' is highly correlated with creativity.

Verma (1973) and Jha (1975) have pointed out that 'openness of mind' is a characteristic of highly creative persons.


Anxiety Kumar (1981) and self-control Verma (1979) are found positively correlated with creativity. Bhargava (1979) found that, creativity was negatively and significantly related to anxiety, extroversion, and was positively and significantly related to independence.
Kaur (1980) found that creativity was positively and significantly related with positive self concept. Bhoodev Singh (1980, 86) found that biographical and personality factors affect the development of creativity.

Geeta Chaubey (1989) observed that creativity is positively correlated with self confidence, withdrawing tendencies and emotional stability.

- The relationship between emotional maturity intelligence and creativity in gifted children was found out by Landau, E. and Weissler, K. (1998).

This study examined the relationship among emotional maturity, intelligence and creativity in 221 gifted children at a special school in Israel. Emotional maturity was defined as strength and courage to actualize individual abilities within the frame of social demands. Highly intelligent and emotionally mature children were more creative than less emotionally gifted children.

**Personality factors related to student teachers and teachers**

- Asha and Patel (1985) found that teachers with high scores on creativity, intelligence and emotional maturity were more effective in teaching.

- Chaudhari, S. (1989) ascertained that highly creative teachers talk more at convergent, divergent and evaluative levels. He also found that pupil's response in class is more and a creative teacher was found to give more emphasis on reflective questions rather than questions on factual level.

- Sumangala, N. (1990) inferred that teacher involvement was positively and significantly related to language creativity.

- Singh, D. (1991) found that teaching effectiveness was positively correlated with creativity.
• Jain (1992), Londhe (2003) found that there is a positive correlation between creativity and classroom creativity, teaching aptitude and teaching skills.

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Author: de soura, Fernando Jose Vieira Cardoso

Title: Creativity and effectiveness in teaching. Perceptions of students and lecturers of the Lisbon Polytechnic Institute (IPL).

Pub date: 1999-10-00

Pb. type: Disserations/Theses. Doctoral Dissertations.

Abstract: This thesis presents research that compares the ways students and lecturers of the Lisbon Polytechnic Institute (IPL) perceive and value effectiveness and creativity in teaching. Creativity can be defined in several ways, in this context, it is related to the effectiveness of a teacher. The document discusses results in the light of IPL’s goals of production, acquisition, maintenance, and transfer of knowledge. In teaching, creativity and effective teaching are similar concepts. The research involved a survey questionnaire of 852 students and 245 lecturers to examine variations of lecturers and students' perceptions of various aspects of creativity and effectiveness in teaching. Research results indicate that the importance of creativity and of creative teaching, may vary depending on the role of observer.
Seen as self perception by teachers, creativity appeared directed towards task improvement or effectiveness, while keeping the student as the main reference and acquiring the designation of creative teaching as a hetero-attribute, when succeeding in establishing a relationship with the students.

To verify whether lecturers and students perceived creativity and effectiveness in teaching in different ways, a survey questionnaire drawn out of Kelly’s personal construct theory and the grid method was administered in each one of 7 schools of IPL. A sample of 852 students and 245 lecturers representing 8,068 students and 912 lecturers used, together with 26 interviews and 18 class observations out of a possible 62, of teachers who had been designated as examples of creative teaching.

Stoycheva, Katya (1996) had made in all four studies investigating personality traits of gifted secondary students, perception of Bulgarian teachers about ‘ideal’ pupil, teacher’s free descriptions of children’s behaviour, teacher’s evaluation of students creativity.

**Study 1**: It investigated the personality traits of gifted secondary students with outstanding achievements in academic fields, high levels of performance in creative activities and acknowledged success in arts. Findings indicated that gifted students have self perceptions, values and motivations that differ from other students and that may cause problems in their search for peer acceptance.

**Study 2**: Examined how Bulgarian teachers perceive and describe the ‘ideal’ pupil. Findings indicated that teachers tended to devalue
independence in judgement and being emotional, two traits after associated with high creative potential.

**Study 3**: Examined teacher's free descriptions of children's behaviour in order to determine the characteristics they find most relevant for work in school; findings showed that creativity related traits ranked very low.

**Study 4**: Compares teachers evaluations of students creativity to student scores on creativity measures, disparities were found. Findings of the studies were used to create an instrument for teacher's evaluation of children's creative behaviour in primary school. Using this instrument, 100 pupil (50 boys and 50 girls) from 2nd and 3rd grade were evaluated by their teachers (n=4). Teacher's perception of creativity was centered around its intellectual aspects and problem solving processes.

Boys were significantly nominated more often than girls as being creative.

Investigators found primary teachers reluctant to nominate whatever child as non original. Both under and over estimation of creativity hinder teacher's evaluative behaviour and attitudes.

Through the study of researches in correlates of creativity in case of student teachers or teachers, the researcher realized the intimate association between creativity and teaching skills, creativity and teacher-qualities. So this has become helpful for her while preparing a programme of 'enhancement of creativity in teaching'.
In case of emotional aspects, the results of previous studies do not provide a definite direction. The contradiction in findings has created an ambiguity. This ambiguity has prompted the researcher to find out the relationship between creativity and such a variable which includes the variables such as emotional stability, self concept, focus of control etc. 'Emotional intelligence' is that variable whose domains are -

1. Self awareness  
2. Managing emotions  
3. Motivating oneself  
4. Recognizing emotions in others; and  
5. Handling relationships.

Previous studies reveal that though a single constituent of emotional intelligence is correlated with creativity, there was not an attempt to correlate creativity with emotional intelligence.

To fill the gap, the researcher was interested to undertake this task. Taking into consideration the practical difficulties, it was decided that instead of collecting the data of EQ from all the B. Ed. colleges during the survey, it should be confined to experimental group and both the control groups.

**2.24 : Academic Factors**

Table 17 gives the relationship between creativity and scholastic achievement.

**TABLE 17**

<table>
<thead>
<tr>
<th>High creativity, high scholastic achievement</th>
<th>Low creativity high scholastic achievement</th>
<th>No relation between creativity and scholastic achievement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Torrance (1966)</td>
<td>Liddicoast (1972)*</td>
<td>Getzel and Jackson (1962)*</td>
</tr>
<tr>
<td>Nattalf (1971)*</td>
<td></td>
<td>Edwards and Tyler (1964)</td>
</tr>
<tr>
<td>Dent (1971)</td>
<td></td>
<td>Cicirelli (1965)*</td>
</tr>
<tr>
<td>Feldhuson et al (1972)*</td>
<td></td>
<td>Molloy (1971)</td>
</tr>
<tr>
<td>Friery (1975)</td>
<td></td>
<td>Kanderian (1971)*</td>
</tr>
<tr>
<td>Theresa (1975)*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mccarthy (1978)*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Adapted from Reddy (2003). Creativity in college students PP. 34-35

It can be said that creativity in abroad study, there are some researches whose findings show that creativity has no relation with scholastic achievement. This may have the relation with aims and objectives of formal education system.

- **Subjectwise relationship with creativity** :
  - Ranjana Pandit and Katiyar (1976) observed that science students were significantly better than arts students in fluency, flexibility and originality.
  - Jayaswal (1977) found that male teacher trainees in science were significantly higher in creative ability than trainees in arts.
  - Rawat and Garg (1977) found no significant difference between the verbal creativity scores of arts and science students.
  - Awasthy (1979) reported that science students were significantly higher than arts students in fluency and flexibility areas of creativity.
Sansanwal and Jarilal (1979) observed that arts and commerce students did not differ significantly on any of the components of creativity.

Kundu, D. (1984) found that science students were more creative than arts students.

2.25 : Area C - Measurement of Creativity

- Total no. of reviewed studies : = 14
- Sample range : 300 to 2000.
- The tests prepared for measurement of creativity are :
  1. Creativity testing at primary and middle school age - Bager Mehdi (1970)
  2. Creativity test (verbal and non-verbal form) - Passi (1972)
  4. Creativity test for children at school leaving age - Ramchandrachar (1975)
  5. A test for literary creativity in Marathi - Kundley (1977)
  6. A creativity test for high school students of South Gujarat - Gilitwala (1978)
  8. Verbal creativity in Marathi language - Joshi (1981)
  9. Creativity in Mathematics - Parasnis (1985)
  11. A test of creativity (verbal and non-verbal, for students of grades VIII and
Out of 13, seven tests of creativity are subject specific whereas others are generic.

General (not subject specific) creativity tests measure mainly four factors:
1. consequences
2. unusual uses
3. similarity findings
4. product improvement

TTCT (Torrance Test of Creative Thinking) also measures the above mentioned factors. The factors show that everyone had adopted Guilford's structure of intellectual model.

If subject specific tests are considered, same model is accepted but the test variables are different than the general tests consist of. For example in case of literary creativity, poetry writing, story writing, imagery formation, completion, story completion, emotional writing, dialogue writing, sentence and verbal fluency are the test variables.

Whereas in case of creativity in Mathematics, visualization, reorganisation, judgement, number fluency and divergent production are the variables that are tested.

- Miyan, Mahammad (1991) had reviewed the existing tests of creativity developed by Indians.
His findings were:

1. Almost all Indian creativity tests have been patterned on the lines of Guilford's structure of Intellect model.
2. Torrance tests of creativity follow the cognitive approach to assess creativity.
3. The various dimensions scored by almost all tests included fluency, flexibility, originality and elaboration.
4. The items in almost all the tests represent a heavy intake from foreign tests.

He further pointed out that 'Though the items are adapted to Indian situations, the rationale for their inclusion can not be justified.

Whereas Raina, M. K. in a trend report called 'Research in creative functioning' has said that 'In case of certain tests, Indian workers have included in their tests, items based on the tests of Torrance and Guilford and that of Wallach and Kogan. This seems to be quite inappropriate as the three tests are based on different theoretical assumptions. There need be no hesitation in asserting that some of these creativity tests can easily be characterised as tests of achievement.

On the background of above discussion, the researcher wants to point out, that in case of general creativity test, the test items are based on general or day today experiences. Whereas in case of subject specific creativity, the test items are in the context of a particular school subject. To answer these items, some previous knowledge becomes an essential part.
In other words, lack of or presence of previous knowledge may affect the validity of test.

Further nobody had tried to establish any relationship or hierarchy between the factors of creativity. It is evident that all these factors are not isolated, but interrelated. Then the process of formation of a particular test item with a specific factor need to be highlighted.

The researcher has mentioned in an operational definition that creativity in teaching is comprised of fluency, flexibility, originality, elaboration openness, sensitivity to problem, redefinition and resourcefulness.

According to the researcher, thinking for teaching happens either traditionally or creatively.

Creative thinking results into fluency, flexibility, originality and elaboration which can be treated as products. Usually these were measured by the test. But the process aspects of creative thinking i.e. sensitivity to the problem, redefinition and resourcefulness were not found measured through any test. To initiate Creative thinking, 'openness' is a fundamental personality characteristic. Hence the researcher had decided to measure all these 8 factors through various roles of a teacher. If a teacher while performing his roles can think creatively, it is sure that while teaching a particular subject he will think creatively. Here assumption is roles reflect the habits, thoughts and attitudes of a teacher as a person.
Through an extensive web search it was realised that there was not a test of 'creativity in teaching' as such. So the researcher had decided to construct a test of 'creativity in teaching'.

2.26(a) : Area D - Development of creativity

- Total no. of studies available : 25
- Duration : 1977 (1) and rest are between 1984-2004
- Method used : experimental
- Sample range : 12 to 575
- Samples from Std IV to std. X : 27
- D. Ed. students : 1

Information about researches in Development of creativity in various subjects is in the table 18.

**TABLE 18**

<table>
<thead>
<tr>
<th>Sr.No.</th>
<th>Subject</th>
<th>Researcher/ers</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.</td>
<td>English</td>
<td>Ludbe (2002)</td>
</tr>
</tbody>
</table>
- Programmes prepared by the researchers of their own = 21
- Programmes prepared by some other and used by the researcher = 04
- Accepting the assumption that 'creativity is trainable', number of experiments have been done and found effective.

Information indicates the trend of these experimental studies. Majority of the studies are of fostering of creativity in general whereas there are few attempts to develop creativity in scholastic subjects.

The attempts of development of creativity were mainly focused on school students. Development of creativity in case of student teachers is a rare one. (in case of D. Ed. students)

2.26(b) : Development of Creativity - Study abroad

- Meyer (1970) attempted to encourage mathematical creativity in first grades by using of fifteen 20 minute lesson, each consisting of open ended geometry problems (triangles) with moderate among structures. No
significant difference was found between the experimental and control groups children.

- Macaranas, Natividad (1982) had used an innovative teaching method used in a theories of personality class at Eastern New Mexico University is described.

The objectives of this method were to foster growth in creativity among students by involving them in creative activities or experiential sessions and to test for improvement in student activity scores. Creative thinking and problem solving method consists of following techniques:
Activities, creative diagrams, presentation of theories, films and one page reactions, outlines and alternative constructs presentations of creative productions and developing and presenting the student's own theories of personality. It was a pretest–post test control group design.

On TTCT (Torrance Test of Creative Thinking) it was found that a change in originality occurred for the students, but flexibility and fluency measures did not change.

Objectives of fostering and experiencing creativity were met.

By getting acquainted with ‘creativity development programme' prepared by investigators, the researcher found that programme mainly consisted of brain storming, problem-solving, transformation techniques.

Almost all programmes were based on Guilford's model of intellect. These programmes had attempted to improve the product aspects i.e. fluency, flexibility, originality and elaboration.
The programmes are of ‘Give as many as’, ‘Suggest as many as responses to ----’ type. Conditioning was found in some programme contents also.

2.26(c) : Development of creativity in teachers and prospective teachers

- Baur (1970) has compared conventional classes in Mathematics for teachers with more open-ended creativity oriented classes. He reported that the performance of prospective teachers on mathematical creativity test can be improved by an appropriate training programme.

- Gibb (1970) developed modules such as application of deferred judgement, recognising the real problems and developing the solutions for teaching creative problem solving to potential mathematics teachers. Prospective teachers were given practice in brainstorming, problem redefining, generating and evaluating solutions and overcoming mental sets. The result indicates some success in teaching creative problem solving by this approach.

- In an experiment Main Ville (1972) compared two groups of prospective elementary teachers in terms of their scores on a test of mathematical creativity. Group first received lecture- text book presentation in a preservice mathematics courses, whereas with group second mathematics activity materials were also used. The mean gains of two groups were not significantly different, although both the groups increased from pre-test to post-test scores on the criterion.
• Shigaki, Irene, S. (1970) had found out the effects of teacher strength and sensitivity and pupil intelligence and creativity on production of divergent responses. The research investigated the effects of teacher attributes of strength and sensitivity on pupils attributes of intelligence and creativity.

32 pupils from 4th, 5th and 6th grade private schools were divided into high IQ- high creative, average IQ- high creative, high IQ-low creative and average IQ-low creative.

16 student teachers were also divided into four categories strong-sensitive, weak-sensitive, strong insensitive, weak-insensitive. All the pupils were taught by all 4 types of teachers on a rotation basis. A 4 factor analysis of variance was used to evaluate the data.

The results strongly support the impact of pupil attributes of creativity and intelligence on divergent production and the greater salience of creativity is exhibited in the significant trend analysis. The findings suggest that achievement may be too inclusive a term and identification of discrete differences in performance between groups of varying cognitive styles would be of value.

• Rookey, Jerome T., Rechardon, Francis J. (1972) had tried to improve pupil creativity via teacher training. It was a pre-post test control group design. One half of the teachers from a school participated in the programme for a year, while one half did not.

Sample group was composed of all fifth and sixth grade students and their teachers in Harrisburgh school district. The fifth grade contained 39
teachers and 945 pupils where as 6th grade also contained 39 teachers and 887 pupils.

The Pennsylvania Dept. of Education designed nine 90 minute workshop programme in 3 parts as an —

a) Introduction to psychological issues involved in pupil creativity.

b) A review of factors of pupil creativity which are under the teacher’s control.

c) The presentation of practical alternatives which are available to teachers.

Teachers and pupils were tested in the fall of 1970 again in the spring of 1971. The inservice programme was well received by the teachers. All but one teacher involved in the programme, experimented with the ideas and material presented.

- Mack, Richard Wayne (1985) had undertaken an interesting study. The problems was "Are methods of enhancing creativity being taught in teacher education programmes as perceived by teacher educators and student teachers?"

A study tested the general proposition that, although professors of education, courses possesses knowledge concerning the concepts of creativity, little of that knowledge is passed on to undergraduate students. Ten colleges and universities in Washington and Idaho with teacher education programmes were selected for the study. A total of 62 teacher educators and 338 student teachers were polled by questionnaires. Results indicated that both teachers educators and student teachers thought that
enhancing creativity in children was an important topic to include in teacher education programmes. However, both the groups felt that it was not being taught to any great extent in the programme. Although many of the teacher educators rated their own teaching styles as being more divergent than convergent in nature, many of the student teachers indicated that no classes they had taken had been taught in a creative manner.

- Cheng Vivian (2001) had undertaken a preliminary study attempting creativity enhancement of elementary science teachers, in Hongkong Institute of education.

  A programme for developing the creativity of designing hands on science activities with the use of every day resources, was prepared. The programme aimed at fostering the creative attitudes (confidence, interests and values) and the divergent thinking abilities (i.e. fluency, flexibility, originality and elaboration) of teachers. This programme was conducted to about 80 in-service teachers. The results are positive indicating that part of the objectives of the programme is achieved.

- Ming (2003) has discussed the problems and issues of the teaching and learning of creativity in Hong Kong schools.

- The Curriculum development Institute of Hongkong had identified nine generic skills to be acquired by students, placing a premium on creativity and the development of creative thinking skills.

  Hence training of teachers about creativity went on. As a teacher educator Hui was actively involved in this training programme. As an
exploratory study, he had undertaken school visits, classroom observations, informal interviews with teachers, students and focused group discussions.

In this paper he had highlighted the critical problems and issues in implementing a creativity development programme. According to him, the four fundamental problems were disciplinary, theoretical, cultural and managerial. They were discussed in detail. There are knowledge based suggestions, theory driven solutions as well as research, professional and policy implications.

As mentioned in Chapter One, (P.20) Korean Educational Development Institute (2003) had identified 0.28% of the entire, middle and high school student population, including both public and private schools in Korea as gifted and were served by the gifted programme.

A study of finding out 'Korean Science Teacher's understanding of creativity in Gifted Education' was undertaken by Hae-Ae Seo and Kung Hee Kim (2005). The researchers were interested in find out the understanding of creativity of 60 science teachers of the above mentioned gifted students. An open ended questionnaire was employed. The data was analysed based on Urban's (1995) three components of creativity. The findings indicated that these science teachers had a thorough understanding of the cognitive component, showing less awareness of the personal and environmental components of creativity.

- From these studies, the researcher came to know that there is not a particular programme which will increase 'creativity in teaching'. So the researcher had decided to prepare it and to test its effectiveness. To
avoid the conditioned responses, the researcher decided to prefer a constructivist approach while designing a programme.

2.27: Area 'E': Factors related to student teachers/teachers

In this area, a review of some studies in the field of teacher education in order to improve its quality is taken.

- Jain, R. (1977) found that creativity components were positively correlated to teaching proficiency.
- Mathur, S. (1988) concluded that age, sex, teaching experience and academic discipline did not tend to affect the attitude of teachers towards creative learning and creative teaching.
- Martis, A. (1990) had tried to develop a making the strange familiar (MSF) competency through synectics model of teaching in graduate student teachers. She found that –
  1. The training in MSF, comprising theory, discussion, demonstration and practice, significantly developed the verbal fluency and verbal originality of trainees, non-verbal fluency, flexibility and originality, scientific fluency, flexibility and originality among experimental group teacher trainees.
  2. These achievements of the training given to the teacher trainees in MSF were observed in the development of general creativity and scientific creativity in school students taught by the traditional method.
Singh, D. (1991) found that in case of secondary school teachers, creativity and intelligence were jointly considered as predictors of teaching effectiveness.

Sohoni (1992) had investigated experimentally the development of problem solving skills in student teachers of B. Ed. college through a special training programme.

1. She found that programme for development of problem solving skill was effective significantly.

2. There was no difference in mean scores according to the facilities of student teachers.

Rao Ganesware (1995) found that there were significant relations between teacher effectiveness, creativity and interpersonal relationships.


1. Creative teacher is likely to facilitate, nurture, stimulate creativity more among pupils as compared to less creative or non-creative teacher or the attitude favouring facilitate skills will also help the teachers to some extent to be creative.

2. There is no significant difference between male and female science teachers as far as their creativity is concerned.

The above studies revealed that teacher effectiveness, teaching proficiency are some quality factors which are correlated with creativity.

So any attempt of fostering this independent variable i.e. creativity will definitely increase teacher effectiveness and proficiency in a way will improve quality of educational system.
Bhor (2004) had studied the expectations of B. Ed. students from their teacher-educators. He found the expectations as –

1. Teacher educator should stress on the methods apart from lecture method.
2. Teacher educators should adopt some new innovative techniques like brain storming, seminars etc.
3. Teacher educators should give recent information through internet.

Through the above findings and then the expectations from student teachers, the researcher had decided to prepare a programme of development of creativity in teaching and to use the methods and techniques which will help initiate creative thinking in student teachers.

2.28 : An overview of review of related literature :

The review of previous studies indicated that although a number of research studies were conducted on various aspects of creativity in India and abroad, no study regarding ‘creativity in teaching’ for B. Ed. student teachers was conducted.

The researcher is aware that present review is not much exhaustive. But it is helpful to have an idea of general trends of study in the field of creativity and their findings.

From the number of studies reviewed, it is evident that the major thrust is on finding the correlation of creativity with social, personality variables. But nobody had tried to find the relationship between exposure
and creativity and between emotional intelligence and creativity also. This was a research gap.

Further there were many creativity development programmes applied to experimental groups and found out their effectiveness. But majority of these programmes were implemented on school students. The researcher could not find any evidence of a programme of ‘creativity in teaching’ particularly for B. Ed. students. Hence the researcher decided to fill this gap by preparing and conducting a programme of ‘creativity of Teaching’.

In addition to that, the present study is related to one more area of creativity i.e. Testing and measurement in creativity. There are tests measuring creativity either verbal and non-verbal. Tests measuring subject specific creativity are also available. But these tests do not go beyond the 4 (product) factors of creativity i.e. Fluency, flexibility, originality and elaboration. This non-availability of test in ‘creativity in teaching’ had prompted the researcher to prepare a test on ‘creativity in teaching’.

Thus the review had helped the researcher to select broad areas of creativity for her research and to decide the method of investigation accordingly.

**Summary:**

The purpose of review of literature was to get an insight into the methodology, tools, approaches used by other researchers and to study the contribution of the researchers. It has helped the researcher to decide on the procedure and tools that need to be used for the present study.
The review of related literature and researches have helped to
develop the conceptual frame work for the study as well as understanding
the various issues related to the problem. The researcher was able to make
decisions on preparation of creativity in teaching as well as training
programme to improve creativity in teaching.

"The mind of man is more intuitive than logical."

– Vauvenargues

(as cited in Khandwala, 2003, P.57)
References:

Books:


ibid P.15

ibid P.6

ibid P. 60

ibid P.7


ibid P.33


Ibid P. 57


ibid P. 472

ibid P. 473


Ibid PP. 14-15

Ibid PP. 23-26

Ibid PP. 30-33

Ibid P. 24

Ibid P. 30


ibid P. 18

ibid P. 19


ibid P. 43

ibid P. 44

ibid P. 45

ibid P. 46
ibid P. 46
ibid P.47
ibid P.51
ibid 83-89
ibid PP. 143-149.


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Magazines, Journals:


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'creativity in school education' by NCERT, New Delhi, Vol. XXVI. PP. 50-56.


**Research Abstracts :**

Following two abstracts of research are referred from —


Ph. D. Edu. Rajasthan Univ. P. 250

**Next eleven research abstracts are from —**

Baquer Mehdi (1970). *Development of a battery of tests for identifying creative talent at the primary and middle school stages.* Dept. of Psy. AMU. P. 248


**Following eight abstracts are from —**


**Following fourteen abstracts of study are from —**


**Following seventeen abstracts of research are referred from —**


Kumar, G. (1989). *A follow up study of creativity talented college students*. 
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**Unpublished Theses :**

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