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SELF-INSTRUCTIONAL STUDY MATERIAL FOR JGND PSOU

JAGAT GURU NANAK DEV
PUNJAB STATE OPEN UNIVERSITY, PATIALA

(Established by Act No. 19 of 2019 of the Legislature of State of Punjab)

CERTIFICATE COURSE

IN

CREATIVITY AND INNOVATION IN SCHOOL EDUCATION

CISE-2

INNOVATION PEDAGOGICAL STRATEGIES FOR FOSTERING CREATIVITY AMONG SCHOOL STUDENTS AND ITS IMPLEMENTATION

Head Quarter: C/28, The Lower Mall, Patiala-147001

WEBSITE: www.psou.ac.in

CERTIFICATE COURSE IN CREATIVITY AND INNOVATION IN SCHOOL EDUCATION

COURSE: INNOVATIVE PEDAGOGICAL STRATEGIES FOR FOSTERING CREATIVITY AMONG SCHOOL STUDENTS AND ITS IMPLEMENTATION (CISE-2)

UNIT 1: INNOVATIVE PEDAGOGICAL STRATEGIES: CONCEPT, NEED AND EMERGENCE

STRUCTURE

1.1 Learning Outcomes

After studying this unit, the learners will be able to:

- Recall the concept of Innovative Pedagogy
- Understand the concept of Innovative Pedagogical Strategies
- Elaborate characteristics and need of Innovative Pedagogical Strategies
- List the various innovative strategies
- Elaborate emergence of new innovations in pedagogy

1.2 Introduction

Innovation is the core element of any society. Innovations help to grow and improve the quality of any process, product, service, and idea. It has been found that innovations are present in every human society with different forms and degrees. Innovations in the teaching-learning process help to achieve the desired goals and objectives. When we talk about innovations in education and the teaching-learning process, it means utilization of various types of technologies and approaches to make the process relevant, interesting, and useful. The stakeholders of the education system need to remain updated on their skills and abilities in terms of innovative pedagogical strategies and approaches. In this unit, you will learn more about innovative pedagogy, innovative pedagogical strategies, and the emergence of innovations in pedagogy.

1.3. Innovative Pedagogy

Pedagogy is a science of teaching and theory and practice of learning. It refers to various methods, techniques, approaches used to deliver the content of the curriculum to a class. It helps to build connections and relationships between the teacher and student. It is the study and practice of how best a teacher has to teach. Pedagogy, within educational settings, is a combination of content, techniques, strategies, and resources that can be utilized by the teacher to share learning experiences. Pedagogy focuses on the different learning styles of students.

According to Knowles et al. (2005), "Pedagogy assigns to the teacher full responsibility for making all decisions about what will be learned, how it will be learned, when it will be learned, and if it has been learned. It is teacher-directed education, leaving to the learner only the submissive role of following a teacher's instructions."

"The pedagogical theory was developed in the seventh century and it was intended for teaching children. It is based on a set of beliefs which "assigns to the teacher full responsibility for making all decisions about what will be learned, how it will be learned, when it will be learned, and if it has been learned" (Knowles et al., 2005).

Pedagogy answers the questions "how content is presented to the student or learner" Pedagogy requires relevant and meaningful classroom interactions.

Innovative pedagogy:

21st century is called as an era of digital technologies and knowledge. Many significant changes are occurring day by day. The major changes in the field of education are

introduction of artificial intelligence, machine learning, robotics etc. Teaching and pedagogy of 21st century differs from that of 20th century. In order to carry out tasks and to achieve the goals of teaching-learning process in a manageable and effective manner, a teacher needs to use innovative pedagogy. It is a significant contribution in the field of teaching and learning. Innovative pedagogy is a combination of two words: innovative and pedagogy.

Here, **innovative** refers to new or novel ways. Every innovative idea starts from creativity. It also means change and improvement

Pedagogy is the core of teaching and learning. It refers to the scientific study of process of teaching as well as involves methods and approaches. Pedagogies provide base to the teachers regarding the multitude of decisions about how they will teach. Effective pedagogies involve different kinds of techniques and activities. In simple words, it's also refers as an art and science of teaching.

Innovative pedagogy refers to new and creative approaches, techniques and methods applied in the field of teaching and learning. Innovative pedagogy is the need of an hour. It refers to those experiences and methods which makes the teaching learning process effective and helps to acquire the knowledge and skills in more appealing and efficient manner. There are numerous innovative methods to improve the education system. Innovate pedagogy integrates new teaching methods and strategies within the classroom. It also enriches the system of education. Research studies have indicated that when teachers teach the students with innovative pedagogies, then they are able to develop creativity, interests and mind-sets get stimulated.

1.4 Innovative Pedagogical Strategies:

Strategy is a combination of different methods and procedures. In general terms, strategy is an anticipatory plan of action which is designed to achieve a long-term goal. **Strategies** in pedagogy refer to methods/techniques used by the teacher to help students learn the desired course contents. There are various strategies that can help the teacher in the classroom for effective interaction and teaching learning process. There is a shift from a teacher-centered approach to a learner centered approach which demands a desired change in our teaching styles. Gone are the days, when teacher relied upon only traditional methods. 21st century learners are more active and participative and require different innovative strategies to learn and achieve. So, in a classroom where there are diverse learners, teachers must use innovative pedagogical strategies. Major improvements can be brought about in classroom learning through the

implementation of innovative pedagogical strategies. Innovative pedagogical strategies are the outcome of dissatisfaction of the previous system which requires improvements.

1.4.1 Meaning of Innovative pedagogical strategies

An innovation in pedagogy is due to the changing scenario from knowledge based and rote learning to more skill based learning. Students always look for some new and interesting learning approaches. So innovative pedagogical strategies help to make learning motivating, relevant and interesting. Innovative or modern pedagogical strategies are those new ways of teaching which helps the teachers and facilitators to achieve goals as well as instructional objectives. These strategies involve different way of viewing at the existing practices. These are the carefully designed intended plan or set of plans to provide conducive learning environment to the students or learners. These also refer to abstract teaching methods and instructional designs. These are based on learning theories. To manage all tasks and activities in the classroom, teacher needs to put into practice various innovative pedagogical strategies in the teaching learning process. These require proper planning and implementation otherwise it may lead to haphazardness in the instructional process. These strategies create engaging and effective learning experiences. Researches showed that innovative pedagogical strategies provide many benefits in the educational processes and help to improve functioning of existing practice. It also refers to both online and offline strategies. The educator, before they begin their instructional process need to acquire sufficient knowledge and information in terms of these innovative pedagogical strategies and processes. These strategies take time, energy and work. Those teachers, who are passionate about teaching, usually use innovative strategies. If there is no innovation, the teaching learning process becomes monotonous and useless.

Mynbayeva AK, Sadvakasova ZM (2007) has proposed " One more typology of innovations in learning (technologies, methods, and techniques): (i) an absolute innovation (absolutely new technology), (ii) a modernized innovation (significantly improved technology), (iii) a modified innovation (slightly improved technology), (iv) an innovation, technology introduced to a new territory (e.g., trainings for the RK, credit technology of training for Kazakhstan, (v) an innovative technology of a new field of application."

According to I. Derizhan (2012), "All innovations in pedagogy, unit the belief that the human potential is unlimited; the pedagogical approach is aimed at mastering reality in the system; stimulation of nonlinear thinking; they are based on the hedonistic principle that is

based on the enjoyment of learning, the joy of achievement, the pedagogy of success; the mobile role-playing field of the teacher—the teacher simultaneously teaches and learns from the student."

The teachers, who have acquired sufficient knowledge and information in terms of these innovative strategies and processes, make use of them, before they begin their lesson plans. The main innovative strategies having two approach has i.e. offline strategies and online strategies.

1.4.2 Characteristics of Innovative pedagogical strategies

There are some questions in the mind of a teacher before entering the classroom:

- What to teach?
- How to create a conducive and engaging classroom environment?
- How to teach?

Innovative pedagogical strategies answer the question:: **How to teach?** Innovative pedagogical strategies possess several key traits and characteristics. Some of the characteristics are as follows:

(i) Goal Oriented:

These strategies are goal-oriented which focus on reaching the specific tasks to achieve targets. If a teacher does not set clear targets, then teaching learning process will be useless. The primary goal and objective of pedagogy is to promote student learning. Innovative pedagogical strategies help the teachers and students to set targets and to help to achieve long term as well as short term goals. These strategies guide the learner towards innovation.

(ii) Based on learning theories:

A number of theories have been given by theorists regarding the way people learn. These learning theories considered learning as an active process. These innovative strategies are based on learning theories i.e. behaviorism, congnitivism, constructivism, connectivism etc.

(iii) Based on learner's nature:

Innovative pedagogical strategies comprise the methods and techniques used by teachers to enable student learning. These innovative strategies are determined partly on content matter to be taught in the classroom and partly by the nature of the learner.

(iv) Personalized instruction for student's unique needs:

Every child has its own needs and demands. Teaching is ineffective if it doesn't fulfill the needs of the students. So, innovative pedagogical strategies provides personalized instruction or individualized instruction or personal learning environment to meet the different needs of students.

(v) **Student-Centered or Learner-Centered:**

Student's choices are the hallmarks of innovative classrooms. These strategies are student centered as it helps the students to perform better in academics and skills. These also build trustworthy relationships with teachers and provide flexible environments.

(vi) **Accessible:**

These strategies need to be accessible to all irrespective of any disabilities. The classroom environments must be supportive, conducive, innovative, and digital. Teachers are more inclined to know how students with different abilities interact with the resources and opportunities available/accessible

(vii) Comforting:

Innovative strategies are comforting for all in the classroom which makes students feel safe, secure, supported, and less nervous or stressed. The major characteristics of these strategies are these provide support to the students for their well-being and development. These allow students to speak freely.

(viii) Creative and Flexible:

These strategies are creative and flexible in nature. Moreover, innovative strategies provide student-led learning experiences. These are flexible and can be changed as per needs and requirements of the classroom instructions as well as of students. These change according to the age, grade level, needs, abilities, disabilities of the students.

(ix) Engaging, stimulating and improving confidence:

Innovative strategies engage the students in the effective learning process. These are stimulating in nature; these generate self confidence among the students.

(x) Planned and Active:

Planning is required at every phase of teaching and learning process. One of the most important features of innovative pedagogical strategies is that these are well planned and structured. Planning is also required to implement these strategies in an effective manner.

(xi) Progressive in nature:

This strategy gives emphasis ones students' experiences and provides a scope for the development of different skills among students. These strategies ultimately help in procreation of the academic performance and skills of the students.

1.4.3 Need and importance of innovative pedagogical strategies

Teachers and educators are the ones who are responsible for preparing students to meet day to day lie challenges in a fast changing world. So, innovative strategy helps to design a system which helps teachers and students to achieve specific goals as well as to match specific competitive needs. These strategies are needed and important because of the following reasons:

(i) These strategies help the teachers as well as students to take responsibility for their own learning.

(ii) Innovative strategies are needed to create a safe and conducive learning environment in the classrooms.

(iii) These are required because these strategies lead to student's engagement, curiosity, passion, interest and deeper level of understanding.

(iv) These are important because a properly implemented strategy results in transformation of education experiences and qualitative improvements of instructional process.

(v) These are needed to help students to build prior knowledge to improve skills. These are required to increase efficiency and effectiveness of the teaching learning process.

(vi) These are required to create activity based learning and help to engage the student's with different kinds of stimuli.

(vii) These make the content, resources of the classroom more funny, joyous and interesting.

(viii) Innovative strategies are required to encourage and motivate the students to explore more and more on a certain topic.

(ix) These are required to develop 21st century skills, aptitude and attitude among the students which advocate student centered curricula and enhances techno based pedagogies.

(x) These are required to provide personalized learning experiences to the learners or students.

Following are some innovative pedagogical strategies (offline and online) which every teacher can embrace:

Cross over Teaching
Role playing and scenario analysis based teaching
Creative teaching
Teaching through Virtual Reality
Prezi–Your Presentations
Sports Based Learning
Z to A approach
Real-world learning
Teaching through collaboration
Story board teaching
Mind Mapping
Teaching through Smart Boards
Teaching through Cloud Computing and 3D printing technology **Virtual conferences**
Teaching through Flipping Classrooms
Jigsaws
Blended and Social learning
Problem based learning and Inquiry-based instruction
Think pair share

Above list is just suggestive, there are many other innovative pedagogical strategies.

1.5. Box I: Some Facts

NCERT has taken an initiative for promoting innovations in the classroom. For that, a scheme "National awards for innovative practices and experiments in Education for Schools and Teacher Educational Institutions" has been initiated.

Hungary started developing its own national innovation strategy for educational sector in the year 2011.

1.6. The Emergence of New Innovations in Pedagogy

This century is known as the period of digital advancements and innovations. Teachers and educators around the globe have adapted and switched teaching from physical form to the virtual form. As per the report of UNESCO, One and a half billon students around the world were engaged in digital remote learning during COVID-19 pandemic in March 2020. From time to time, major shifts in the policy framework of curriculum lead to innovation in pedagogy and its approaches. Curriculum policy in different countries promotes the development of knowledge, skills, competencies, including "21st century skills." If teacher want to develop 21st century competencies then innovative pedagogies must deliberately foster them. If we carefully analyze the traditional strategies and methods used in the classroom, we will find some disadvantages of traditional classroom strategies. These limitations are as follows:

Teacher-oriented and syllabus oriented
Lacks emphasis on larger concepts
Lacks student focused learning
Lacks interactivity
Dependence of students on teachers
Monotony and inflexible
Emphasis on rote learning and examination only
Lacks motivation
Focus on presentation and not on practice
Emphasis on note-taking
Less alignment between aims, objectives, tasks, activities and assessments
No emphasis on critical and reflective thinking
No focus on creativity
No Catering to individual differences
No innovation
Lack of collaboration and group work

So, we can say there were many demerits of traditional methods of teaching which led to the emergence of modern or innovative methods of teaching. 21st century required a different set of skills for students like communication skills, problem solving skills, collaborative skills, creativity skills, critical thinking skills, reasoning skills etc. These skills lead to the emergence of innovative pedagogical strategies.

Innovative pedagogical strategies (Online and In-Person simultaneously)

To retain the student's attention and to promote meaningful engagement for learning, most of the teachers use two approaches while delivering the content. These are online as well as offline innovative pedagogical strategies. There are various other reasons which lead to the emergence of these strategies.

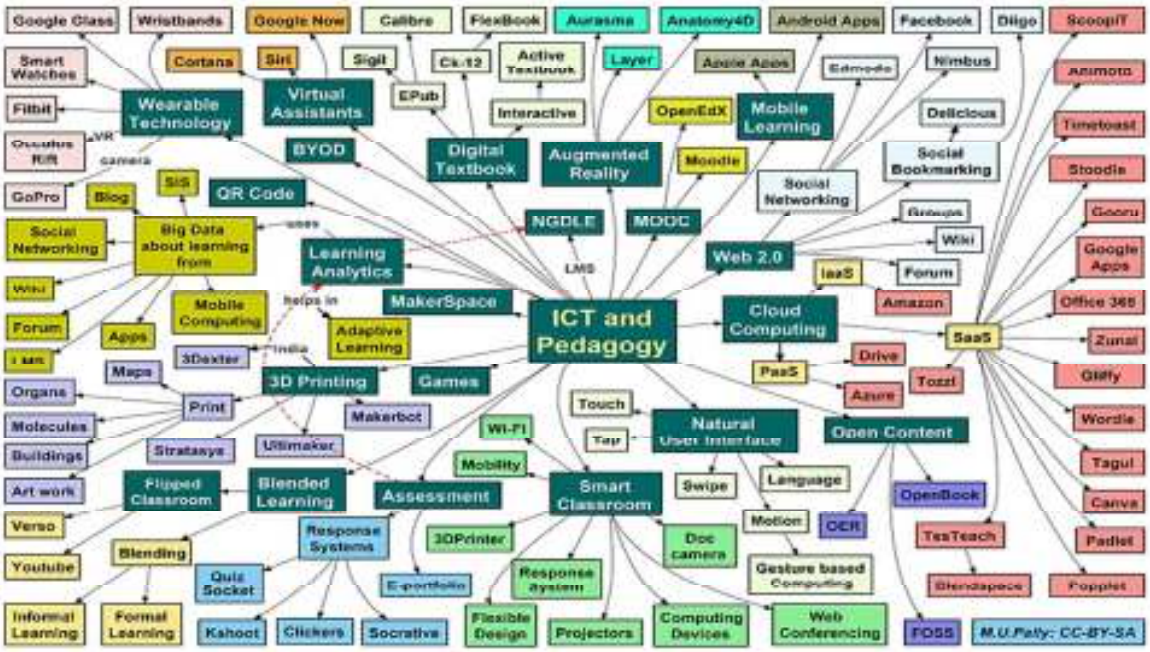
Reasons triggering emergence of innovative pedagogical strategies

Following are some of the reasons which lead to the emergence of **innovative pedagogical strategies:**

Demands of a knowledge-based society
More use of multimedia
Expectations of 21st century students
Increased student choices
Changing demands from world of work
Rising demand for open educational resources (OER)
More emphasis on inquiry and practice
Introduction of new technologies
Rising Competition
Emerging forms of assessment and evaluation
Flexible learning environments
Inclusion of all
Research oriented learning
Need to develop decision making skills, problem solving skills, and reflection
Shift from behaviorism to constructivism
From rote learning to reflective thinking
From subject centered to learning
Emphasis on e-learning, MOOCs and self-pace learning
Digital distance and open learning
Diverse learners
More emphasis on understanding and application of concepts

Continuous and Comprehensive learning
Emphasis on life skills and values

Following diagram will help to summarize the ICT as an innovative learning tool and pedagogy:



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Innovative pedagogical strategies may be teacher-centric or learner-centric. These could be low-tech or high-tech. An innovative classroom includes innovative pedagogical strategies that are always evolving. These strategies have significant impact on educational system of the nation. Effective pedagogies involve a range of techniques and focus on developing higher order thinking skills, particularly reflective thinking and metacognition. Teacher and Teacher educators must utilize offline and online innovative pedagogical strategies to make the teaching-learning process effective.

1.7 Summing Up

In this unit, students learnt about the need and emergence of innovative pedagogical strategies. If a teacher wants to achieve objectives, innovative pedagogical strategies need to be well planned and structured. These strategies should allow the students to move at their own pace. Moreover, Teachers are responsible for preparing students to meet challenges in a fast-changing world and that is why innovation in pedagogy has become essential. 21st

century era is era of digitalization which requires online strategies also along with offline. Teacher must be well equipped, trained, skilled and professional while using these strategies. While developing curriculum, the policy makers and curriculum developers must focus on innovative strategies. These strategies will help to improve the quality standards of the education system as well as classroom environment.

1.8 Questions for Practice

(i) How can a teacher improve her/his pedagogical skills?
(ii) Why innovative pedagogical strategies are important in the present scenario?
(iii)Define Innovative Pedagogical Strategies. Give the characteristics of these strategies.

1.9. SUGGESTED READINGS AND REFERENCES

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CERTIFICATE COURSE IN CREATIVITY AND INNOVATION IN SCHOOL EDUCATION

COURSE: INNOVATIVE PEDAGOGICAL STRATEGIES FOR FOSTERING CREATIVITY AMONG SCHOOL STUDENTS AND ITS IMPLEMENTATION (CISE-2)

UNIT 2: UNLEASH CREATIVITY AND CREATING A CULTURE OF CREATIVITY

SRTUCTURE:

2.1 Learning Outcomes

After studying this unit, the learners will be able to:

- Recall the concept and nature of creativity.
- Recognize the different aspects of creative children.
- Identify the different types of creativity among students
- Elaborate the ways to unleash the creativity among school students

- List the activities to develop creativity
- Develop a culture of creativity in schools.
- Adapt the different ways of creativity in classroom
- Enhance skills in conducting activities to foster the creativity among students

2.2 Introduction

It has been found that creativity is present in every human being with different forms and degree. Children express their self in many ways: novel and original responses, suggest unusual uses for different techniques etc. Therefore, it is the need of the hour to explore such children and help them to develop creativity and contribute to the progress of nation. The development of any nation and society is based on the creativity of its people, their inventions and discoveries. So, the facilities that are given by a society to develop creativity depends upon the history and ethos of that particular nation and society. Creativity of our scientists, poets and many others are well known to us. You will learn more in this unit about creativity and how to unleash creativity among children.

2.3 Creativity

Creativity means different things to everyone, depending upon one's perspective. One definition of being creative is having the ability to turn new imaginative ideas into reality. The first aspect of creativity is imagination, and history shows that imagination later actually converted in originality. Creative children grow into creative adults. Our job is to aid this development while they are young so that they are free to reach their unique, creative potential as they transform through the years. In some instances, children will require a bit of guidance when it comes to choosing something which they are passionate about.

2.4 BOX 1: Some Facts

In 1966 Gene Roddenberry imagined the* Star Trek *flip communicators, and Motorola produced them in 1996. Augusta Ada in the mid-1800s, A King envisioned a language for computing machines that didn't even exist; today she is honored as the founder of modern programming languages.

When Benjamin Bloom identified what he called the taxonomy of the cognitive domain, he ranked synthesis (creativity) as one of the most difficult skills to master because a person has to use all of the other cognitive skills in the creative process. Since, according to Bloom, creating is the highest order of thinking, it should be in the forefront of all learning environments and an end goal.

Hence, when students create from their imagination, they are in the driver's seat.

2.5BOX II: Research Studies

In 1968, According to Idea to Value, George Land and Beth Jarman conducted a research study to test the creativity of 1,600 children over two decades. The purpose of the test was to see how people looked at a problem and to witness if they could come up with new, different, and innovative ideas. At the beginning of the study, the students were between the ages of three through five years old, initially test was conducted on the same children's level of creativity at the age of 10, and again at the age of 15.

The results showed that the proportion of people who scored at the genius level of creativity were the following:

Amongst 5-years old: 98%, Amongst 10-year old: 30%, Amongst 15-year old 12%

Later on in the same test it has been found that by applying on 280,000 persons at the average age of 31-years, their creativity levels dropped to 2% only.

2.6. Meaning and Definitions of Creativity

The term creativity means the ability to produce new, novel and valuable. Creative mind is sharpened by stimulating good education, proper care and giving opportunities to inspire and it is possible in this scenario by significant contribution of parents, society and teachers.

Previously, creativity has been defined as the ability to respond adaptively to the needs of new approaches and new products, and the ability to bring something new and valuable into existence purposefully. Teachers and parents help to nourishing and utilizing the creative abilities of children to the utmost, and the educational process should aim at developing the creative abilities among children. Hence, teachers and parents should know the importance of creative process and the ways and means of developing creativity among children

"Creativity implies the products of totally or partially novel identity." Stagner and Karowski

"Creativity is the capacity of a person to produce composition products or ideas which are essentially new or novel and previously unknown to the producer." Drevdahl.

Creating an environment of full of creative abilities among children should be focused by teachers and parents for proper stimulation and nurturing of the traits that help to develop creativity, namely originality, flexibility, ideational fluency, divergent thinking, self-confidence, persistence, sensitiveness, ability to see relationship and make associations, etc.

Hence, it has been concluded that creativity is enhanced more easily and passionately during early years of life of pupils.

2.7 Unleashing Creativity Among School Students:

At its core, system and routine activities are all about creative potential. By creativity, one can motivate the other students and teachers to come up with, and do their own. Creative children are more appropriate to think critically and develop problem-solving skills. Creative children are more likely to channel their feelings in healthy ways and grow in self-confidence. Creativity is an asset to one's long-term professional, social, and emotional development. Child experts encourage caregivers to nurture children's creativity. Creativity is the skill that is more difficult to acquire, and also the most craved one. One can appreciate and thirst for this as it enriches our understanding and can make our life easier. Fostering creativity among children is important for various reasons.

2.7.1 Various Ways to Unleash Creativity among School Students:

- By encouraging creative writing
- By changing Classroom layout
- By working with the students side by side
- Creating an environment of choice
- By encouraging their curiosity level
- By Exploring the Outdoors
- By replacing hierarchy with collaborative learning spaces
- Not limiting assignments to one format

- By rewards and recognition to motivate the students
- By team building exercises
- By exploring different cultures
- By celebrating success with ceremonies
- **By encouraging creative writing**

The key things children need to be a great writer is creativity and encouragement from those around them. If children show an interest in writing short stories, one can do all to foster creativity. By this means children will be able to get help with how to structure their stories and make them more appealing. Giving this type of encouragement at a young age is a great way to put children on the right path.

- **By changing classroom layout**

In the present scenario classroom design has not advanced in ways that support the type of teaching and learning. Schools need to provide classrooms that place the teacher at the front of the room and students in rows of fixed furniture create conditions for repetitive, individual, and passive work. Accessible technologies allow students and teachers to focus on the content creation and enable them to think outside the boundaries. Different arrangements in the classrooms should be done and always make sure that the classroom set up is to accommodate the learning activities and their work styles.

- **By working with the children side by side**

Students benefit working alongside with teachers and teachers benefit from working alongside students. They look to each other for inspiration and have the space to engage in real conversations. Students and teachers should have to share meeting spaces. Meeting spaces are designed to support different modes of meetings, ranging from an informal meeting space with soft seating called “The Living Room,” to a more conventional conference room with chairs around a large table called “The Board Room,” to a space equipped with elevated stools around a high-top table, called the “Think Tank.” Students observe adults meeting and working, and they have access to the same spaces with the same room-reservation system and are comfortable meeting and working in similar ways.

- **By creating an environment of choice**

Students should be given time to work in spaces that allow time in groups to generate ideas and for time alone to focus. In creating research and design levels in a new structure, one should strive to establish an environment with choice to support different brain modes, like active group work and individual thinking time. In addition to creating flexible, open, collaborative spaces, one should provide private, individual space with reduced visual distraction and ambient noise.

- **By Encouraging curiosity level**

Children's development is more dependent on fostering curiosity than forcing them to learn massive amounts of information. Children are naturally curious. Parents grow to their children as accustomed to being bombarded with endless questions, but it may be best if one doesn't try to give answers to all of them. Allow the child to experiment. Ask them what they think the answer might be. Children's curiosity is used to help them process information and develop their own conclusions.

- **By exploring the outdoors**

Children need time to explore in a safe and protected environment. Preschoolers naturally absorb their environment. Young children need to be able to experience the wonder of nature, the beauty of flowers and sun, and the miracles hidden in our earth's processes. Allowing children to help decide which route to take, learning new skills, or sorting leaves by shape and color gives them the opportunity to exercise their creative minds, build thinking skills and participate in family fun.

- **By replacing hierarchy with collaborative learning environments**

Collaborative working environment help students to enhance their knowledge. In collaborative learning environment every seat is the best seat in the class, and students are always at the center of learning. Maintain the structure of classroom by creating different zones for different learning

process, such as reflection and brainstorming. For collaborative learning and for new ideas and inspiration flexible learning environment should be created in the classroom.

- **By rewards and recognition to motivate the students**

Everyone does better with encouragement and the ultimate encouragement is a reward. Rewarding achievement visually in the classroom gives students motivation to continue doing work as well as achieving a sense of pride. It also helps them to know that creativity and experimentation is a good thing separate from right or wrong answers. Create specialized certificates that reflect the specific creative achievements of students to drive their efforts.

- **Don't limit assignments and work to one format**

Allowing students to choose the format of their own assignments allows them to explore the task using a format they enjoy the most, making them more naturally inclined to draw on their creativity. Students need to explore and accept the society and their ways of dealing and allowing them to choose their own way of teaching and learning.

- **By team building exercises**

The most important thing about team building exercises is that no answer is right or wrong, just the strategies that allow teams to thrive and think together. Cooperative learning allows students to work together and help them to make decisions based on creative thinking, communication, and collaboration.

- **By exploring different creative cultures**

By developing students' ability to consider multiple perspectives is an important part of thinking beyond boundaries. It's likely you'll have students from multiple cultural backgrounds, so celebrate these differences, while also learning from them: invite their unique perspectives into discussions, encourage students to be curious and allow them the space to bring their own cultural context into tasks in order to diversify the responses to tasks.

- **By celebrating success with ceremonies**

Instilling a great sense of pride in their achievements encourages students to learn more rigorously in the future. In spite of the use of report cards or certificates one should celebrate their success, and allow students to plan a victory ceremony when they think about their goals.

Self-Assessment Questions

1) ……is found in all children but in different forms and in different degrees.

2) Creativity always starts with what?

a. Innovation b. Imagination c. All of these d. None of these

3) At the age of 5 years the general level of creativity is

a. 98% b. 70% c. 50% d. 20%

4). What is Creativity? Explain with example.

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5) What are the various ways to Unleash the Creativity among School students? Explain with examples.

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2.8 BOX III:

Why creativity is important in the classroom?

Creative classrooms mainly focused on developing creativity in students and build long term success for life, especially in the areas of expression, problem solving, innovation, as well as effective learning.

Creativity especially involves cognitive processes that transform one's understanding of, or relationship to, the world (Liane Gabora).

Creativity is the novelty based component of cultural evolution. Like in any evolutionary process, novelty must be balanced by preservation. Creativity is not an action that one should perform, it is a mode of thinking that one may apply and when one considers how many tasks in life require us to think differently about an existing concept, it seems inextricable from everything we do.

Even if nothing 'results' from our creativity, it's still a beneficial approach to apply to learning.

2.9 Creating a culture of creativity in schools and classrooms:

Creativity needs a safe environment to play, exercise autonomy, and to take risks. It is the responsibility of teachers to establish this kind of culture in schools and in classrooms. While initiating different learning experiences, teachers can plan and frame curriculum accordingly, that provide tools to give students different options, voice, and choice in order to enable them to be creative. A successful teacher can develop a culture of creativity in schools and in classrooms in a number of ways:

i. **Create a compassionate, accepting environment**

Being creative requires going out from boundary walls, so children need to trust that they can make a mistake in front of others.

ii. **Be present and welcome students' ideas**

Teachers need to discuss more off-the-cuff conversations with children and try to find out what their passion areas are, and build those into class approach.

iii. **Encourage autonomy among children**

Teacher should encourage autonomy among children not the arbiter of what "good" work is. Instead, teacher needs to give feedback that encourages self-assessment and independence.

iv. **Rephrase assignments to promote creative thinking**

Teachers should try to add words like “create,” “design,” “invent,” “imagine,” “suppose,” to the assignments and adding instructions such as “Come up with as many solutions as possible” or “Be creative!” can increase creative performance of children in many ways.

v. **Direct feedback given to students on their creative work**

Sometimes children don’t realize by their self how creative they are, or get feedback to help them incorporate creativity into their self-concept. Explore the ideas of creative competence with their academic competencies. When one is trying to evaluate something, we need to value it! Creating a self-concept that includes creativity.

vi. **Appropriate time to know and to help children when to be creative**

Teachers should help the children to check the appropriate time to know and to help when create is more or less helpful by providing them different situations.

vii. **Use creative instructional strategies and methods**

One should use creative instructional strategies to a greater extent in a variety of domains. For example, a teacher could say “I taught you about three ways to introduce this lesson. I’m going to show in front of you two out of three, then you come up with a third,” or show them a personal project you’ve been working on.

viii. **Channel the creative impulses in conducting misbehavior**

The children who are often creating disturbances, being teacher it’s the responsibility to check any creativity in their behavior. Perhaps that originality could be channeled in other ways?

ix. **Protect and support children’s intrinsic motivation**

Intrinsic motivation is just like added fuel to the creativity. In a number of studies, it has been shown that relying on rewards and incentives can undermine intrinsic motivation to complete

a particular work and an effect called it as over justification. To avoid this, educators try to limit competitions and focusing on self-improvement.

x. **Creativity requires effort and need to know by children**

The creative process is not a simple way like “aha” “wao” that strikes without warning. Teacher should make it clear to children that truly creative people must imagine, and struggle, and re-imagine while working on a topic.

xi. **Practice the activities with children to creative thinking**

Many teachers have suggestions for creative activities they have tried as warm-ups or quick breaks. Droodles, scribble or riddles, are simple line drawings that can have a wide range of different interpretations, and can stimulate divergent thinking. “Quick writes” and “free writes” can help students to let go of their internal censor.

xii. **Discuss creativity myths and stereotypes with children**

Teachers need to help children to understand what creativity is and what is not, and how to recognize it in the world around them.

xiii. **Incorporate humor and happiness into the classroom**

Humor is an important part of creating a positive environment in which creativity can flourish. Draw on pop culture references, use puns and find relevant jokes that make light of the learning process. Plan the activities that embrace supportive and lighthearted approach to ensure children to understand that learning can be fun oriented, rather than just something that falls into ‘right’ and ‘wrong’ fallacies.

xiv. **Pair struggling learners with those children who excel in different tasks**

To **e**mpower creativity through leadership is an extremely effective learning strategy. For children who have mastered the content, being tasked with teaching a peer encourages them to

come up with creative ways to reframe the content. Creativity provides a supportive environment where children understand their role as supporters to their peers when it comes to learning, effectively extending the teacher role far beyond your capabilities. Peers offer a different perspective to problems than teachers do and that diversity of opinion and support can be endlessly encouraging.

To conclude, one should have to set up in front of student's different ways to explore their creativity. When the children have completed their tasks, the teacher should explain them to transform into another way they like. In this way, children got an opportunity to explain to the whole class why they liked the way they created. For enhancing creativity one needs to remove constraints and give children space and a framework in which they can be more creative.

2.11. Self-Assessment Questions

1). Explain how to create a culture of creativity in schools and classrooms?
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2) Why creativity among school students is important in the present scenario?
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2.10 Summing Up

In this unit, students learnt about the meaning of creativity by knowing some research facts too. It has been found that children express themselves in various ways. Therefore, it is important to identify such children and help them develop creativity and to contribute to the progress of society. The development of a society is dependent on the creativity of its human beings, and

many of its inventions came into existence because of their creativity. In this unit you learnt how to unleash creativity among school students and which ways one can adopt to be creative. Further, you learnt about why creativity in important the present scenario and how we can create a culture of creativity in schools and in classrooms.

2.11 Questions for Practice

i. Define Creativity Discuss its importance in Classrooms.

ii. Give the importance of rewards and recognition and team building exercise to unleash creativity.

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CERTIFICATE COURSE IN CREATIVITY AND INNOVATION IN SCHOOL EDUCATION

COURSE: INNOVATIVE PEDAGOGICAL STRATEGIES FOR FOSTERING CREATIVITY AMONG SCHOOL STUDENTS AND ITS IMPLEMENTATION (CISE-2)

UNIT 3: ROLE OF TEACHERS IN DEVELOPING AND ASSESSING CREATIVITY

STRUCTURE:

3.0 Learning Objectives

After the completion of this topic, you should be able to

- Identify the role of creative teachers.
- Explain the qualities of creative teachers
- Elaborate the role of teachers in developing creativity among students.
- Adopt various strategies to develop creative habits.
- Enhancement of creative skills.
- Differentiate among different types of creativity
- Compare the different techniques of assessment of creativity.

3.1 Introduction

In the preceding unit, you have learnt in detail about creativity and some of its basic characteristics. The mantra of the 'knowledge economy' is now renowned worldwide, alongside the importance of creativity. For the best people one needed to choose-the best author, craftsman, business owners, or CEO one would doubtlessly need somebody who is creative (Sternberg & Lubart). As a result, every nation, in order to cement international competitiveness, is investing education resources into development of professionals and creativity. Students' creativity as a key competency is shown in many countries' education strategies. Compared to traditional rote learning, creative instruction encourages students to think independently, participate actively, and express themselves freely. Under creative instruction, students are more likely to become creative professionals. The focus of this chapter is to explore the factors that influence creative teaching and to find out what effective strategies are used by teachers in the learning areas for developing and fostering creativity among children.

3.2 Creative Teachers

A creative teacher encourages appropriate exposure and unexpected situations while reinforcing creative activities. Being creative assists you with improving as a difficult solver in all parts of your life and work. Creativity assists you with seeing things contrastingly and manage vulnerability in a superior manner. Studies shows that creative individuals are better ready to live with vulnerability since they can adjust their thinking to allow the flow of the unknown. The main motivation to instruct with creativity is one that is seldom assessed yet is the way in to a youngster's instructive achievement: they will cherish school by making things more pleasant. Acquiring another expertise, teaming up and making some significant, fulfilling and blissful work.

A close relationship with students and a stimulating classroom environment should also be in sync with the teacher's good scientific background and his ability to challenge on a cognitive level. Encouraging students' self-confidence and self-regulation, as well as their active role in defining and redefining the multiplicity of ideas and problematic points. Finally, the teacher must also be tolerant of ambiguities, demonstrate critical and constructive abilities to their practices.

According to teachers, the promotion of student autonomy and self-confidence seems to be the most valued aspect for defining a creative teacher.

To be a creative teacher, you will want to expand your understanding of your creativity, and a list of imaginative approaches and repertoire of engaging activities that you can employ to develop children's ability to have original ideas and actions. You will want to exercise your professional autonomy, learn to be flexible and responsive to different learners and diverse learning contexts. Creative teaching is an art. One cannot teach teachers academically how to be creative- there is no fail-safe recipe or creative; or routine.

In a study of creative teacher's research, an emergent creative teaching framework, highlighting three dimensions of creative practices are shown as under:

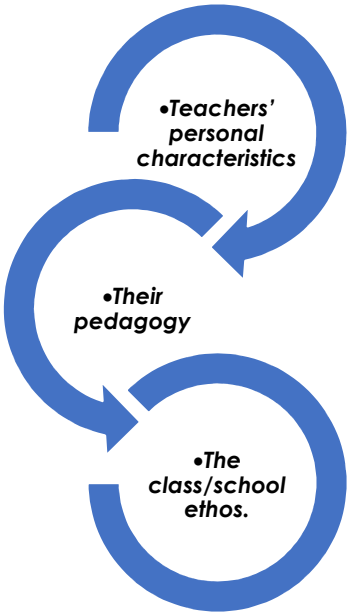


Fig. 3.1. Showing Three dimensions of creative process

BOX I

What is a creative teacher?

There is nothing of the sort as completely creative or a non-creative teacher. The demonstration of showing requests on imagination to respond to the ubiquitous inquiry, "How could I be going to connect with the understudies this week?" This inquiry weighs intensely on each teacher as the person makes learning plans.

1. ***There is an insight that a few educators are skilled with common innovativeness, and most of us need to ask and get to acquire imaginative thoughts. I speculate that really creative teachers are not so skilled in creation however they are aces at gathering thoughts from a wide range of sources.***
2. ***All teachers can use a creativity to liven up the learning.***

BOX II

Where can teachers find creative ideas?

Indeed, on the off chance that you have a ton of time, you can filter through the mountains of terribly adorable exercises for shading, coming to an obvious conclusion, fill in the spaces, or other not-so-captivating worksheets found on sites. I propose an alternate strategy. Start with the bosses of creativity: enlivened shorts. These little videos can be brilliant introductions with exercise points - intriguing, drawing in, and amusing. In the greater part of these videos there are no words, so they work with essentially all levels and different subjects.

3.3 Qualities of Creative Teachers

Creative teachers understand the significance of tackling and supporting the inventiveness of their understudies. Inventive educators realize that it is essential to permit students to imagine their own Creativity.

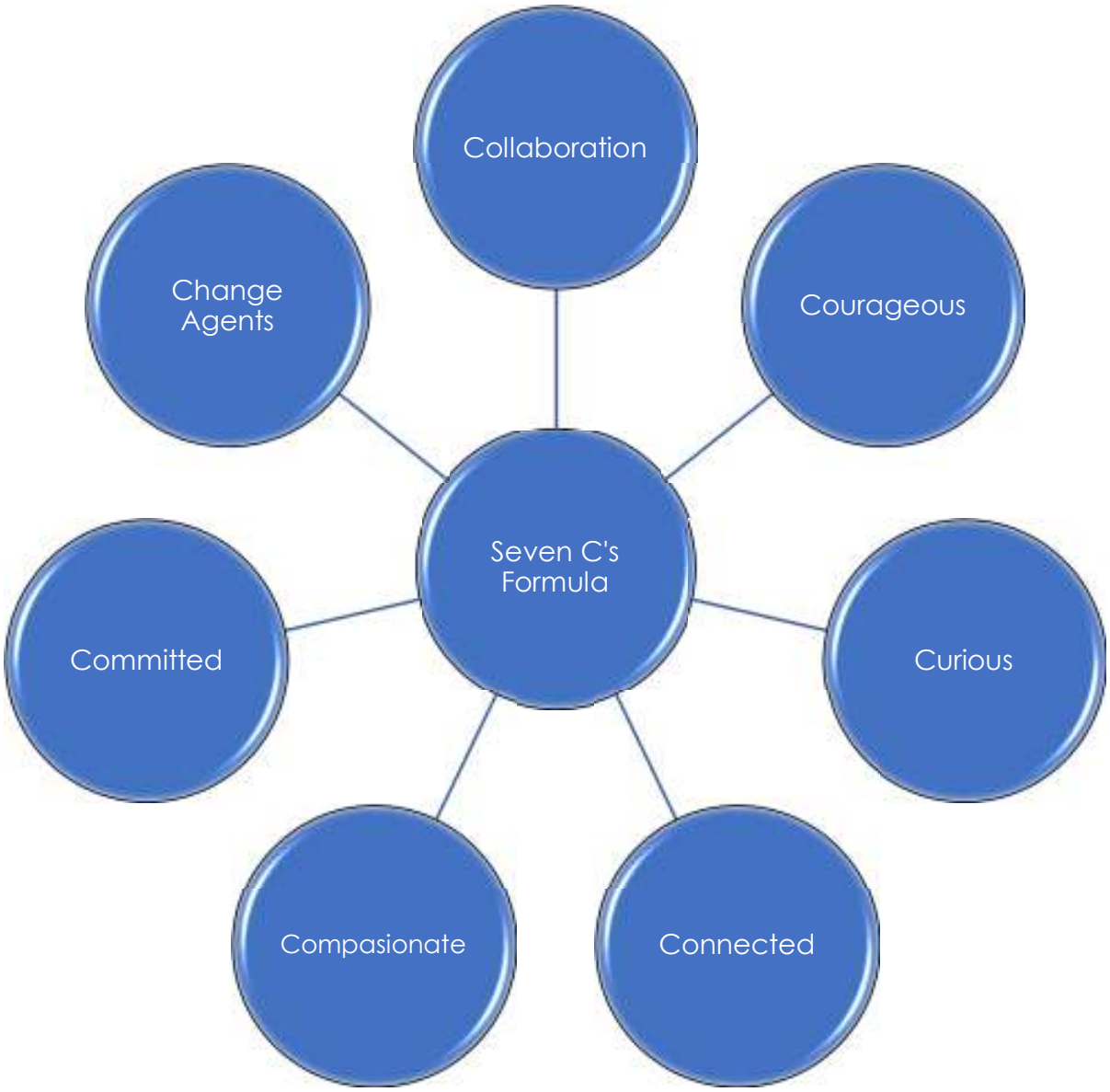
A common quality of a creative teachers is to follow the Seven C's Formula:

i. Collaborative

The collaboration effort work is the requirement for a typical vision shared by experts with different ability to make a creative interaction to improve student results for all included.

ii. **Courageous**

Creative teachers are at their heart, courageous. They enjoy freedom to learn new things, are not reluctant to face challenges in their learning and educating. Their courage is motivating!



iii. **Curious**

Curiosity is a trait that new learning possesses. They are naturally inquisitive and like to explore new ideas.

iv. **Connected**

The connections through which teachers are connected must be digital, community-oriented, and/or oriented toward professional development.

v. **Compassionate**

Compassion is a fundamental attribute that creative teachers possess. To turn out to be completely drawn in about learning, learners should feel that their educators care for them.

vi. **Committed**

The creative teacher is committed to life-long learning. They feel that this form of commitment is necessary to be truly innovative and provide the best educational experience to their students. Innovative teachers are also committed to reflective practice.

vii. **Change Agents**

Creative teachers can even become "change agents". Today's rapidly changing society requires teachers to be able and willing to face the many challenges of change.

OTHER IMPORTANT QUALITIES OF A CREATIVE TEACHER:

Become a knowledgeable teacher

There is part of books, instructional classes, free online courses, online assets and college programs that can assist us with developing as teachers. It's additionally imperative to find out about different things. Creative teachers bring something other than showing information into the study hall. They are taught in different fields, and can draw on their own encounters and outside interests.

Connect with other teachers

Although formal preparing will assist with creating as teacher, it's essential to associate with others in a specific field. Motivation can emerge out of the large name speakers and essayists, yet similarly as frequently, it comes from teachers like you and me. Motivation focuses on and will make a longing to impersonate these instructors in your day-by-day teaching practices.

Become a collector of teaching ideas

The significant thing is to gather and arrange thoughts such that makes it simple to give them a shot whenever the correct chance comes. Curation will likewise assist a teacher with getting cleverer: thoughts and exercises will be readily available if things turn out badly!

Share your learning

In the current scenario, teachers can pick up things from others moving forward, but there comes a time when they feel they have to make a commitment or contribution. Start a learning blog. The demonstration of contributing to a blog and portraying your training thoughts produces discussions with different educators, and those discussions energize more thoughts; They are an incredible scaffold for creative learning and teaching.

Practice your creativity

Teachers need to routinely inform understudies that cautious order brings regarding promising outcomes, yet it is imperative huge that we apply this to ourselves. Gifted people in all fields, from artists to experts to teachers, show up at the most raised levels through preparing – they didn't show up for now.

Start experimenting and reflecting on your teaching

One sure approach to get out as an educator is to adhere to similar thoughts and methods without having a go at anything new. This methodology is bound to demotivate your understudies eventually also. Students like teachers who show restraint, lenient and ready to clarify things well, they like educators who have components of shock and fun in their exercises. Attempt groundbreaking thoughts or embrace old ones, however when it's set make sure to stop, think, and assess the experience.

Fill the Classroom with Positivity

It is amazing how far a smile and a kind word can go towards elevating the mood of the whole class — especially for students who are struggling with reading or other subjects. Another quality of an effective teacher is that they are constantly enthusiastic, which enables their students to feel safe in their learning environment.

Patiently Handle Challenging Situations

Teachers are under a lot of stress and have parents, districts, and policies to answer to. With so many different opinions going into the education system it’s easy to get frustrated when faced with harsh criticisms but teacher must have to handle patiently for their successful career.

Constantly Look for Ways to Become Better

The most influential teachers did not become like this overnight. They constantly look for ways to improve their craft and are not afraid to try new things. These teachers are determined to succeed and work hard for the results they ultimately achieve.

SELF ASSESSMENT EXERCISE

1. What kind of teacher helps you to become a better problem solver in areas of your life and work?

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2. What do studies show that creative people are better able to live with uncertainty because they can do so?

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3. Describe the role of creative teacher in quality enhancement with examples.

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4. Explain the 7'C Formula for being creative.

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3.4 Role Of Teachers In Developing Creativity Among Students

Nine conditions necessary for teachers to foster student creativity are as follows*:*

1. *Independence*: Encouraging students to learn independently;
2. *Integration*: Having a co-operative, socially integrative style of teaching;
3. *Motivation*: Motivating students to master factual knowledge, so that they have a solid base for divergent thinking;
4. *Judgement*: Delaying judging students' ideas until they have been thoroughly worked out and clearly formulated;

5. *Flexibility*: Encouraging flexible thinking;
6. *Evaluation*: Promoting self-evaluation in students;
7. *Question*: Taking students' suggestions and questions seriously;
8. *Opportunities*: Offering students opportunities to work with a wide variety of materials and under many different conditions.
9. *Frustration*: Helping students to learn to cope with frustration and failure, so that they have the courage to try the new and unusual

Creative classrooms can really truly change the manner by which understudies can apply it in their reality. Truth be told, innovative articulation assumes a critical part in an understudy's turn of events.

Let us have a look at how important is the role of creativity in today's classroom and its benefits.

- **Reduced Stress and Anxiety**

At the point when some time is saved for creativity in the middle of all the demanding examination times, it removes a ton of stress from understudies. This feeling of happiness keeps them loose and lessens their nervousness which thusly assists them with getting ready well for tests and dominate in it.

- **Learn with fun**

Students are consistently carefree and incorporating creative exercises alongside educational plan acquires their premium for learning. Inventive homerooms offer a chance for understudies to learn with fun. The showing exercises, for example, narrating and productions assist them with learning without the pressing factor of learning.

- **Boosts Problem Solving Skills**

Creativity can truly change the manner in which understudies approach an issue and it tends to be astonishingly idealistic once they go through innovative educating. Inventive critical thinking can be energized in homerooms that assist understudies with thinking out about the crate and be more creative and imaginative.

- **Freedom of Expression**

The Freedom of expression gives them a feeling of goodness and joy. Making a few commitments in the learning meetings gives them a feeling of fulfillment as well. An inventive way to deal with learning makes them more open with the

riddles that come their direction and gives them a sensation of achievement and pride.

- **Emotional Development**

Creative expression is significant for a youngster to trigger up their passionate turn of events. Creativity gives them that opportunity to investigate the environmental factors and take in new things from them. Understudies would consistently cherish a study hall setting that assists them with investigating uninhibitedly without defining them any limits.

- **Enhancing thinking Capabilities**

Creativity can invigorate creative deduction capacities in understudies. That is the reason educators advance exercises like open-finished inquiries, inventive group building exercises, meetings to generate new ideas and discussions in the midst of occupied educational program plans. The open-finished inquiries will open them a universe of innovative reasoning and they can think of imaginative reactions.

- **Improves communication skills**

A classroom climate that advances creativity opens a universe of correspondence. Understudies can improve discussions and animate inventive reasoning and talking meetings in their leisure time. This sort of shared creative experience assists them with opening dependent upon each other and grow up as better communicators.

- **Future opportunities and Lifelong Learning**

The abilities and the certainty they acquire all through their school days are truly going to have an effect in the manner they thrive the profession. Truth be told, creative people have a high ground in setting off future freedoms than those with a simple scholastic range of abilities and an individual with a creative mentality consistently has that hankering to learn new things without fail and this assists them with having that astonishing sensation of long lasting learning.

However, the role of a good teacher is to bring the right integration of creativity in classrooms and bring out the best in the students.

3.5 Strategies to Develop Creative Habits and Skills Among Students

Promoting a creative climate in the school by developing strategies of creative habits and skills that support creativity in many ways:

- Nothing is a higher priority than the instructor representing the propensities, practices and thinking they need understudies to illustrate.
- Appreciating the basic significance of inquiries, both their own and those asked by understudies Considered later in this section.
- Treating botches as learning openings and urging students to face reasonable challenges in the homeroom.
- Giving students adequate opportunity to finish their work Sometimes thoughts need time to create prior to getting significant. Giving students the extension to concoct their own thoughts can be trying for the two instructors and students.
- Encouraging students to face 'reasonable challenges' in their work is significant for developing their imaginative certainty.
- Scaffolding errands cautiously to give the fitting degree of challenge. In a perfect world, an educator should attempt to configuration assignments that assist the student with getting over into this space by 'framework', or supporting them from the start, and afterward pulling out help so the student can progressively accomplish the undertaking all alone.

Students must learn how to imagine the unimaginable and develop their creative skills.

Robert Epstein identified four competencies essential for creative expression:

SELF ASSESSMENT EXERCISE

1. Give one example of a classroom that encourage students to learn to cope with frustration and failure?

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2. What is the role of creative expression in the development of learners?

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3. What are the four essential components of creative expression?

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3.6 Assessment Of Creativity

BOX III

WHY WE NEED TO ASSESS CREATIVITY DIFFERENTLY IN THE CLASSROOM?

- Classroom assessments are commonly used by teachers to document whether students have achieved academic learning goals, by assessing students' performance on learning activities that have clearly defined success criteria.
- Teachers would simply assess whether students can arrive at the expected answers using the expected approach (i.e. 'showing their work'). Even in subject areas with multiple ways of approaching a task.
- Teachers develop and use scoring rubrics and checklists that specify, in advance, what it is they are expecting to see demonstrated in students' work.
- Success is thus determined by whether students can match their performance to what is expected and how it is expected. Assessing creativity is different.
- Academic learning outcomes are often known in advance, while creative learning outcomes are emergent. This is not to say that creativity is completely unconstrained. Indeed, classroom creativity has been defined as a blend between originality and meaningfully meeting task criteria. creativity can be thought of as using unusual or different ways to meet curricular goals.
- There are numerous creative paths students (and teachers) can take to meeting pre-established criteria .
- These paths can even start on a previously taught or expected path and then diverge, thereby meeting the criteria creatively.
- Conversely, a path that diverges from what is expected, but does not meet the criteria, is simply different or original and not creative.
- Creativity represents a 'both/and' combination of meeting the criteria, but in new, different and often unexpected ways.
- When students are invited to meet criteria in new and different ways, they are provided with an opportunity to demonstrate and develop their creativity. Opening up the possibilities for how students meet criteria requires transforming the typically

predetermined pathways into TBD pathways, thus introducing uncertainty. This uncertainty is both necessary for and supportive of creative expression. In other words, if students and teachers already know how to get from A to Z, the pathway would not be creative.

Assessments that are not just of creativity, but for creativity; not only to evaluate creativity but also help cultivate it.

Guilford and Torrance found these general abilities put together forms creativity. They are

- Fluency- is the ability to think of a large number of responses.
- Flexibility- is the ability to think of different types of responses.
- Originality- is the ability to think in an original and uncommon way.
- Inquisitiveness- is the ability to raise a number a questions out of curiosity.
- Persistency- is the ability to continue with the problem, even though one is failing from long.
- Elaboration –is the ability to add details to the given situation or problem at hand.

In India Baqer Mehdi and B.K.Passi were the first to develop creativity tests.

Passi's Tests of Creativity have the following sub-tests.

a. Seeing Problems test: This test has 4 questions and students are asked to write the defects and problems of a postcard, chapel and the like.

b. Unusual uses test: This test has 2 questions where students are asked to write usual and unusual uses of a piece of cloth, a bottle

c. Consequences test: In this test, students are asked to write the consequences for improbable situation. Ex: (i) Suppose all people become mad (ii) suppose all females become males, and the like.

d. Inquisitiveness test: In this test, students are asked to write a number of questions on a metronome and a placard.

e. Persistency test: In this test, students are given a set of cubes, half cubes and cuboids. They are asked to construct a number of different shapes out of these given objects.

f. Elaboration test: Students are given incomplete figures and students have to add details to them. A number of other tests have been developed by other researchers based on Torrance, Guilford.

There are three key paradigm shifts in assessment of creativity:

key #1: Focus on the Creative Process rather than the Product or the Person

There is no such thing as a creative type. We are all creative and we need to focus on creative process. It's just that we often need a bigger definition of creativity. Creativity is not innate or tied to our personality. Instead, creative thinking is a skill that we can develop over time. By focusing on the creative process, we move away from conversations about creative potential and towards the idea of creative momentum. The idea that we do not have a certain amount of creative potential.

key #2: Focus on Growth and Improvement Rather than Achievement

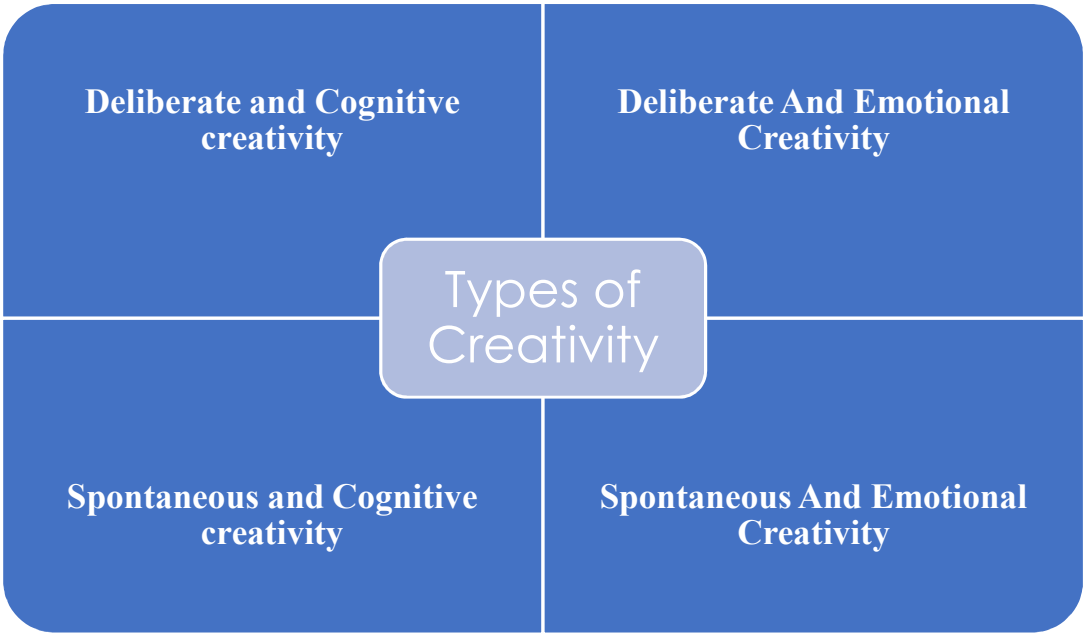
Teachers can provide feedback on the creative process without assigning a specific grade to the assessment. Allowing students to revise and resubmit work might actually lead to greater creative risk-taking. Students will still value the feedback and focus on their creative process but they can do so without worrying about how it will be graded. If students are focusing on growth and improvement, they are likely to do so with a critical eye. So, how do we help students apply a critical lens without falling into self-defeating or self-defeat?

key #3: Empower Students to Self-Assess Instead of Depending on the Teacher

By focusing on the creative process and using feedback rather than grading, I was able to assess student's creativity. In life, most of our major growth is through self-assessment and peer assessment. In some cases, assessment is descriptive and reflective. When students describe their creative process, it can take some of the judgement out of the assessment process.

3.7 TYPES OF CREATIVITY

Four different types of creativity with corresponding different brain activities.



I. **Deliberate and Cognitive creativity**

People who possess deliberate and cognitive characteristics are purposeful. This type of creativity is located in the brain's prefrontal cortex, which is at the front part of the brain. Thomas Alva Edison is one prominent example of this type of creative people.

II. **Deliberate and Emotional Creativity**

People who are deliberate and emotional let their work influenced by their state of emotions. This type of creativity is found in the amygdala and cingulate cortex parts of the human brain. Those moments are usually referred to as "a-ha!" moments when someone suddenly thinks of a solution.

III. **Spontaneous and Cognitive creativity**

There are times when you spend a while to break an issue yet can't think about any arrangement. Isaac Newton found out about the law of gravity when an apple hit his head while he was sitting under a tree and unwinding. This type of creativity happens when one has the knowledge to get a particular job done with inspiration.

IV. **Spontaneous and Emotional Creativity**

Spontaneous ideas and creativity happen when conscious and Prefrontal brain is resting. This type of creativity is mostly found in a great artist such as musicians, painters, and writers. Spontaneous and emotional creativity takes place in the “amygdala” part of the human brain.

SELF ASSESSMENT

1. What is determined by whether students can match their performance to what is expected?
   a. Success b. Innovation c. Creativity d. None of these

2. Why there is need to assess creativity?

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3. What are the different types of creativity? Explain with example.

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3.8 Assessment Strategies for Creativity

3.8.1 Brain Storming

Alex Osborn (psychologist) developed this technique. He had studied the way people think. Most of us evaluate our thinking immediately much before the idea is born.

Hence, Osborn divided the thinking into two stages:

a) Ideation stage
b) Evaluation stage.

In the Ideation stage, he has given four principles

- ✓ Free whelming is emphasized. Whether the idea is crazy, funny or costly express it.
- ✓ Criticism is avoided. Self-criticism or of others is not permitted.
- ✓ Quality breeds quality. More the number of ideas, the chances of better ideas are there. Hence, larger number of ideas are welcome.
- ✓ Hitchhiking is allowed. That means you can combine your ideas with that of others.

Students or people from different backgrounds, say 6-8 of them, are seated in a circle and made to express their views freely and openly, without fear or authority. These ideas are immediately recorded by a stenographer or on tape without the participants' knowledge.

In the evaluation phase, several officials and a few participants will sit and consider all the recorded ideas from the implementation point of view. Many ideas will be new, which the officials of that department would never have imagined.

3.8.2 Questioning

Teachers and researchers have developed a number of types of questions, which can be used to foster the creativity.

Redefining Questions: In this type of question, children are asked to redefine an object, animal, person or event.

a. Why is a fountain pen like a tap.

b. How are face and TV similar.

Consequences questions: These questions pose situations or events that might not have happened or will never happen.

a. If it is against the law to size.

b. Just suppose all people in the world become mad.

Hypothetical questions: In this type of questions students have to go beyond the available data (their learning) and synthesize them with their personality characteristics.

a. If you were the manager of a bank?

b. If you become an ant suddenly?

Provocative questions: The children may be taught a passage or they may be asked to go through a passage and proactive question may be put.

a. What would have Gandhiji done had he lived today?

b. Do you think lord Krishna would be the right type of leader today?

Questions seeking new relationships: Sometime these questions look to be funny or crazy and may lead on to frustration on the part of the students, but they will enjoy later.

a. Is month a mile?

b. Is day a week?

Divergent questions: These questions require the students to break from the fixed pattern of one question one answer and develop many relevant responses.

a. A town hidden beneath the mud has been found. What might have been the reasons as to why the town might have gone underground?

b. A tank is full of crocodiles. A pole is standing in the middle of the tank you have been given a rope and your job is to put a knot to the pole at the centre.

3.8.3 Scamper

Scamper is based on the notion that everything new is some addition or modification of something that already exists. You take a subject and change it into something else.

Scamper Stands for:

S = Substitute
C = Combine
A = Adapt
M = Magnify/Modify
P = Put to other uses
E = Eliminate
R = Rearrange/Reverse

With each word, just think of how you could apply that action to the idea you want to work with. For eg., ask yourself: Can I substitute certain parts of this plan to make something new? Would I be able to consolidate it with something different, or adjust it to fit an alternate circumstance? As we've said previously, hardly any things are really unique. The absolute

best thoughts come from adjusting different thoughts into something that hasn't been done previously, so an incredible method to keep away from a temporarily uncooperative mind to work off something you know.

3.9 Some Other Important Strategies

Riddle Solving

Alexander, the extraordinary, welcomed Indian Rishie to the challenge of puzzle development and riddle settling. Indian culture from days of yore has had puzzles in their writing. Grannies used to request that their grandkids tackle the riddles. Every one of the provinces of India have riddles in their dialects. Riddle addressing and puzzle development are like two standards of "Synectic", an Creativity encouraging procedures grew abroad. They are 'making the weird natural' and 'making the recognizable peculiar'. The greater part of the puzzles has been created utilizing analogies, might be immediate, basic, symbolic or dream.

Puzzle Solving

According to Edison’s son, Charles was very fond of solving puzzles. He kept himself creatively open to many problems and ideas. Most puzzles have a clue. Identifying and solving the clue will help you solve the puzzle. Otherwise, you will keep thinking in the old formal ways and will never be able to solve it. Peter Papper and others have written books on puzzles. Bhaskaracharya's "Amar Lilavati" is a collection of many riddles in Indian condition. You may recall Isaac Asimov's page in the "Illustrated Weekly of India" here.

Use Choice Boards

Use choice boards, which can allow teachers to create lessons around a specific learning goal, but offer students voice and choice in how to get it done/demonstrate mastery, etc.

Use Creative Rubrics

Use Creative Rubric is intended to help assess creative thinking in a broad range of areas. The rubric is made up of a set of attributes that are common to creative thinking.

Consequences situations

Children are given impossible situations and when such a thing happens what would be the consequences. Students enjoy variety of consequences for these just suppose situations some of them work out long and farfetched consequences that even the adults would be astonished.

3.10 Summing Up

The 'knowledge economy' is now renowned worldwide, alongside the importance of innovation. The focus of this chapter is to explore the factors that influence creative teaching

and to find out what effective strategies are used by teachers in the learning areas for developing and fostering creativity among children. Being creative helps you become a better problem solver in all areas of your life and work in a more creative way. The author believes that by understanding the role of creative teachers in developing students' creativity, we can better equip them for the world of work they need to do in the classroom.

3.11 Questions for Practice

1. What are the qualities of a Creative Teacher?
2. Discus types of Creativity
3. Define:
   (i) Scamper
   (ii) Brain Storming
   (iii) Components of Creative Expresses

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CERTIFICATE COURSE IN CREATIVITY AND INNOVATION IN SCHOOL EDUCATION

COURSE: CREATIVITY AND INNOVATION IN SCHOOLS (CISE-2)

UNIT 4: RECENT TRENDS TO FOSTER CREATIVITY

STRUCTURE

4.1 Learning Outcomes

After studying this unit, the learners will be able to:

- **Know about the recent trends to foster creativity among learners**
- **Identify the recent trends in India and abroad to foster creativity**

4.2 Introduction

In the preceding unit, you have learnt in detail about innovative pedagogy and need of innovative pedagogical strategies in teaching learning process. The addition of creativity and creative skills in the school curriculum helps students to be innovative and also encourages them to learn new skills. Creativity has become very important as digital media have proliferated. Ken Robinson has rightly pointed out that “Creativity is as important now in education as literacy and we

should treat it with the same status." Creative learners think deeply about whatever they are working on. They usually come up with new levels of depth in old and existing content or topics. Teaching or fostering creativity in classrooms is an evolving topic. To foster creativity, the environment around the learner should not be too serious. Creativity is having conceptual, structural, social and analytical dimension. The surroundings should foster encouragement. From time to time, the techniques and trends to foster creativity keep on changing. In this unit, you will learn about recent trends to foster creativity among learners.

4.3 Trends in India and Abroad to foster creativity among learners

Creativity is the ability to do something new, novel and unique. It helps to break static ways of thinking. There are various factors that affect creativity in the classrooms i.e. team climate, peer support, time invested, zeal to work, classroom environment, and different perceptions towards the concept. There are mainly two approaches to foster creativity i.e. structured and non-structured. Teaching creativity in the classroom is an evolving area. According to the Encyclopedia of Children's Health, creativity is defined as the ability to think up and design new inventions, produce works of art, solve problems in new ways or develop an idea based on an original, novel or unconventional approach. To foster creativity among learners, a safe environment is required. Scott Barry Kaufman and Carolyn Gregoire, a creativity scholars write in their book Wired to create: "Creativity isn't just about innovating or making art—it's about living creatively. We can approach any situation in life with a creative spirit."

Creativity is not static and there may be certain things every classroom should have to produce creative learners. "Encouraging creativity in young children is a process where teachers must open their own channels of allowing, accepting, and turning over some control to the children themselves." (James D. Moran III, Dean, College of Human Eco.)

Earlier it was believed that creativity is an inborn attribute possessed by only a few persons and it would develop automatically. But it is now believed that all children have the potential for creativity. They may differ in degree and quantity. It is now an accepted fact that the calm environment and safe surroundings provide opportunities for creativity to develop in children.

A review of the literature revealed that creativity is a relatively neglected area in educational research. Over the past few years, the area of creativity and innovation has been expanded. Various factors showed a critical role in shaping learner's creativity. Environment,

cognitive ability and motivation are the most important factors among all. Recent trends in the India and abroad continue in the direction of promoting creative thinking skills, imagination and curiosity among learners. Teaching creativity is emerging daily.

Kaufman and Beghetto (2009, p. 6) developed **four categories of creativity** which help to reveal the nuances between different levels and types of creativity. The four categories are as follows:

Big-C creativity or High creativity	Big-C creativity is reserved to describe the work of an elite few who have transformed their discipline with their inventions. Their work has been generally accepted as being innovative and ground-breaking, even if it was considered controversial when it was first created. Some examples are scientific works such as Einstein's theory of relativity and Darwin's theory of evolution, and works of art such as Picasso's Guernica, Jane Austen's novel Emma or Ludwig van Beethoven's Symphony No. 9 in D Minor. Big-C creativity is out of reach for most of us, and big-C creators themselves are often as extraordinary as their creations.
Pro-c creativity	This type of creativity has involved time (usually at least 10 years) and effort to develop. A musician, who showed promise as a child, has trained to degree level and now makes a living teaching and playing classical music could be classified as pro-c. A physicist working at a university who teaches and undertakes academic research could also be classified as pro-c.
Little-c creativity	Little-c creativity is about 'acting with flexibility, intelligence and novelty in the everyday' (Craft, 2005, p. 43). This results in creating something new that has 'originality and meaningfulness' (Richards, 2007, p. 5). This everyday kind of creativity can be found in the kind of person who can resolve a complex problem at work, is a keen gardener with an eye for design, or takes creative photographs and exhibits them on a photo-sharing website. School-age learners may work at little-c level if they engage in purposeful practice in their discipline. Little-c creativity involves practice and may be developed over a long period of time. The internet has provided the infrastructure for little-c creativity to thrive. Websites such as YouTube, Instagram and Etsy enable creative people to share their expertise and work.
Mini-c	Mini-c is defined as the 'novel and personally meaningful interpretation of

creativity	experiences, actions, and events' (Beghetto & Kaufman, 2007, p. 73). This is the kind of creativity that can be nurtured by teachers and parents. 'Mini-c happens when a person demonstrates "flexibility, intelligence and novelty" in their thinking' (Craft, 2005, p. 19). It is usually applied, but not necessarily limited, to children's creativity. Mini-c creativity may not be visible to outsiders and may consist purely of ideas and connections that the learner creates. As Vygotsky (1967, p. 7) explains: 'Any human act that gives rise to something new is referred to as a creative act, regardless of whether what is constructed is a physical object or some mental or emotional construct that lives within the person who created it and is known only to him.' Piaget suggested that 'to understand is to invent' (1976, cited by Richards, 2007, p. 95) meaning that a learner 'invents' an understanding of new material for themselves. Mini-c creativity could describe a learner's achievement in finding several different ways of approaching a Maths problem. It could also involve making a new connection between their existing knowledge and a new piece of information which helps them to understand the subject more fully

Above view of Kaufman and Beghetto (2009) categorized creativity with respect to different levels and types. "Creativity has also been called *"*the skill of the future*"* (Powers, 2018). Creativity expert Robert Epstein, a visiting scholar at the University of California, San Diego, has identified **four competencies essential for creative expression:**

1. Capturing—preserving new ideas.
2. Challenging—giving ourselves tough problems to solve.
3. Broadening—boosting creativity by learning interesting new things.
4. Surrounding—associating with interesting and diverse things and people.

Following are some of the **recent advances in** India and abroad to foster creativity among learners:

(i) Mind maps or spider diagrams are a useful, flexible and powerful tool for graphical representation of information and nurturing creative thinking. A mind map helps to generate idea to solve problem and to think with greater clarity to explore relationships between ideas. These are an effective **creative** thinking tool. Mind maps boost memory, imagination, productivity and innovation.

(ii) Inquiry Based and Experiential Learning: According to the University of Toronto: "Emergent curriculum is based on the premise that children are most successful at learning when curriculum experiences account for their interests, strengths, needs, and lived realities." To promote inquiry, imagination, curiosity, flexibility, activity-based learning and relationship building is important. Emergent curriculum requires observation, brainstorming and flexibility by the teacher.

(iii) Creative academic writings: Creativity is essential to all stages of academic writings. Certain courses or subjects in teacher educational institutions focuses on the techniques requited to boost creative academic writing. These put focus on storytelling and sharing personal experiences also.

(iv) E-Creativity Training programmes: There are various new and recent online courses for creativity training which are continue to emerge. Psychology of art and creativity, creative thinking skills, creative problem solving, design thinking, creativity for innovation etc. are some of the latest online courses offered by online platforms for fostering creativity among learners.

(v) Co-curricular Programs: Fostering Creativity related specific programs are not necessarily recent however many programs have been started in recent year. In many schools abroad, some programs provided co-curricular or extra-curricular education on creativity process and skills.

(vi) Design thinking and creativity for innovation: Design thinking refers to process for creative problem solving. It focuses on handling problems from a novel and unique direction. Creative thinking and critical thinking both are the part of design thinking. This is mainly human centered and collaborative approach. Design thinking is used to solve complex problems. Design thinking focuses on finding right problem which can be tackled.

(vii) Brainstorming: It refers to informal way to solve problems or misunderstanding. It refers to generating ideas and sharing knowledge to solve complex options. Brain storming is needed to identify and solve complex problems. It leads to more innovative ideas.

(viii) Collaborative learning/ online creative collaborative group projects/Project based learning: Uzzi and Spiro (2005, p. 447) note how collaboration can boost creative production: *"*creativity is not only, as myth tells, the brash work of loners, but also the consequence of a social system of actors that amplify or stifle one another's creativity*."* Uzzi and Spiro (2005). "Many of history's great creators – such as Beethoven, Marie Curie, the Beatles, and Maya Angelou – were involved in creative networks in which members critiqued, encouraged and

collaborated on each other's projects." There is peer to peer collaboration and teacher-student mentorship during collaborative learning or work on creative ideas. Online creative collaborative group project is included to foster creativity among learners.

(ix) Read and Sing Aloud Stories and Songs: Reading and storytelling in the elementary classes is used to foster creativity. But still there is very little research on effect of children's read and sings on creativity. Digital stories are also used to foster imagination and creativity among learners.

(x) Creative dramatic activities, games and skits workshops: Creative drama, games and skit workshop can help children learn about emotions and relating to other people. According to Nellie Mc Caslin "Of all the arts, drama involves the participant the most fully: intellectually, emotionally, physically, verbally, and socially. As players, children assume the roles of others, and they learn about becoming more sensitive to the problems and values of persons different from themselves. At the same time, they are learning to work cooperatively, for drama is a communal art; each person is necessary to the whole."Creative drama includes dramatic play, storytelling, curiosity, imagination games, music, and dance.

(xi) Free Open Expression for Children in Prose and Poetry in any language: It is very important that children should be free to express their ideas and views in their own language. Chomsky uses the "creative aspect of language use" to define the innovative and creative uses of language. Language has creativity, usefulness and productivity. Now-a-days, the term linguistic creativity is used extensively.

(xii) Blended Learning Program: Blended learning is a new technique and amalgamation of face-to-face interaction and online technology methods. Now-a-days, student's creative thinking skill can be improved through Blended Learning approach.

(xiii) Do nothing at all: According to Alan Cohen "There is virtue in work and there is virtue in rest. Use both and overlook neither." Sometimes your mind just needs to give pause. Processing too much information can stop your productivity as well as your creativity.

(xiv) Social Creativity: Recent researches highlight the importance of social and collaborative dimension of creativity. According to Sawyer (2012), "A creation process can be enhanced by collaboration and focus on the processes involved, named as "process approach." Social

creativity can be fostered with the help of team assignments, group work, cooperative learning and collaborative work.

(xv) **Social Media and Multimedia-Based Pedagogy:** Rapidly growing technological advances have led many educators to implement a technology-centered educational system in the classrooms. Existing social media and multimedia-based pedagogies encourage a student's creativity. Social media provides more effective and efficient strategies to cultivate creativity among learners.

4.4 BOX I

Kills Creativity

According to Hennessy and Amiable (1992), "Creativity is reduced when- (i) close watch is kept over kids. Constant observation makes them uncomfortable and their natural risk taking urge and creativity is curbed. They are repeatedly made conscious of the appraisal. (ii) Competition starts playing a definite role in negating the risk-taking abilities of children thus depriving them of creative urge and (iii) The child is checked repeatedly and not allowed a free hand killing all exploration and desire to experiment (iv) Achievement targets are set putting undue pressure on the child."

Freshgigs blogs: Five culprits-that-are-killing-your-creativity

Pessimism
Fear
Pressure
Isolation
Narrow-mindedness

(Source: https://www.freshgigs.ca/blog/5-culprits-that-are-killing-your-creativity/)

4.5 Self-assessment questions

1. According to you, which is the one major cause of creativity killer and why?

_____

_____

_____

_____

2. Scott Barry Kaufman and Carolyn Gregoire, creativity scholars, write in their book Wired:

"Creativity isn't just about innovating or making art—it's about living creatively". Describe this statement.

_____

_____

_____

_____

4.6 Summing Up

Fostering creativity among learners is very important to utilize their potentialities. All young children need to be creative. Creativity is helpful in mental growth of the children by providing opportunities for trying out new ideas and new ways. If we review the related literature, we will observe that no much effort have been made by the experts in the recent past to foster creativity. It is still an evolving concept. National Education Policy- India (2020) aims at using unique capabilities of the learners by promoting creativity, critical thinning and innovation. Teachers must be well equipped with necessary techniques so that they can foster creativity among learners. In order to promote creativity, teachers and teacher educators need auyonomy with respect to curriculum, pedagogy and assessment.

4.7 Questions for Practice

(i) Give the four categories of Creativity.

(ii) Give recent trends in fostering Creativity**.**

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CERTIFICATE COURSE IN CREATIVITY AND INNOVATION IN SCHOOL EDUCATION

COURSE: CREATIVITY AND INNOVATION IN SCHOOLS (CISE-2)

UNIT 5: GENERAL STRATEGIES FOR PROMOTING CREATIVITY AND INNOVATION

STRUCTURE

5.1 Learning Objectives

After studying this unit, the learners will be able to:

- Elaborate on the various strategies to develop creativity and innovation among learners
- Enlist the various strategies to develop creativity and innovation
- Adopt various strategies to develop creativity and innovation

5.2 Introduction

In the preceding units, you have learnt in detail about creativity, its recent trends and other related terms and concepts. It is very much necessary that to encourage innovation, there is a need to create an environment conducive to creativity. In Oxford Living Dictionary, creativity is defined as "the use of imagination or original ideas to create something." Innovation, on the other hand, means "a new method, idea, product, etc." Creativity is crucial for learners, musicians, poets, writers, painters, journalists and marketing experts and other kinds of artists. Innovation is mainly

needed in business, technology and related fields to give a company a push forward. Creativity can exit without innovation whereas innovation cannot exist without creativity. The main three levels of creativity are: Discovery, Invention and Creation. In the 21st century, it is very important to boost creativity and innovation among learners. There are various strategies which promotes creativity and innovations. The focus of this chapter is to explore the various general strategies used by teachers and teacher educators to promote creativity and innovation.

5.3 Ideas-Collection Processes

"Creative thinking inspires ideas. Ideas inspire change" – Barbara Januszkiewicz

Ideas play an important role in creativity and innovation. To improve anything, new ideas are required. It is very important that there must be a systematic process for managing those ideas. Idea in simple words refers to thoughts and impressions that are created by mind after seeking opportunities like invention of pen was an idea and later was use in business. Idea can be related or unrelated. Some ideas are tough or impossible to implement. Idea generation is the process of generating, developing and communicating ideas which are concrete and abstract. Ideas are plan, design, scheme, project, proposal, proposition, suggestion, recommendation, aim, intention, objective, purpose, end, goal and target. Ideas are also connections.

Let us discuss about source of an idea in the field of business. The major sources of new idea in business and entrepreneurship are:

(i) Consumer
(ii) Existing situations like existing product or competitors
(iii) Distribution channel (wholesaler and retailers)
(iv) Government
(v) Research and development

Idea collection is a very important link between creativity and innovation. As such, developing a decent quantity of ideas, as well as stockpiling them has long been recommended (Campbell, 1960; Osborn, 1957). Idea collection is the first stage of collaborative and creative innovation. One should encourage ideas to be submitted and collected, no matter what type of idea it is and remember that the ideas which may be submitted may not be as practical as we expect. Idea collection helps to uncover

opportunities. You must know that there are four main stages of creativity viz. Preparation, Incubation, Illumination and Verification/implementation. Idea collection and gathering is concerned with preparation stage. Idea collection is convergent thinking whereas idea creation is a divergent thinking. Idea collection refers to collecting information from every possible source.

Basis of collection of ideas:

(i) Need

(ii) Transformation

(iii) Innovation (something new or different)

(iv) Necessity is the mother of invention

(v) Solve a problem and create a solution

Mind tolls content team has mentioned three key approaches to generating new ideas. These are

1. Breaking old thinking patterns.
2. Making new connections.
3. Getting fresh perspectives.

There are several theories for idea collection. Some of them are as below:

- Idea collection with the help of survey use of surveying form
- Online idea discussions
- Face to face idea collection
- Round table techniques to gather consensus
- With brainstorming

Leon Ho, the founder and CEO of Lifehack, wrote about idea collection method. According to Leon Ho, "It's a simple process that involves seven steps:

Keep a notebook in your car-Your car is a key location where ideas may occur.
Keep a notebook beside your bed-If not pen and paper, dictate a note on phone.
Separate collection from retrieval-Lot nothing impede collection, reflect on ideas later.
Compile ideas in one place-Funnel everything into your idea repository.
Organise your ideas-Put ideas into categories: Stories, Home etc.
Kill your darlings-Make a cull as not all ideas are good ones.
Make your ideas actionable-Work on ideas to make them actionable.

Source:

(https://bettermarketing.pub/what-you-should-know-about-curating-your-ideas-86eced3fd221)

Idea collection and generation is the creative process or procedure that one uses in order to figure out solutions to any number of problems. Ideas can be collected in a group discussion, selecting the best idea or ideas out of different alternative ideas, implement that idea and then actually taking that idea and giving it a practical shape.

Tools/Methods/Techniques to be used for idea collection:

There are many excellent and creative techniques that can be used for idea collection or generation. Some of them are:

(i) Read More Books
(ii) Gamification (to provide rewards for good ideas)
(iii) Survey
(iv) Brain storming
(v) Focus groups (open minded in-depth discussion)
(vi) The 5W+H Method (Who, what, where, when, why, and how?)
(vii) Questionnaire
(viii) Social Listening
(ix) Problem Inventory Analysis (like analysis of problems in a product)
(x) Searching from web or internet
(xi) Face to face discussion
(xii) Creativity and problem solving
(xiii) Panel discussion
(xiv) Role playing
(xv) Expert's view
(xvi) Literature review
(xvii) Environment scanning
(xviii) Keep a Regular Journal.
(xix) Use Structured Exercises.
(xx) Engage in Observation Sessions.
(xxi) Socialize Outside Your Normal Circles.

(xxii) Meditate.

(xxiii) Use of online tools

(xxiv) Mind Mapping

(xxv) Reverse thinking

Points to be kept in mind while collection of ideas:

(i) Encourage others to submit ideas

(ii) All ideas need to be accepted.

(iii) Have an open mind and reject nothing

(iv) Use different tools to collect ideas like gamification etc.

(v) Give comments on ideas and provide others to offer constructive criticism and modifications

(vi) Set clear goals about why do you want different ideas and what do you want to achieve with these ideas

(vii) How to evaluate the standard of these ideas

(viii) Before rejecting any idea, ask why you're rejecting.

(ix) Idea collection should be Ubiquitous (your idea collection system must be at your hand.)

(x) There must be a foolproof retrieval system, once you have collected your ideas.

A teacher must use idea collection processes in the classroom to nurture creativity among learners. But we should also consider its disadvantages. Jeffrey Baumgartner in his article, "Collecting Ideas Is Killing Your Innovation" mentioned, "Having spoken to many innovation managers over the years, I have observed two things. Firstly, most of them oversee initiatives designed to capture lots of ideas and, secondly, the collection of those ideas is destroying their innovation initiatives, stifling creativity and holding back actual innovation." Jeffrey Baumgartner has mentioned, "I believe there are several reasons why this is so. Blindly praising every idea encourages mediocrity.

(i) Criticising an idea starts a conversation about the idea as well as your needs, restrictions, assumptions and more. When ideas cannot be criticised, you cannot delve into them. You cannot really discuss them. You certainly cannot build upon them until you've discovered the weaknesses that need improving.

(ii) Criticising an idea gives it importance. When all ideas are "great", the compliment becomes meaningless. When someone stops to listen to an

idea, thinks about it and addresses its weaknesses, she is saying, "This idea has meaning to me. I want to talk about it."

(iii) Criticising ideas gives guidance. If an idea is criticised, debated and rightly found not to be viable, this tells people to think in a new direction."

To develop and nurture creativity, it is very important for a teacher to help students to generate new ideas or collect ideas from different sources and analyse all ideas. Idea collection requires proper organising of ideas. Ideation is the process where you generate or form ideas or concepts.

SELF-ASSESEMENT EXERCISE

Give some tools to be used to for idea collection.

5.4 Brainstorming/Brain-Writing

Brainstorming is a strategy used to generate a number of ideas to help solve a clearly defined and particular problem. Brainstorming is a method and informal way of collecting and generating ideas and sharing knowledge to solve a particular problem. Here participants are encouraged to think and discuss. It is a group activity where each participant shares their ideas. Alex Osborn (psychologist) developed this technique. He had studied the way people think. It involves storming of a creative problem. Most of us evaluate our thinking immediately much before the idea is born. Hence, Osborn divided the thinking into two stages:

a) Ideation stage
b) Evaluation stage.

In the Ideation stage, he has given four principles

- ✓ Free whelming is emphasized. Whether the idea is crazy, funny or costly-express it.
- ✓ Criticism is to be avoided. Self-criticism or of others is not permitted.
- ✓ Quality breeds quality. More the number of ideas more are the chances of better ideas. Hence, larger number of ideas are welcome.
- ✓ Hitchhiking is allowed. That means you can combine your ideas with those of others.

Students or people from different backgrounds, say 6-8 of them, are seated in a circle and made to express their views freely and openly, without fear or authority. These

ideas are immediately recorded by a stenographer or on tape without the participants' knowledge.

In the evaluation phase, several officials and a few participants will sit and consider all the recorded ideas from the implementation point of view. Many ideas will be new, which the officials of that department would never have imagined.

"Brainstorming is the process of free thinking and generating ideas without being bound by restraints such as "is this a good or bad idea?" (Slater and Cory, 2003)."

Brainstorming technique can be easily used for small groups of children. There is full freedom of expression and with the help of teacher, students reach some conclusions. The main purpose of brainstorming is to solve a problem creatively or innovatively. Brain storming technique helps to arouse attention and develop interest of the students. An effective **brainstorming** session is from 15 to 45 minutes. 30 minutes is usually ideal and perfect. Brainstorming is a creative activity that encourages creative thinking from all participants.

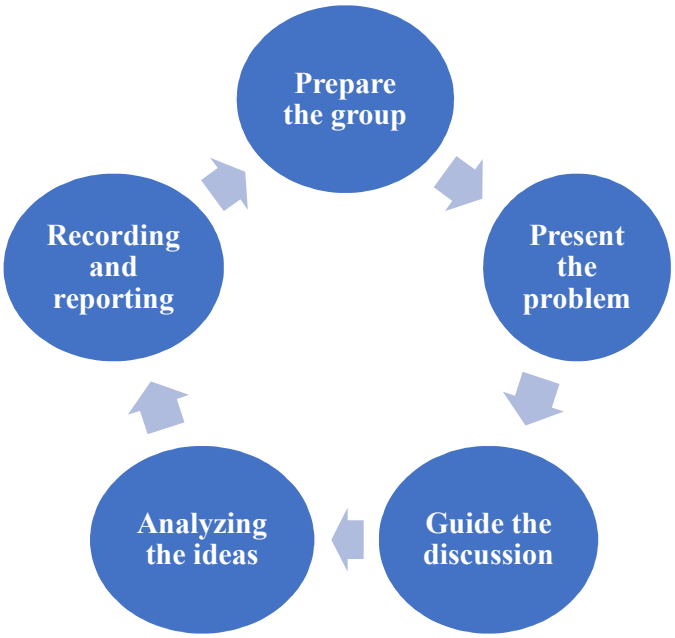
There are different **types of brainstorming**. These are as follows:

1. Individual brainstorming
2. Group brainstorming

Techniques of brainstorming:

- Abstraction
- Means-end analysis
- Hypothesis testing
- Analogy
- Divide and Conquer
- Trial and error
- Reverse Brainstorming
- Question brainstorming
- Brain writing
- Mind Mapping
- Focus groups
- Concept maps
- Electronic or online brainstorming

Steps of Brainstorming:



The four phases of effective brainstorming as follows:

1. Define the problem
2. Generation of ideas
3. Discussion of the produced or generated ideas
4. Final evaluation of the presented ideas.

Brainstorming is part of ideation phase of design thinking.

Source:

https://pixabay.com/illustrations/brainstorming-team-idea-5334706/

Benefits of Brainstorming

The following are some of the benefits of brainstorming technique

1. Brainstorming encourages more creative thinking.
2. Encourages Critical Thinking.
3. Development of imagination.
4. Teach acceptance and respect for individual differences.
5. Finding solutions.
6. Leads to better teamwork and greater group cohesiveness.
7. Helping to reveal new ideas and solutions.
8. Encourage learners to take risks in sharing their ideas and opinions.
9. Demonstrate to students that their knowledge and their language abilities are valued and accepted.
10. Brainstorming gives everybody a chance to be heard.
11. It encourages free speech and creativity.
12. Brainstorming gives everybody a chance to be heard.
13. Arouses attention and develop interest.
14. It is a source of joy and satisfaction.

The rules of brainstorming are:

- One should focus on quantity.
- Criticism should be avoided
- Encourage wild and ambitious ideas
- Combine and improve ideas.
- Welcome unusual ideas
- People are encouraged to build on other ideas.
- Maintain team spirit among participants
- A chairman and a recorder and observer must be appointed

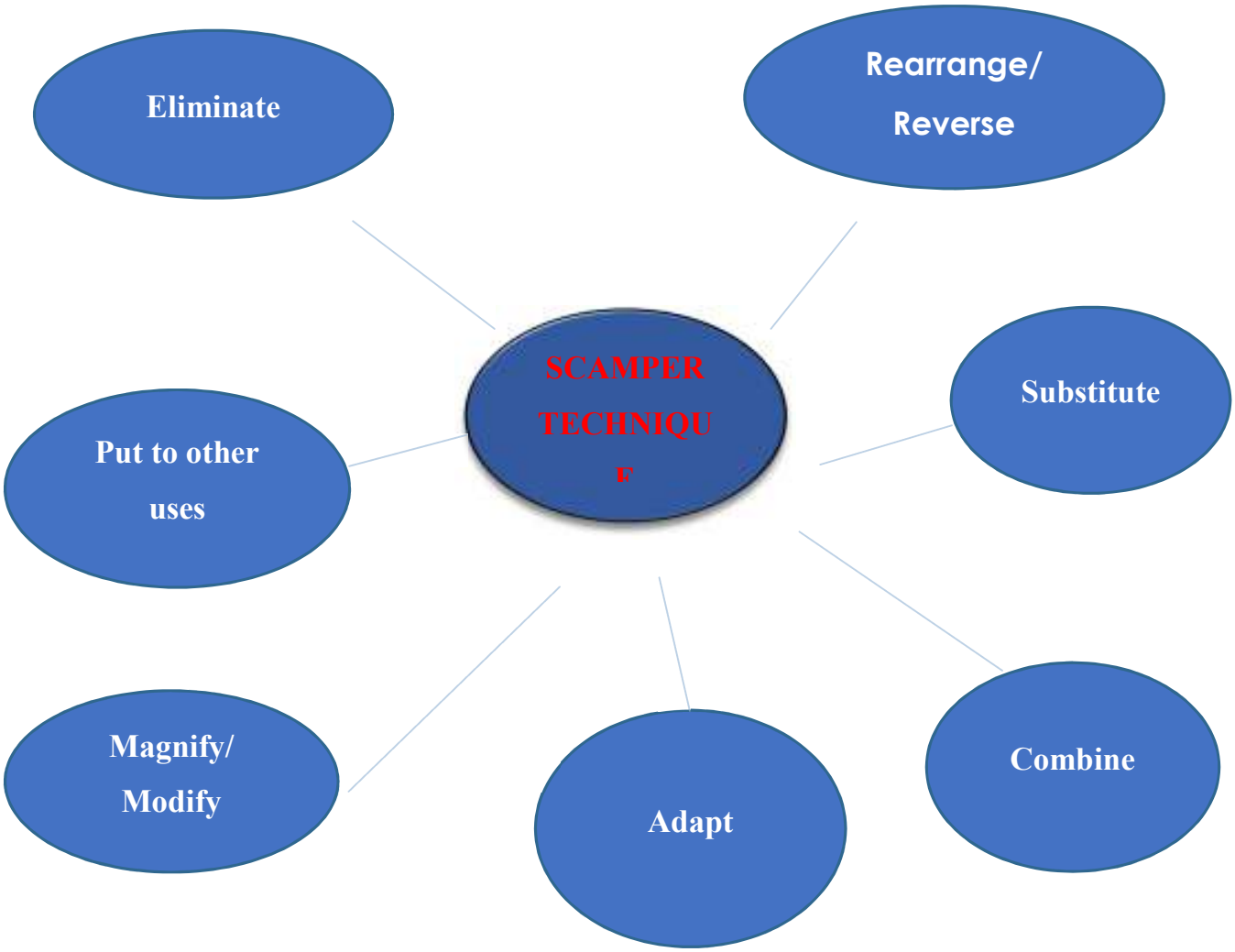
Brainstorm means to think about and try to come up with solutions to a given problem, some of the related words for brainstorm are like: inspiration, thoughts, deliriousness, brainstorming, brain wave, insight, brainwave, brainstormed and mind mapping. Brainstorming is an indispensable part of critical and reflective thinking and a tool that people use to invent an idea and find a solution to a problem.

Brain-writing: Brain-writing is different from brainstorming. Brain writing is suitable in the situations where the number of introverts in a team or group is there. It is silent and written generation of ideas. With this technique, team members share ideas by writing them down independently. It's especially helpful if you know there are students in the group whose nature is shy. A teacher asks participants to write their ideas on paper or online. It is also called as individual brainstorming. Brainstorming is the oral and discussion generation of ideas. Brain-writing is the written discussion of ideas. But ideas should be written in a stipulated period of time. Brain-writing enables to share creative ideas of others. Like brainstorming , brain-writing was designed by German marketing expert Bernd Rohrbach in 1969 and it is a great way to develop innovative ideas, share new ideas and encourage creativity & innovation. 6-3-5 Brain-writing is one of the most widely used technique. In 6-3-5 sessions brain-writing activities are split into several rounds. Here, in each round, six people write down three ideas each within five minutes. These sessions can also be hosted online in a remote or virtual meeting.

5.5 The Scamper Methods

SCAMPER is a creativity tool. "There is nothing new under the sun but there are lots of old things we don't know."-Ambrose Bierce

Scamper is based on the notion that everything new is some addition or modification of something that already exists. You take something (existing) and change it into something else. Eberle played with Alex Osborn's list (Osborn is the marketing guru who invented "brainstorming") and developed SCAMPER. SCAMPER is easy to implement. It is creative thinking and problem solving method that facilitates improvement. It is an idea manipulation tool to guide us in generating different ideas. SCAMPER address targeted questions that help solve problems or ignite creativity during brainstorming sessions.



SCAMPER Stands for:

S =Substitute
C =Combine
A =Adapt
M =Magnify/Modify
P =Put to other uses
E =Eliminate
R = Rearrange/Reverse

With each word, just think of how you could apply that action to the idea you want to work with. For e.g., ask yourself: Can I substitute certain parts of this plan to make something new? Would I be able to consolidate it with something different, or adjust it to fit an alternate circumstance? As we've said previously, hardly any things are really unique. The absolute best thoughts come from adjusting different thoughts into something that hasn't been done previously, so incredible methods to keep away from a temporarily uncooperative mind to work off something you know.

5.6-- BOX I: FACTS

1. In a 2014 study conducted by Kaufman, 72% OF PEOPLE HAVE CREATIVE INSIGHTS IN THE SHOWER.

2. A pile of scientific research reviewed by Kaufman and Gregoire suggests that, in their words, “the drive for exploration, in its many forms, may be the single most important personal factor predicting creative achievement.”

3. Frida Kahlo. John Lennon. Paul McCartney. Truman Capote. Robin Williams. Jerry Garcia. Some of the most revered creative minds in modern history have one thing in common: They experienced some kind of major loss or trauma (quite often, the death of a parent or another loved one) that had an impact on their artistic endeavors. It’s no coincidence, either. Psychologists call this phenomenon “post-traumatic growth.

*(Source:*https://www.fastcompany.com/3063626/7-surprising-facts-about-creativity-according-to-science)

5.7 Metaphoric Thinking

Metaphors are the key to creative thinking. The word originates from the Greek word metaphorá, meaning to transfer, to carry over. Metaphoric thinking is a substitutional mental process. In it implicit comparisons are made between qualities of objects or persons which are in separate classifications. Metaphorical, in simple words, is used to symbolize another thing. For example, a sunny day in a poem might be a metaphorical representation of happiness. Most of the teachers use adjective metaphorical all the time if they take a poetry class. Poems are usually full of metaphors. It is a figurative language. Metaphor compares two things. It does not use any comparison terms (such as like, as, resembles, than) to do comparisons.

If a teacher wants to improve creativity among learners, metaphors can open up the creative side of the brain. So metaphorical thinking can help solving the problem in a creative manner. It helps to "think outside the box".

American philosopher Richard Rorty characterized the creative metaphor as a challenge to established schemes and conventional perceptions: "A metaphor is, so to speak, a voice from outside logical space. It is a call to change one's language and one's life, rather than a proposal about how to systematize them" ("Metaphor as the Growing Point of Language," 1991).

Example:

Her tall black-suited body seemed to carve its way through the crowded room." (Josephine Hart, *Damage*, 1991)

- "By using metaphors, much more can be conveyed, through implication and connotation, than through straightforward, literal language. Take the case of . . . that literary metaphor *dolphin-torn*: what exactly is Yeats suggesting about the sea, and how else could this have been expressed? Just as writers convey meaning more open-endedly when they use metaphorical language, readers interpret less narrowly than they would literal language. So meaning is communicated between writer and reader in a less precise way, even though the metaphors may seem concrete and vivid. It is this imprecision, this 'fuzziness' of meaning, which makes metaphor such a powerful tool in the communication of emotion, evaluation, and explanation too."
(Murray Knowles and Rosamund Moon, *Introducing Metaphor*. Routledge, 2006)
(Sue William Silverman, *Fearless Confessions: A Writer's Guide to Memoir*. University of Georgia Press, 2009), “Even though our individual stories are different, we communicate through the common language of metaphor by embodying our ideas in images and details. By ruminating upon ourselves, we also conjure stories of others. By this acknowledgment of others' experiences, we address a whole range of social, political, and cultural issues. "It's impossible to live every life, fight every war, battle every illness, belong to every tribe, believe in every religion. The only way we come close to the whole experience is by embracing what we see both inside and outside the window of the page."

Types of Metaphors

There are countless ways of looking at metaphors, thinking about them, and using them

Richard Nordquist (2019) has listed following types of metaphors:

1. Absolute:
2. Complex
3. Conceptual
4. Conventional
5. Creative
6. Dead
7. Extended
8. Mixed
9. Primary
10. Root
11. Submerged
12. Therapeutic
13. Visual

14. Organizational

To develop creativity, Metaphoric thinking plays an important role. Andy Eklund (2014) in his article "

How To Use Metaphors to Inspire Creative Thinking" mentioned "Metaphors help creative thinking in three ways:

1. It helps to identifying similarities between qualities of objects or persons which are in separate classifications.
2. It examines the old problem in a new context or perspective
3. Looks elsewhere for answers, particularly outside our existing body of knowledge as well as our comfort zone."

Andy Eklund (2014) in his article further added "William J.J. Gordon formalized the metaphor process during the 1950s as 'Synectics' when he learnt through his research that people often solved problems creatively when they expressed the issue or need as a metaphor. Gordon and his colleagues used another poet – the German writer Novalis – to explain how metaphors can work in brainstorms: Metaphors make the strange familiar and Metaphors make the familiar strange."

Gibbs (1990) recently discussed the role of metaphors in creative production. He suggested first that metaphors are often found in creative works like in poetry. Metaphor may not be creative by themselves but my lead to creative ideas by interaction with other cognitive processes. Teachers must use metaphor to foster creativity among learners. Teachers can be encouraged to think of metaphors for other aspects of teaching: for example, students (nation builders?), learning (a journey?), and the classroom (a temple of learning?).

5.8 Outrageous Thinking

Outrageous in simple words refers to infamous, unspeakable, intolerable, insufferable, unacceptable, being or having the nature of an **outrage**, very strange or unusual. The question of popular successful people generally is "why not". The people who are game changers ask themselves this question. Steve Jobs said, "Let's make a dent in the universe." He usually thinks big, to not be limited by any boundaries and to dream beyond wildest imaginations. By allowing yourself to be outrageous, you will find that you'll come up with unusual, unique and innovative solutions. Outrageous thinking" is a thought process that helps to develop breakthrough ideas. One can think big and do big by thinking outrageous.

There are some reasons why successful people thing outrageously:

1. They create new boxes or new norms for normal people to think inside of
2. They are never scared, having no fear. Will Smith, "Fear is not real. The only place that fear exists is in our thoughts of the future. It is a product of our imagination, causing is to fear things that do not at present and may not ever exist. That is near insanity. Do not misunderstand me. Danger is very real but fear is a choice."
3. Having high energy
4. Break the rules
5. Strive for authenticity
6. They invent out of necessity as rightly said invention is a key to necessity.
7. Recognize other crazy or outrageous thoughts
8. They are always anxious and curious
9. Never label people or problems.
10. Out of box thinking
11. Creative thinkers

A great teacher always keeps the students busy in the interesting things they can explore and discover each day. Creative teachers help the learners to be creative and for that outrageous thoughts help to be creative.

"Creativity involves breaking out of established patterns in order to look at things in a different way."-Edward de Bono.

Dorothy Parker rightly said that creativity is a wild mind and disciplined eye.

Lindsay Lonai Linegar (2019) in her article " Tame Your Wild Mind Into a thriving creativity garden." Suggested some practical ideas to use outrageous thoughts to creative energies. These are:

1. Write whatever comes without edit and overthink.
2. Do not even worry about making coherent, complete, grammatically correct, or non-run-on sentences.
3. Let loose on the page. Write one word only. Then another. Or write a single run-on sentence that fills an entire page. Did some song lyrics just pop into your head? Why not write those down, too?! Write a list. Record that epiphanic thought you had earlier. Then leave it for a completely different, mundane one.
4. Write exactly what's on your mind. Complain. Cry and curse and be angry on the page if you need to. Do not judge or criticize yourself. Rejoice if you need

to. Celebrate what's going well in your life. Give thanks where thanks are due. Let yourself be excited about your ideas, and your goals, and your plans for the future.

5. Do this for at least two pages. Cameron recommends doing three longhand pages — which generally equates to about 300–500 words on lined notebook paper, depending on the ruling. Depending on the size of paper you use, two to three pages does seem to be the sweet spot. Then switch over to creative journal for other creative release.
6. Breathe. Stretch. Wonder. When you finish, see if it helped. See if your brain feels different — lighter somehow, and better able to focus. See if it leads to more creative work.

   All of the above practices can be used by a teacher in the classroom to see if it takes their wild and beautiful mind.

(Source: Lindsay Lonai Linegar (2019) in her article " Tame Your Wild Mind into a thriving creativity garden https://medium.com/lindsaylinegar/the-best-creativity-hack-21259ddb81be)

5.9 Mapping Thoughts

Mapping thoughts refers to "radiant thoughts or thinking" – that is, thoughts radiate out from a single idea and often expressed as an image. A mind map is a graphical or pictorial representation of ideas and concepts. It is a visual thinking tool. Mind mapping helps to structuring information, and to better analyze, comprehend, synthesize, recall and generate new ideas and concepts. Mapping thoughts helps to increase efficiency. Mapping thoughts also refers to as Mind mapping. A mind map is a simple hierarchical radial diagram invented by Tony Buzan. This technique is useful to develop an idea, a project, a problem, a solution, etc. The main goal of a mapping thought is to clearly visualize all thoughts and ideas. Creating a mind map is not very complex rather it has three main steps:

1. Choose any topic
2. Add branches for related ideas or concepts or terms
3. Add sub branches for related ideas or concepts or terms

Mind maps are multisensory, brainstorming and powerful note-taking tool that help learners to think and remember better, creatively solve problems and take action. It also encourages creativity and flexibility and to think outside the box. Mind maps open up to creativity and new ways of thinking. Mind maps are realistic. These help to

get the big picture. They naturally hook into your right brain, where creativity and intuition can help you. Mind maps help the students to organize, integrate, and retain information. Recent researches suggest that mind mapping strategy facilitates critical and creative thinking. These are graphic organizers.

Types of mind maps

- Brainstorming mind maps
- Note taking mind maps
- Memorization mind maps
- Reading comprehensive mind maps
- Group project mind maps
- Essay and Exam preparation mind map
- Creative writing mind map
- Flow maps
- Multi flow maps
- Tree map
- Brace map
- Circle maps
- Bubble maps
- Double bubble maps

Students can use mind mapping for:

- Note taking
- Easy comparisons and classifications
- Problem solving
- Examination
- Gaining insight on complex subjects
- Studying and memorization
- Planning and organising
- Brainstorming (individually or in groups)
- Researching and consolidating information from multiple sources
- Presenting information
- Creativity

Now-a-days various online apps and websites are available for in mapping like Mindmeister, Mindmup,Coggle, Mindly, Diagrams.net etc.

Merits of Mindmaps

1. Helps to create interest in the topics
2. Involves visual sense
3. Facilitates better understanding of relationships and connections between ideas and concepts.
4. Makes it easy to organise ideas and concepts
5. Helps to plan tasks
6. Makes it easy to communicate new ideas and thought processes
7. Allows students to easily recall information
8. Helps students brainstorm and explore any idea, concept, or problem
9. Helps students take study notes
10. Helps to think critically and creatively
11. Helps to solve problems

(source: Safety Professionals Chennai https://commons.wikimedia.org/wiki/File:Mind_map_Strategy.png)

(source: fbatista72 https://www.istockphoto.com/photo/mind-mapping-planning-projects-gm1015950846-273366953?irgwc=1&cid=IS&utm_medium=affiliate_SP&utm_source=FreeImages&clickid=QUw3YvQtuxyLWiK0O7XQxx3QUkB1RowoZ2ju3Q0&utm_term=mindmap%20on%20learning&utm_campaign=&utm_content=270501&irpid=246195)

Mind map is an important tool in the hands of a teacher to make content and presentation effective. Teachers must use mind map during teaching process and students must use it for learning purposes.

5.10 Lets Sum Up

National Policy of Education (India), 2020 emphasis on the holistic development of the learners. It is important to advance our students with 21st-century skills. The most important skills are critical thinking skills and creativity. Creativity refers to tendency to generate or recognize new ideas and making an idea by changing or modifying existing. Creativity plays an important role in learner's success. Teacher must try to improve creativity skills of the learners. Teacher and teacher educator may use some strategies to boost creativity and creative skills among learners. Creativity helps the learner to become better problem solver in all areas of your life and work.

5.11 SELF ASSESSMENT QUESTIONS

1. Why brain storming is the most important strategy to develop creativity?

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2. According to you, which strategy is the most useful for your learners?

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3. How will you implement the strategy "Mapping thoughts" in your classroom?

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CERTIFICATE COURSE IN CREATIVITY AND INNOVATION IN SCHOOL EDUCATION

COURSE: INNOVATIVE PEDAGOGICAL STRATEGIES FOR FOSTERING CREATIVITY AMONG SCHOOL STUDENTS AND ITS IMPLEMENTATION (CISE-2)

UNIT 6: NEW APPROACHES TO BOOST CREATIVITY

STRUCTURE

6.1 Learning Outcomes

After studying this unit, the learners will be able to:

- Explain the approaches to creativity and creative thinking
- Elaborate Eight-Dimensional (8D) Approach to Ideation
- Elaborate Systematic Inventive Thinking

6.2 Introduction

Creativity is an asset to one's long-term professional, social, and emotional development. Child experts encourage caregivers to nurture children's creativity. Creativity is the skill that is more difficult to acquire, and also the most craved one. One can appreciate and thirst for this as it enriches our understanding and can make our life most easily. Fostering creativity among children is important for various reasons. Many researches highlighted the fact that creativity isn't solely a talent possessed by artists, designers or musicians. One learns how to be creative by changing the way of thinking, communicating and behaving. Teachers may use different innovative pedagogical strategies to foster creativity among learners. There are various approaches that will help to boost the creativity of the learners. In this unit, you will learn about different approaches to boost creativity.

6.3. Approaches to Creativity and Creative Thinking

Creativity makes our world a better place to live and makes lives more exciting and interesting. Various disciplines explain and describe creativity in different ways. . These disciplines include education, sociology, psychology, linguistics, literature and engineering etc. Creativity is ability or a process by which something unique, different and new is made. There are various techniques that will help to improve creativity skills i.e. Improvisation, Lateral thinking, Brainstorming, "Five W's and H." By Toyoda etc. There are different approaches of creativity which helps to boost creativity skills. Approaches refer to a way of dealing with or doing or thinking something, it also an act of approaching. For innovation and creativity, there are three key approaches to generating new ideas: breaking old thinking patterns, making new connections and getting fresh perspectives._Sternberg & Lubart, 1999 has given seven approaches to creativity i.e. Mystical approaches, Pragmatic approaches, Psychodynamic approaches, Psychometric approaches, Cognitive approaches, Social-personality approaches and Confluence approaches. The other point of view suggests four approaches: the productive approach, process approach, the creative person approach and the creative press approach.

6.4 Eight-Dimensional (8d) Approach to Ideation

To overcome the disadvantages of existing methods and use of past experiences, there is a need of systematic and organized approach to idea generation. Ideation refers to the formation of ideas or concepts. Creativity is problem solving. You have a problem, so you generate ideas to solve the problem. Creative problem solving is a way of using creativity to develop new ideas and solutions to problems. Creativity is one of the skills required to solve problems. Creative thinking includes analysis, evaluation, open-mindedness, problem-solving, systematization, organization, and communication. Eight-Dimensional approach to problem solving unifies existing problem solving knowledge, techniques and solution from different disciplines. This approach stimulates thinking (ideas) by focusing on eight strategies of problem solving. The eight dimensions here are not mutually exclusive. It means same solution may be found in more than one dimension. Here, the order in which dimensions are not important.

The eight dimensional (8D) model is a problem solving approach is most commonly used by the automotive industry. These have also been successfully applied in healthcare, education, finance, government, and manufacturing. The objective of this approach is to diagnose or identify, correct, and eliminate problems which are recurring in nature and to make improvement in processes.

The 8D approaches to ideation approach solve problems of any kind in a systematic manner and stimulate innovation. It quickly generates unique "out-of-the-box" thinking and ideas and lead to unexpected and high-quality solutions. Eight disciplines problem solving (8Ds) is a method developed at Ford Motor Company used to resolve problems, typically employed by quality engineers or other professionals.

Here, 8D stands for the 8 disciplines, 8 dimensions or the 8 critical steps for solving problems. To resolve recurring problems, this approach is used as it is highly disciplined and effective scientific approach. It provides guidelines to identify the cause/reasons of those problems, plan corrective measures, implement those corrections and take preventive actions to resolve the issue permanently. It is a deeper and insightful understanding of the problem to be used for solving the problem.

8 Dimensions to Problem Solving and Innovative Thinking

The following are the Eight-Dimensions for inventive and innovative problem solving.

The dimensions are:

a) Uniqueness: Uniqueness is the state or condition in which someone or something is distinguishable from anything else in comparison. A product's uniqueness is frequently referenced when the term is used in relation to the object, with the term being a factor used to promote the product in order to make it stand out from other products in the same category. When the term "uniqueness" is used in relation to a product, it is frequently used in the realm of new products.

b) Dimensionality: It refers to features of high-dimensional settings that do not exist in low-dimensional contexts such as daily physical space. Dimensionally cursed phenomena include data collection and networks. The basic theme is that as dimensionality expands, data becomes scarce. This sparsity hinders all statistical methods. To obtain a statistically valid and trustworthy conclusion, data requirements might grow exponentially with complexity.

c) Directionality: The directionality of text, the size and color of letters and words, and other aspects of typography all combined to generate intellectual meaning and emotional flavor. The possessing the attribute of having a distinct direction or of maintaining a straight path.

d) Consolidation: Consolidation is the process through which an asset fluctuates between well-defined transaction levels. Consolidation is widely understood to be a period of trading uncertainty that ends when the price of the asset moves above or below the system accordingly.

e) Segmentation: In an effective segmentation plan, your product or direction is divided into groups based on factors like as demographic, regional, behavioural, and psychographic characteristics—or a mix of these factors. When it comes to organizing strategies, segmentation is one that is utilized to divide down a target audience into smaller, more manageable groupings.

f) Modification: It is the act of making a change or the process of making a change that is characterized as modification. When you have a plan in place and you make a minor alteration to the plan, such as raising the height of a wall by one inch, this is an example of modification. To slightly alter the form or characteristics of something; to partially alter; to amend: to modify an agreement.

g) Similarity: The degree to which two mental representations are similar in terms of psychological identity is referred to as similarity. It is crucial to human cognition because it serves as the foundation for categorization of entities into types as well as for a variety of other cognitive

processes. The idea of similarity has been approached from a variety of perspectives in cognitive psychology research.

h) Experimentation: When you try out a new hairstyle, for example, you are engaging in experimentation. An experiment is when you utilise test tubes and chemicals in a lab to finish a project while also attempting to gain a better understanding of reactions in general.

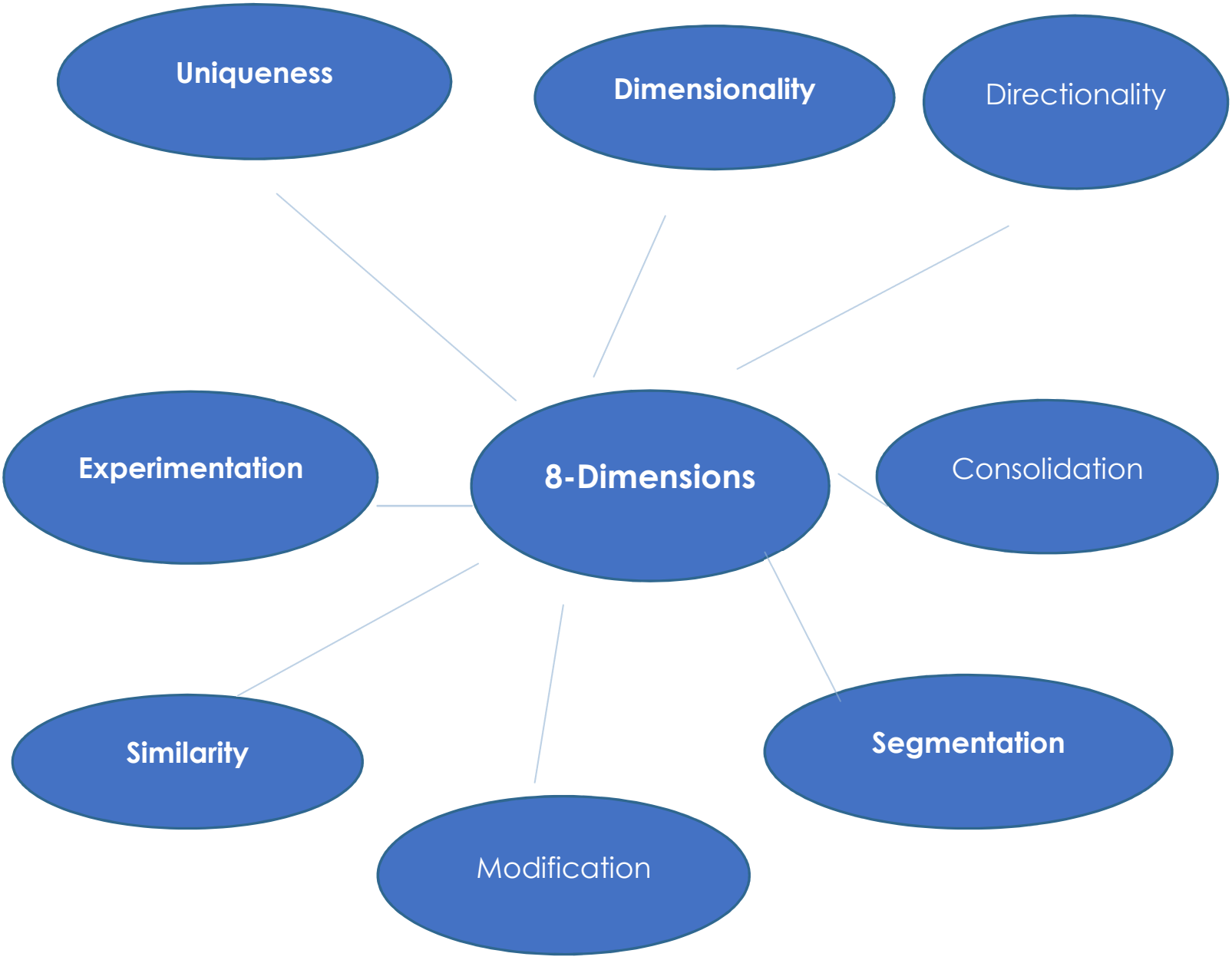


Fig 1: Unit 6, CISE-2

8 D is a team oriented and collaborative approach to solve critical problems. 8D was created to represent the innovative practices to solve problems. The 8D process applies inductive and deductive problem solving tools or approaches to solve a problem. This approach enhances creative power and innovative skills.

Daniel Raviv in his article, “Hands-on Activities for Innovative Problem Solving” described cooperation based or team-based, interpersonal and practical hands-on activities that boost out-of-the-box creative thinking. The activities are inquiry-based and self-exploration of problems and solutions. It allows for a self-paced mode, and also promotes group competitions, thinking and discussions. Students are encouraged to identify multiple, imaginative, intuitive and common solutions of a given problem. The focus was not on “one right answer” to a problem. The activities are part of an undergraduate course at Florida Atlantic University titled: “Introduction to Inventive Problem Solving in Engineering”. The goal of this “elective” is to enhance innovative and inventive thinking abilities of undergraduate students resulting in skills that can be used in science, math, engineering and technology. The activities help the students understand concepts of the Eight-Dimensional Methodology for Innovative Problem Solving, that has been developed and taught by the author at FAU. The dimensions, namely Uniqueness, Dimensionality, Directionality, Consolidation, Segmentation, Modification, Similarity, and Experimentation provide problem solvers of different professions with new insights and thinking strategies to solve day-to-day problems that they face in the workplace.

The main activities were:

3D Puzzles

Use 6 Popsicle sticks to make 4 equilateral triangles.

Quarto.

Darwin’s approach.

Shape division and “stuck” mind exercise.

Describe yourself using three adjectives.

The Diversity Game.

Helium balloon

Transportation projects

Tower of Babylon

Lego

Line up according to your birthday

8 Dimensional Approaches to Creativity Help the Learners to:

- **Solve problems in an innovative manner:** Instead of viewing problems as obstacles that must be endured, a shift in perspective might allow problems to be viewed as challenges that present new opportunities. Assist your students in shifting their perceptions so that they can find possibilities where they previously only saw challenges.
- **Think innovative and out of box ideas**: Thinking outside the box (also known as thinking out of the box, thinking beyond the box, and thinking outside the square) is a metaphor that refers to thinking in a distinct, unorthodox, or novel way. It is used to describe thinking in a new way. This phrase is frequently used to allude to innovative or creative thinking.
- **Improve efficiency and effectiveness of learning:** When it comes to being an efficient and effective teacher, you must be aware of both what your students are learning and what they are dealing with. Early and frequent assessment of their learning helps you to address any challenges or misconceptions that develop as soon as they arise, before they become barriers to future learning.
- **Improve creative, critical and problem solving skills:** Creativity is the ability to solve problems based on the data you interpreted and processed. When conventional thinking fails, creative problem solving (CPS) steps in. It inspires you to think outside the box and devise creative methods to overcome problems and achieve your goals.
- **Enhances collaboration and team work:** When people work together within and between teams, they may ensure that information, time, and other resources are shared to the benefit of all parties participating in the project. In a collaborative environment, each member has the opportunity to contribute their best ideas and efforts, thus increasing the overall productivity of the group.

- **Generate high quality and unique ideas :** Idea creation is the process of conceiving, formulating, and expressing ideas that are abstract, concrete, or visual. Idea generation, as the initial stage of the process management funnel, is concerned solely with the identification of solutions to problems that have been identified. A concept is simply an idea, and the same techniques that you would use to develop any form of idea may be applied to the creation of design concepts as well.
- **Helps to evaluate ideas:** Not a decision-making system, but a tool for making decisions is what evaluation is all about. Typically, in most businesses, it is one person or a small group of individuals who makes the decision to proceed or not to proceed, and assessment is just a tool for providing them with the best available information to help them make that decision.
- **Helps to select appropriate ideas:** Leading the innovation process demands your team to generate a large number of ideas (both good and terrible) and to connect them in novel ways to move the process forward. It's a journey of discovery that's at once entertaining, invigorating, and infuriating. However, it is when you have to decide which concept to pursue that the shoe meets the road.
- **Promotes discussions and brain storming:** When working in a group, brainstorming is a strategy for generating solutions to specific problems by compiling a list of ideas that are spontaneously given by the group's participants. Each concept is written down without being critiqued, and after the brainstorming session is completed, the ideas are evaluated.
- **Suitable for diverse learners:** Supporting diversity learners requires a tolerant and caring approach. Every student has something to offer the classroom and school community. To promote effective classroom learning for all students, teachers must develop sensitivity to individual student needs and change their teaching tactics and content accordingly. Teachers can therefore help kids reach their full potential.

  8D=TOPS (Team Oriented Problem Solving)

  Teacher can effectively use 8 Dimensional approaches to generate ideas to boost creativity among learners. Various activities can be implemented in the class to develop creativity through 8 D approach. Anyone can be creative by generating out of box ideas and high

quality ideas. Creative problem solving may have two steps: idea generation (collection or pool of ideas) and idea selection (analyze, evaluate and select idea from the poll or collection of ideas) evaluate. So teacher can use this approach to generate ideas among learners. This approach can be implemented and used by individual as well as team or groups. This approach is very easy to learn, use and teach. To successfully implemented this approach, teacher can use different strategies like discussion, brainstorming, brain writing, Phillips 66, cooperative and collaborative work, peer tutoring etc. It uses techniques from different discipline and implement to solve problems.8 Dimensional approach stimulate thinking and ideas by focusing on 8 different problem solving strategies.

SELF-CHECK EXERCISE

1. Name the various approaches to Creativity and Creative Thinking.
2. Which are the eight dimensions to problem solving?

6.5 Box I Why Apply Eight Disciplines of Problem Solving (8D)

According to Quality-one International discover the value, following are some benefits of 8 D approach

"The 8D methodology is so popular, when properly applied, one can expect the following benefits:

- Improved team oriented problem solving skills rather than reliance on the individual
- Increased familiarity with a structure for problem solving
- Creation and expansion of a database of past failures and lessons learned to prevent problems in the future
- Better understanding of how to use basic statistical tools required for problem solving
- Improved effectiveness and efficiency at problem solving
- A practical understanding of **Root Cause Analysis (RCA)**
- Problem solving effort may be adopted into the processes and methods of the organization
- Improved skills for implementing corrective action
- Better ability to identify necessary systemic changes and subsequent inputs for change
- More candid and open communication in problem solving discussion, increasing effectiveness
- An improvement in management's understanding of problems and problem resolution"

8D was created to represent the best practices in problem solving.

(Source: https://quality-one.com/8d/)

6.6 Systematic Inventive Thinking (SIT)

Systematic inventive thinking is a practical and functional approach to creativity, innovation and problem solving. Systematic Inventive Thinking (SIT) is derived from Genrich Altshuller's TRIZ engineering discipline. It is a thinking method developed in Israel in the mid -1990s by Amnon Levav, Haim Harduf, Haim Peres, Jacob Goldenberg and Roni Horowitz. This approach of inventive thinking rejects "out of box thinking".

It emphasis on the power of thinking inside the box. So, Systematic invention thinking aims at "thinking inside the box". SIT came into existed when Genrich Altshuller worked with colleagues to analyse over 200,000 patents. They analyzed the patents to identify *the* formula of innovation. They identified 40 inventive principles and these 40 inventive principles then put together to create a creativity equation named "the theory of inventive problem solving". It was known a TRIZ (Russian acronym) "Theory of Inventive Problem Solving". Following is the list of 40 inventive principles:

1. Segmentation: It may entail isolating a thing from a part or property that is interfering with it. To add value to a product, divide an object into sections that are comparable in nature.

- Hair clippers have a variety of cutting guards of varying sizes.
- A camera's focal lenses are used to focus the image.

2. Extraction (Extracting, Retrieving, Removing): Remove the "disturbing" part or property of an object from the rest of the object and only the parts or properties that are required are extracted from an object. Because of this, the product becomes more simplified.

1. Apps that allow customers to check in themselves at dining establishments (taking out long wait times)
2. In the restrooms, there is music playing (without the actual musicians)
3. When lactose is removed from milk, the outcome is a milk that is allergy-friendly.

3. Local Quality: Adjust item properties to fit user/application requirements.

- A transition from a homogeneous to a heterogeneous structure in an object or in the surrounding environment is defined as (action).
- Objects should have diverse functions performed by different portions of the thing.

- Ideally, each component of an object should be positioned in a location that is most conducive to its operation and performance.
    1. Erasable ink pens and
    2. keyboards that are comfortable to use

4. Asymmetry: Change the condition of an object from one that is balanced to one that is unequal. Asymmetry, despite the fact that it is in opposition to nature, provides value to a wide range of items.

- Bottles of water (small spout for easy drinking, large base to hold water)

Grips for Pencil

5. Consolidation: Combine concepts, items, or systems that have similar properties with those that do not. Because of this, the goal becomes more condensed in scope.

- Printers that can print in both colour and black and white are also available.
- Roofers who work throughout the winter season to install Christmas lights on their roofs

6. Universality: Consolidate several aspects of an object into a single, unified function. With this in mind, the product is being used in a broader range of situations. An object can perform several different functions; therefore, other elements can be removed.

- A tablet compared to a laptop when you are on the go.
- USP drivers verses CDs or floppy disks.

7. Nesting (Matrioshka): Two objects are intertwined and nested within one another. After that, a third object is placed within the first, and so on.A piece of one thing travels through a hollow in another piece of another object.

- A portable chess set:
- Stackable chairs

8. Counterweight: Combining an object's weight with elements that offer lift can help to balance it out. The object is lighter in weight, to put it another way.

Adjust the weight of an object by compensating using aerodynamic or hydrodynamic forces that are influenced by the surrounding environment.

- Balloons in the sky
- Rockets
- Car jacks with hydraulics

9. Prior Counteraction: Preload counter tension is applied to an object in order to compensate for excessive and unwanted stress.

- Vehicles equipped with vehicle blind spot monitors in order to avoid crashes when changing lanes are becoming more common.

10. Prior Action: Make the necessary changes in ADVANCE of the event. To be clear, the action occurs prior to the start of a process.

- Furniture that comes in a box with pre-drilled holes for easy assembly
- When the phone's battery is running low, it sends a notification, which keeps the phone from dying.

11. Cushon in Advance : In order to make up for an object's low reliability, it is necessary to plan for and implement emergency actions in advance.

- In the event of a fire, sprinkler systems are installed.
- Emergency shut-off switches are available.

12. Equipotentiality : Create a work environment in which there will be no need to lift or lower an object by altering the existing conditions.

- Laundry chute — a device that uses gravity to transport laundry downstairs.

13. Do It in Reverse : Instead of taking the straight action indicated by the situation, take the polar opposite of that action (i.e., cooling instead of heating).

- Make the movable component of a thing, or the outside environment, stationary — and the fixed part of the object, or the outside environment, moving.
- Invert the position of an item.

14. Spheroidality : Make an object more curved or shaped by bending or shaping it. This also involves the manner in which the thing moves.

- Archways open up the interior of buildings, creating greater space and better acoustics for the occupants.

- The motion of a drill gun is comparable to the motion of a hammer.

15. Dynamicity : To optimise performance at each stage of an operation, an object's or external environment's characteristics must be updated.

- Make an immobile object mobile. Make it interchangeable.
- Divide an item into elements that can change their relative positions to one another.
- **Gas and liquid pressure valves**

16. Partial or Excessive Action : If ideal performance cannot be obtained, aim for a level of performance that is somewhat higher or lower than the optimal level.

- Paint primer is applied to an object before the actual painting process begins.

17. Transition Into a New Dimension : Take an object from one dimension or plan to two planes by reversing its orientation. This covers converting from two to three dimensions, or vice versa.

- When comparing a spiral staircase to a set of regular steps
- A desk that is sent pre-assembled is preferable than one that is assembled in advance.

18. Mechanical Vibration : Affect a thing with vibration. Though it contradicts Six Sigma's goal of process variance reduction, higher vibration can be helpful in certain instances.

- Electric toothbrushes provide superior tooth cleaning compared to manual toothbrushes.
- Increased vibration in a foot massage results in a more effective and powerful massage.

19. Periodic Action : Change a continuous action to one that occurs at intervals. This enables users to alter the scale of the process during execution.

- A fire truck's lights and sirens serve as a warning to other motorists to move.
- Nerf guns with spring-loaded magazines.

20. Continuity of Useful Action : A process or object's continuous flow. Additionally, it is possible to eliminate inactive objects.

- Dams that utilise falling water generate electricity, which results in a more comprehensive workout.

21. Rushing Through: Conduct at-risk or harmful stages at high speeds in order to avoid extra damage.

- Friction can heat up an object, which leads to warped material. Faster cutting speeds prevents more warping

22. Convert Harm Into Benefit: Make the most of detrimental elements in order to generate a beneficial impact.

- Composting, for example, by tossing egg shells into a garden, can help improve the soil's quality.
- Reconstruction of infrastructure following catastrophic catastrophes

23. Feedback: Increase the performance of a process or item by adding performance data. Statistical Process Control is a Six Sigma example of feedback.

- Automated survey inquiries enable individuals to quickly collect feedback from clients.
- On-screen audiovisuals that inform viewers of the television's volume

24. Mediator: Utilize a vehicle or method that acts as a middleman. In other words, establishing a connection between two processes through the use of someone or something.

- Using email to communicate with a group of individuals
- US Postal Service, which transports commodities and letters between individuals Food processors, which enable those without teeth to eat as well!

25. Self-service : A self-contained object or process that performs self-contained functions or provides auxiliary help.

- Automated call screening to ensure that callers are sent to the appropriate department.
- Car wash stations equipped with self-vacuum units, allowing customers to clean both the inside and outside of their vehicle!

26. Copying: Make use of less expensive materials that are more readily available to substitute more expensive and less readily available components.

- 3-D Printing is a type of additive manufacturing.
- Metal components are being replaced by high-durability plastic components.

27. Dispose: Substitute many low-cost items for high-priced, high-quality items. This results in a trade-off in terms of quality, but results in cost savings.

- Glass plates and mugs are attractive until they need to be cleaned. Paper plates and cups, on the other hand, can be discarded after use.
- While washable diapers are less expensive than disposable diapers, single-use diapers are more convenient to use.

28. Replacement of Mechanical System : Electronic, sensory, or chemical systems can be used to replace a mechanical system in some cases.

- Speaking aloud to be typed versus typing it out by hand: Dictation vs. typing out by hand
- Using a car fob rather than a car key slot can unlock the vehicle much more quickly.

29. Pneumatic or Hydraulic Constructions: Solid components should be replaced by gas or liquid components.

- When comparing hydraulic brakes to regular brakes,
- When compared to ordinary insoles, gel-filled insoles in shoes provide more effective foot support.

30. Flexible Membranes or Thin Films : Flexible materials are more durable, lighter, and more cost-effective than rigid materials.

- Vests designed to protect against bullets are made of a lightweight material known as kevlar, which is more effective than heavy metal in terms of weapon safety.
- Because of its added cushioning, bubble wrap is an excellent choice for shipping items.

31. Porous Material: Make holes (pores) in an object by clicking on it. As a result, the thing becomes lighter and less dense.

- Fiberglass insulation is used in the construction of some homes.
- Sponges are used to absorb excess moisture.

32. Changing the Color : Change the colour of an object or the colour of the area around the object by clicking on it.

- Camouflage is a technique that allows people to blend in with their surroundings.

- Lighter-colored dwellings are more resistant to heat absorption caused by the sun.

33. Homogeneity : The interaction of two or more things that are made of the same substance or serve the same function.

- Blood transfusions are only effective if the recipient's blood type matches that of the donor.
- Pieces of wood are joined together with wooden dowels.

34. Rejecting and Regenerating Parts: After completion, you can either reject or discard the object, or you can keep it and use it again.

- After launching a spacecraft, SpaceEx's rocket returns to the launch pad where it began its ascent. Because of this, the cost of space travel has decreased.
- Changing jobs is a good way to advance in your career.

35. Transformation of Properties: Any change in the input/output relationship, such as temperature, durability, or pressure, is included. This bucket can hold a wide variety of items!

- Increase your productivity by moving into a larger workspace.
- Better cakes are made with cake batter that has been baked at a lower temperature.

36. Phase Transition: Gradual adjustments to certain specifications, such as volume or pressure.

- Change of transmission in a car, which reduces gasoline consumption
- Move objects to lower temperatures, such as a refrigerator, to reduce the amount of heat they produce.

37. Thermal Expansion: In order to produce the required outcomes, heat or pressure need be applied.

- Heat can be used to expand pipes, allowing them to connect. Pipes should be kept cool in order to cement them.

38. Accelerated Oxidation: Replace stale air with oxygen-rich air to improve your health.

- Patients who are having difficulty breathing benefit from the use of ventilators.
- When it comes to fire, oxygen-rich air is a better fuel, which can be used during heat treatment.

39. Inert Environment : Reduce the impact of moving or changing environments by using less mobile or chemically inert places.

- Fire extinguishers function by removing oxygen from the area around the flames. This results in the fire being extinguished.
- Bags that have been vacuum sealed are excellent space savers because the air has been removed from the object.

40. Composite Materials: In contrast to principle 5, composite materials are made up of a combination of several types of materials.

- Metals, foam, polymers, kevlar, and other materials are used to construct the aircraft's body. The same logic holds true for the interiors of automobiles.

When these principles are put together individually and in combination, one can have hundreds of combinations for solving technical contradictions and other problems. The 40 Inventive Principles are one of the best known and most used tools of TRIZ (Theory of Inventive Problem Solving". TRIZ a technique that promotes invention for project teams who have become stuck while trying to solve a business challenge/problem.

Systematic inventive thinking fosters creativity in problem solving. This approach helps to solve problem in a creative manner. SIT a powerful creativity tool and it requires thinking inside the box rather thinking outside the box. It also emphasized "closed world conditions" which means when solving a problem rather than finding new solution it is important to analyze and use existing elements already present in the problem to solve it. There is a need to open the mind set to think inside the box. It stated that reorganization of existing elements is required to solve the problem.

Why "Thinking Inside the box"??

It has many benefits:

1. Thinking inside the box is a more focused and innovative approach where one can pay closer attention to existing elements or points in a problem. It also motivates to reconsider elements within the problem to solve it.

2. While solving a puzzle, one cannot borrow pieces from outside. One has to solve puzzle from existing provided pieces. Thinking inside the box helps to solve puzzle.

3. It provided solution quicker than traditional brainstorming because brain storming can generate various ideas and views and it is difficult to put together all and generate a single idea or solution to solve a problem.

4. By thinking inside the box, one can be creative, innovative and mentally sound.

5. It helps to keep life energetic, fresh and interesting because one need creativity to solve problems.

6. It saves time and efforts.

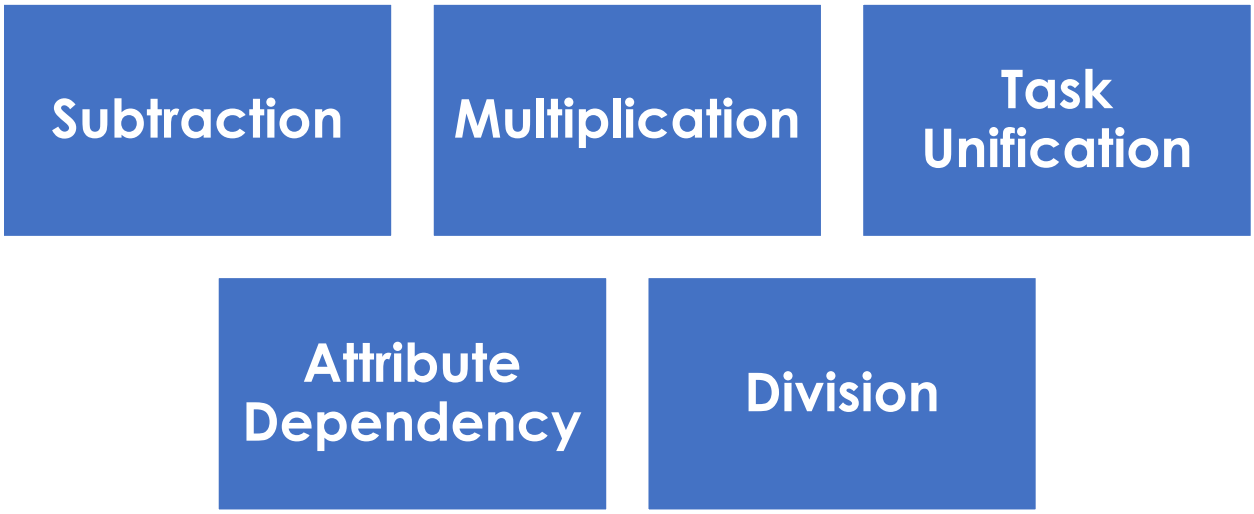
7. It uses problem as a part of the solution.

8. It uses divergent thinking.

Teachers can use Systematic Inventive Thinking in the classrooms to foster creativity and problem solving among learners. Systematic inventive thinking is a problem solving approach and helps to find out original, novel and useful ideas by alterations in existing components within a system and their attributes. Systematic Inventive Thinking is mostly usable in industrial and academic frameworks. This method applies divergent thinking in problem-solving. This process of thinking encourages alternation sin existing system or elements to solve an issue or problem.

Five Thinking Patterns of Systematic Inventive Thinking

Systematic inventive thinking is having five thinking tools. These patterns/tools form the basis of SIT. These are subtraction, Multiplication, Division, Task Unification and Attribute dependency. He following is a diagram to show these patterns:



The following is brief description of these patterns:

1. Subtraction: Removing essential components from a product and process. Here no one is not new ideas. Rather working reverse to imagine what benefits there are in using only the existing features.
2. Multiplication: Adding existing components to a system and giving them a twist. Multiply your potentials with your plans and it will be equal to your purpose of existence". – Israelmore Ayivor
3. Task Unification: It is a collaborative process and assigning new tasks to existing. It requires contributions from group or team. There is a need to have strong understanding in order to create new functions for a product or service.
4. Attribute Dependency: creating dependencies between variables of a product. There are three ways to implement attribute dependency: Active, passive and automatic.
5. Division: It's a powerful tools and it focuses on Division of works by breaking a .product into its different components and then rearranging them. Three ways to apply these techniques i.e. Functionality, Physicality and Preservability.

Steps of Systematic inventive thinking:

1. Define problem
2. Choose from five thinking tools (Multiplication, Division, Task Unification and Attribute dependency)

Principles of SIT

1. The closed world-thinking inside the box
2. Qualitative change
3. Function follows form (process where starting point is existing resource or element or idea)
4. Encourages path of most resistance (counter intuitive path)
5. Cognitive fixedness (functional and structural)
6. So, systematic Inventive thinking is helpful for teachers to boost creativity by encouraging students to think "inside the box". It helps to bring efficiency. It Deals with mainly two areas: Thinking of new ideas and solving problems. The following are some widely used **methods for SIT:**

1. Brainstorming
2. Lateral thinking
3. Synectics
4. Random Stimulation

6.7 Lets Sum Up

Creativity is producing new and innovative ideas that lead to enhanced productivity of the system, processes and product. Two main approaches to creative problem solving are adaption or innovation. The various dimensions of creativity are originality, flexibility in ideas, elaboration of details, synthesis of objects and artistic value. In the classroom, teacher can use variety of strategies to boost creative thinking among learners. InnovationTraining.org blogs has given 5 popular approaches to innovation i.e.

1. Agile (Scrum): It is highly collaborative and requires every person's input to move forward.
2. Lean Startup: It is specifically for entrepreneurs, startups, or companies who want to develop new products or services.
3. Jobs to Be Done: It helps to know what "job" your product or service helps customers/users get done.
4. User Experience: It involves putting your users at the center of everything you do.
5. Design Sprints: It is a design sprint, fast-paced way to generate ideas quickly and efficiently.

These approaches can easily be implemented in teaching-learning process to boost creativity and creative ideas among learners. Approaches can be used taking into consideration individual differences.

6.8 Self Assessment Questions

1. Explain the 8 D approach for inventive and innovative problem solving with suitable examples.

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2. Which approach is more suitable for secondary school students to enhance creativity in language skills? (or in your respective subject area)

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CERTIFICATE COURSE IN CREATIVITY AND INNOVATION IN SCHOOL EDUCATION

COURSE: INNOVATIVE PEDAGOGICAL STRATIGIES FOR FORTERING CREATIVITY AMONG SCHOOL STUDENTS AND ITS IMPLEMENTATION (CISE-2)

UNIT 7: INNOVATIVE STRATEGIES FOR FOSTERING CREATIVITY

STRUCTURE

7.1 Learning Outcomes

After studying this unit, the learners will be able to: .

- Enlist various Innovative Strategies for fostering creativity among school students
- Elaborate Innovative Strategies (Online and Offline) for fostering creativity among school students
- Adopt various strategies in the classroom to foster creativity among school students
- Use questions to trigger creative thinking, making connections and mind mapping
- Adopt pedagogic practices and assessing innovation and creativity

7.2 Introduction

Strategy is a combination of different methods and procedures. In general terms, strategy is an anticipatory plan of action which is designed to achieve a long-term goal. Strategies in pedagogy refer to methods/techniques used by the teacher to help students learn the desired course contents. There are various strategies that can help the teacher in the classroom for effective interaction and teaching learning process. There is a shift from a teacher-centered approach to a learner centered approach which demands a desired change in our teaching styles. Gone are the days, when teacher rely upon only traditional methods. 21st century learners are more active & participative and require different innovative strategies to learn and achieve. So, in the classroom where diverse learners are there, teachers must use Innovative Pedagogical strategies. Major improvements can be brought about in classroom learning through the implementation of innovative pedagogical strategies. Innovative pedagogical strategies are the outcome of dissatisfaction of the previous system which requires improvements. In this unit, you will be able to learn about innovative strategies (Online and Offline) for fostering creativity among school students.

7.3 Innovative Strategies (Online And Offline) for Fostering Creativity Among School Students

An innovation in pedagogy is due to the changing scenario from knowledge based and rote learning to more skill based learning. Students always look for some new and interesting learning approaches. So, innovative pedagogical strategies help to make learning motivating, relevant and interesting. Innovative or modern pedagogical strategies are those new ways of teaching which helps the teachers and facilitators to achieve goals as well as instructional objectives. These strategies involve different way of viewing at the existing practices. These are the carefully designed intended plan or set of plans to provide conducive learning environment to the students or learners. These also refer to abstract teaching methods and instructional designs. These are based on learning theories. To manage all tasks and activities in the classroom, teacher needs to put into practice various innovative pedagogical strategies in the teaching learning process. These require proper planning and implementation otherwise it may lead to haphazardness in the instructional process. These strategies create engaging and effective

learning experiences. Researches showed that innovative pedagogical strategies provide many benefits in the educational processes and help to improve functioning of existing practice. It also refers to both online and offline strategies. The educator, before they are beginning their instructional process need to acquire sufficient knowledge and information in terms of these innovative pedagogical strategies and processes. These strategies take time, energy and work. Those teachers, who are passionate about teaching, usually use innovative strategies. If there is no innovation, the teaching learning process becomes monotonous and useless.

Mynbayeva AK, Sadvakasova ZM (2007) has proposed " One more typology of innovations in learning (technologies, methods, and techniques): (i) an absolute innovation (absolutely new technology), (ii) a modernized innovation (significantly improved technology), (iii) a modified innovation (slightly improved technology), (iv) an innovation, technology introduced to a new territory (e.g., trainings for the RK, credit technology of training for Kazakhstan, (v) an innovative technology of a new field of application."

According to I. Derizhan (2012), "All innovations in pedagogy, unite: the belief that the human potential is unlimited; the pedagogical approach is aimed at mastering reality in the system; stimulation of nonlinear thinking; they are based on the hedonistic principle that is, based on the enjoyment of learning, the joy of achievement, the pedagogy of success; the mobile role-playing field of the teacher—the teacher simultaneously teaches and learns from the student."

The teachers, who have acquired sufficient knowledge and information in terms of these innovative strategies and processes, make use of them, before they are beginning their lesson plans. The main innovative strategies having two approach i.e. offline strategies and online strategies.

Innovative pedagogical strategies (Online and In-Person simultaneously)

To retain the student's attention and to promote meaningful engagement for learning, most of the teachers used two approaches while delivering the content. These are online as well as offline innovative pedagogical strategies. There are various other reasons which lead to the emergence of these strategies.

Following are some innovative pedagogical strategies (general) (offline and Online) which every teacher can embrace:

Cross over Teaching
Expression of divergent thoughts
Scenario analysis based teaching
Role playing
Spaced learning
Originality of thoughts and ideas by discussions and debates
Creative teaching
Teaching through Virtual Reality
Ideas generating questions
Hannibal learning approach
Utilize creative resources in the community
Prezi–Your Presentations
Sports Based Learning
Z to A approach
Real-world learning
Learning Detectives
Teaching through collaboration
Peer editing
Free from thinking
Problem mapping
Games
Story board teaching
Mind Mapping
Teaching through Smart Boards
Teaching through Cloud Computing and 3D printing technology **Virtual conferences**
Teaching through Flipping Classrooms
Jigsaws

Blended and Social learning
Tiered instruction
6 Hats approach
Independent Projects
Computer mediated cooperative and collaborative learning
Expert Group method
Mnemonics, Analogies and metaphord
Phillips 66
Problem based learning and Inquiry-based instruction
Think pair share
Quescussions
Trigger Their Curiosity

Above list is just suggestive, there are many other innovative pedagogical strategies.

The following is a list of some of the innovative pedagogical strategies and techniques (online and offline) for fostering creativity among school students:

Quescussions
Brainstorming/Brainwriting
Exploration and Implementtaion
Mind maps
SCAMPER
Games and puzzles
Riddle Solving
Use Choice Boards and Story boards
Cultural activities, arts festivals, exhibitions etc.
6 hats technique (Black hat, Blue hat, White hat, Red hat, Green hat, Yellow hat
Use Creative Rubrics
Problem solving
Flexible tasks
Spaced learning
Use of flow charts

Promtes divergent thinking and ideas
Free from thinking
Critical thinking and Communication
Online creative collaborative group projects
Mystery box lessons
World Creativity and Innovation Week Activities
Constraint Challenges
Lateral Thinking
Online Creative Boosts (Like Scavenger hunts)
Picture Association
Brain Sketching
Paired Comparison
Circle of Opportunity
Potential Problem Analysis
Progressive Hurdles
Crawford Slip Writing
Snowball technique

Leonard Sommer (2014) in his article "How To Foster More Creativity In 21st Century Education" discussed that "Our current education system is ill-prepared to educate the next generation of creative leaders. Developing every individual's creative potential will be one of the crucial value-creating factors for leading economies in the Imagination Age. We live in a time where things are constantly changing and evolving. The old, established rules used by past generations to educate and secure success are not suitable for the next generation who will thrive in such an innovative time."

So, the above statement highlighted the fact that teachers and educational institutions must use innovative pedagogical strategies, methods and techniques to foster creativity among students.

LET US HAVE A BRIEF LOOK ON SOME OF THE INNOVATIVE PEDAGOGICAL STARTEGIES FOR FOSTERING CREATIVITY AMONG SCHOOL STUDENTS:

1. 6 Hats Technique:

The six thinking hats is a tool to boost the productivity of creative thinking by dividing up the different styles of thinking into six "hats" .These style of thinking are logic, emotion, caution, optimism, creativity, and control. Each student have to take on the role of a hat, ensuring that all viewpoints and styles are covered. It is a role-playing model presented by Edward de Bono in 1986. It is team-based problem solving and brainstorming technique that can be used to explore problems and solutions and uncover ideas and options.

Chris Adams , "The 6 types or "Thinking Hats" are:

White Hat: analytical, objective thinking, with an emphasis on facts and feasibility.

Red Hat: emotional thinking, subjective feelings, perception, and opinion.

Black Hat: critical, skeptical, focused on risks, and identifying problems

Yellow Hat: optimistic, speculative, best-case scenario.

Blue Hat: structured thinking, high-level overview of the situation, the big picture.

Green Hat: creative, associative thinking, new ideas, brainstorming, out-of-the-box.

Since each member is assigned a single hat you don't have to remember the characteristics of them all, only the hat which is assigned to you. With 6 team members working together from their one-dimensional point of view, problems and solutions can be worked and dissected from 6 very different perspectives leading to well thought out conclusions."

2. Brain Storming

It refers to informal way to solve problems or misunderstanding. It refers to generating ideas and sharing knowledge to solve complex options. Brain storming is needed to identify and solve complex problems. It leads to more innovative ideas. Brainstorming is a strategy for allowing the students to explore ideas w ithout judgement. Alex Osborn (psychologist) developed this technique. He had studied the way people think. Most of us evaluate our thinking immediately much before the idea is born.

Hence, Osborn divided the thinking into two stages:

a) Ideation stage
b) Evaluation stage.

In the Ideation stage, he has given four principles

- ✓ Free whelming is emphasized. Whether the idea is crazy, funny or costly express it.
- ✓ Criticism is avoided. Self-criticism or of others is not permitted.
- ✓ Quality breeds quality. More the number of ideas, the chances of better ideas are there. Hence, larger number of ideas are welcome.
- ✓ Hitchhiking is allowed. That means you can combine your ideas with that of others.

Students or people from different backgrounds, say 6-8 of them, are seated in a circle and made to express their views freely and openly, without fear or authority. These ideas are immediately recorded by a stenographer or on tape without the participants' knowledge. In the evaluation phase, several officials and a few participants will sit and consider all the recorded ideas from the implementation point of view. Many ideas will be new, which the officials of that department would never have imagined.

Reverse Brainstorming

Reverse brainstorming is a really useful technique to tackle a topic or challenge from a different angle as it requires students to take original problem statement and reverse it to trigger new ideas. It allows students to expand their creative thinking and consider their challenge from a completely new perspective.

3. Gaming/Gamification

Gaming techniques in a playful manner help the students in the development of creative traits. Both verbal and non-verbal material can be used in this technique. Playing games is a powerful way of facilitating creative thinking. It can lower the barriers of established behavioural norms and routines by offering new rules and sometimes even new realities. A recent study published in the Creativity Research Journal claims that games like Minecraft encourage players to practice some level of creativity. Here, Gamification is adding game mechanics into nongame environments, like a website, learning management system etc. to increase participation. The goal of gamification is to engage inspire collaborate with the students. share and interact.

Online Video Games to Boost Creativity

- Minecraft.
- Terraria.
- Little Big Planet.
- Big Brain Academy.
- Animal Crossing.

- Scribblenauts.
- SimCity.
- Portal.

4. Scamper

Scamper is based on the notion that everything new is some addition or modification of something that already exists. You take a subject and change it into something else.

Scamper Stands for:

S =Substitute

C =Combine

A =Adapt

M =Magnify/Modify

P =Put to other uses

E = Eliminate

R = Rearrange/Reverse

With each word, just think of how you could apply that action to the idea you want to work with. For eg., ask yourself: Can I substitute certain parts of this plan to make something new? Would I be able to consolidate it with something different, or adjust it to fit an alternate circumstance? As we've said previously, hardly any things are really unique. The absolute best thoughts come from adjusting different thoughts into something that hasn't been done previously, so an incredible method to keep away from a temporarily uncooperative mind to work off something you know.

5. Riddle Solving

Alexander, the extraordinary, welcomed Indian Rishie to the challenge of puzzle development and riddle settling. Indian culture from days of yore has had puzzles in their writing. Grannies used to request that their grandkids tackle the riddles. Every one of the provinces of India have

riddles in their dialects. Riddle addressing and puzzle development are like two standards of "Synectic", an Creativity encouraging procedures grew abroad. They are 'making the weird natural' and 'making the recognizable peculiar'. The greater part of the puzzles has been created utilizing analogies, might be immediate, basic, symbolic or dream.

6. Puzzle Solving

According to Edison's son, Charles was very fond of solving puzzles. He kept himself creatively open to many problems and ideas. Most puzzles have a clue. Identifying and solving the clue will help you solve the puzzle. Otherwise, you will keep thinking in the old formal ways and will never be able to solve it. Peter Papper and others have written books on puzzles. Bhaskaracharya's "Amar Lilavati" is a collection of many riddles in Indian condition. You may recall Isaac Asimov's page in the "Illustrated Weekly of India" here.

7. Use Choice Boards and Story Boards

Use choice boards, which can allow teachers to create lessons around a specific learning goal, but offer students voice and choice in how to get it done/demonstrate mastery, etc. A storyboard is a graphic organizer that plans a narrative. Storyboards are a powerful way to visually present information. Storyboards are a set of sequential drawings to tell a story. The following are some online storyboard apps:

1. ***StudioBinder***
2. ***Moviestorm***
3. ***FrameForge***
4. ***ShotPro***
5. ***Power Production Software***
6. ***StoryBoardPro***
7. ***StoryBoard Fountain***
8. ***Storyboard Composer***
9. ***Storyboard That***
10. ***Toon Boom Storyboard Pro***
11. ***Prolost Boardo***

12. Make Storyboard

13. Adobe Photoshop

14. Clip Studio Paint

15. OpenToonz

16. TVPaint

17. Paper

18. Penultimate

19. Artemis Pro

20. Astropad Standard

21. Procreate

22. Cinemek Storyboard Composer

23. Shot Designer

24. Camera-Storyboard

(source: https://www.studiobinder.com/blog/best-storyboard-software-free-storyboard-templates/)

8. Experimentation and implementation:

Hands-on experiments and its effective implementation can be the appropriate tool for the development of creativity of students. Hands-on experiments include student activities, meaningful content, critical thinking and strong motivation. Implementation of hands-on experiments and activities learning involves basic processes that give rise to creativity.

7.4 BOX I

The Effects of Video Games on Creativity: A Systematic Review
--Seyedahmad Rahimi & Valerie Shute Florida State University

Abstract:
Creativity contributes to both personal and societal growth. Recently, new methods for assessing and fostering creativity using video games have been proposed and tested. In this study, researchers examined the effects of video games on creativity via empirical studies, and discussed how video games can be useful for improving creativity. Their main findings show that not all video games can enhance creativity—some game genres have more potential to enhance creativity than others. Specifically, video games that have most potential for enhancing creativity are those that facilitate flow, allow the players to co-create the game, and enhance players' intrinsic motivation.

Self-Check Exercise

Give Some innovative pedagogical strategies.

8 Ways to Embrace Creativity in the Classroom in 2018

— By Jonathan Gerlach, DiscOvery Education (2018)

The following are 8 ways to foster creativity among students by Jonathan:

Engineering STEM Bins
Science Fair Central Maker Corner
Visible Thinking Routines
TeenDrive365
Instructables
Literature Inspires Creativity
Ignite My Future
Project Zero

7.5 Using Questions to trigger creative thinking, making connections: mind mapping

Using Questions to Trigger Creative Thinking

Creative thinking includes analysis, open-mindedness, problem-solving, organization, and communication. Good questions encourages creative thinking and innovative ideas. **Questions** can also help to unleash imaginations and think more creatively. Teachers and researchers have developed a number of types of questions, which can be used to foster the creativity. The different type of questions are as follows:

Redefining Questions: In this type of question, children are asked to redefine an object, animal, person or event.

a. Why is a fountain pen like a tap.

b. How are face and TV similar.

Consequences questions: These questions pose situations or events that might not have happened or will never happen.

a. If it is against the law to size.

b. Just suppose all people in the world become mad.

Hypothetical questions: In this type of questions students have to go beyond the available data (their learning) and synthesize them with their personality characteristics.

a. If you were the manager of a bank?

b. If you become an ant suddenly?

Provocative questions: The children may be taught a passage or they may be asked to go through a passage and proactive question may be put.

a. What would have Gandhiji done had he lived today?

b. Do you think lord Krishna would be the right type of leader today?

Questions seeking new relationships: Sometimes these questions look to be funny or crazy and may lead on to frustration on the part of the students, but they will enjoy later.

a. Is month a mile?

b. Is day a week?

Divergent questions: These questions require the students to break from the fixed pattern of one question one answer and develop many relevant responses.

a. A town hidden beneath the mud has been found. What might have been the reasons as to why the town might have gone underground?

b. A tank is full of crocodiles. A pole is standing in the middle of the tank you have been given a rope and your job is to put a knot to the pole at the centre.

Observational questions: These questions focus on the bigger picture and are usually a good place to start brainstorming session.

Reflective questions: Reflective questions encourage each participant to consider their 'gut feelings' and emotions related to the topic at hand. It also gives participants the chance to explore and discuss their feeling related to the topic.

Interpretive questions: These questions typically allow students to consider how things have been done in the past and if there are lessons that can be learned for moving forward.

Decisional questions: Decisional questions will allow group to consider what they will do next to action the information gathered. Typical decisional questions like What can we continue doing to achieve our goals and what do we need to start or stop?

Other type of questions are:

Factual (These are usually at the lowest level of cognitive or affective processes)

Convergent (These may be at several different levels of cognition -- comprehension, application, analysis)

Divergent (These types of questions often require students to analyze, synthesize, or evaluate a knowledge base and then project or predict different outcomes)

Evaluative (These types of questions usually require sophisticated levels of cognitive and/or emotional judgment)

Combination (These are questions that blend any combination of the above)

(source: http://acmd615.pbworks.com/f/quest2.html)

Quescussion

It is a strategy invented by Paul Bidwell in the University of Saskatchewan English Department. The Quescussion strategy represents a shift from making statements to starting and asking questions. The participants make points as in a normal discussion, but the use of statements is forbidden.Only questions can be raised. It is helpful for develomnet of the hi=gher order thinking skills. Learning Futures(2019), Griffith University in the topic "Ques-cussionActive Learning - active learning" mentioned "Ques-cussion can be an effective way of generating discussion and learning in topic areas that are controversial, traditionally difficult and where students are reluctant to ask questions. Questions allow students to structure and scaffold their thinking resulting in a deeper understanding of the content. By getting students to ask questions, you are inviting them to generate a variety of thoughts about the topic without requiring them to directly state their own views. Additionally, with each question students will likely think of answers to the proposed question. In terms of formative assessment, the quality of questions asked by students enables you to gauge the level of understanding on a specific topic." Learning Futures. (2019) in article *Ques-cussion* has given a practical summary on the link between deeper learning and questioning.

THE LEARNING FOCUS OF THE STRATEGY
Collaborative Learning
CLASS SIZE THAT IS SUITABLE FOR THE STRATEGY
100+ students
20 - 50 students
50+ students

ACTIVITY GROUP SIZE Individual Small group < 10 YEAR LEVEL IN WHICH THE STRATEGY IS OFTEN USED Post graduate Second year Third Year+ PHASE OF THE LEARNING AND TEACHING SESSION IN WHICH THE STRATEGY WILL BE USED Main phase of the session PREPARATION TIME FOR THE STRATEGY Less than 10 minutes DURATION OF THE STRATEGY Less than 10 minutes
LEVEL OF LEARNING OUTCOME THAT THE STRATEGY IS DESIGNED TO ADDRESS Analyse Apply Understand LEARNING SPACE APPROPRIATE FOR THE STRATEGY Computer room Laboratory/studio Lecture theatre Online Seminar room Workshop ASSESSMENT STRATEGIES Formative Assessment

Making Connections (Read, Write and Think): Mind Mapping

Making Connections is a critical reading and reading comprehension strategy. This startegy helps students to make meaning of what they are reading. When they make connections to the text, content or ideas that they're reading, it's going to help them make sense of what they're reading.It helps students to retain the information better, and help them to engage more with the text itself. It helps students find meaning in a text by connecting it to their background or existing knowledge. There are three types of connections:

Text-to-Self Connection,

Text-to-Text Connection,

and Text-to-World Connection.

This strategy guide students to connect the information or facts that they find in the text with themselves, the other texts, and the world, so they can interact and involve actively with the text. It helps students to comprehend the text and help to increase the reading comprehension ability.

Making connections are possible if students are able to map their thoughts. Mind mapping helps to think, collect knowledge and remember essential points.

Mapping Thoughts or Mind Mapping

It refers to "radiant thoughts or thinking" – that is, thoughts radiate out from a single idea and often expressed as an image. A mind map is a graphical or pictorial representation of ideas and concepts. It is a visual thinking tool. Mind mapping helps to structuring information, and to better analyze, comprehend, synthesize, recall and generate new ideas and concepts. Mapping thoughts helps to increase efficiency. Mapping thoughts also refers to as Mind mapping. A mind map is a simple hierarchical radial diagram invented by Tony Buzan. This technique is useful to develop an idea, a project, a problem, a solution, etc. The main goal of a mapping thought is to clearly visualize all thoughts and ideas. Creating a mind map is not very complex rather it has three main steps:

1. Choose any topic
2. Add branches for related ideas or concepts or terms
3. Add sub branches for related ideas or concepts or terms

Mind maps are multisensory, brainstorming and powerful note-taking tool that help learners to think and remember better, creatively solve problems and take action. It also encourages creativity and flexibility and to think outside the box. Mind maps open up to creativity and new

ways of thinking. Mind maps are realistic. These help to get the big picture. They naturally hook into your right brain, where creativity and intuition can help you. Mind maps help the students to organize, integrate, and retain information. Recent researches suggest that mind mapping strategy facilitates critical and creative thinking. These are graphic organizers.

Types of Mind Maps

- Brainstorming mind maps
- Note taking mind maps
- Memorization mind maps
- Reading comprehensive mind maps
- Group project mind maps
- Essay and Exam preparation mind map
- Creative writing mind map
- Flow maps
- Multi flow maps
- Tree map
- Brace map
- Circle maps
- Bubble maps
- Double bubble maps

Students Can Use Mind Mapping for:

- Note taking
- Easy comparisons and classifications
- Problem solving
- Examination
- Gaining insight on complex subjects
- Studying and memorization
- Planning and organising
- Brainstorming (individually or in groups)
- Researching and consolidating information from multiple sources
- Presenting information
- Creativity

Now-a-days various online apps and websites are available for in mapping like Mindmeister, Mindmup,Coggle, Mindly, Diagrams.net etc.

Merits of Mindmaps

1. Helps to create interest in the topics
2. Involves visual sense
3. Facilitates better understanding of relationships and connections between ideas and concepts.
4. Makes it easy to organise ideas and concepts
5. Helps to plan tasks
6. Makes it easy to communicate new ideas and thought processes
7. Allows students to easily recall information
8. Helps students brainstorm and explore any idea, concept, or problem
9. Helps students take study notes
10. Helps to think critically and creatively
11. Helps to solve problems

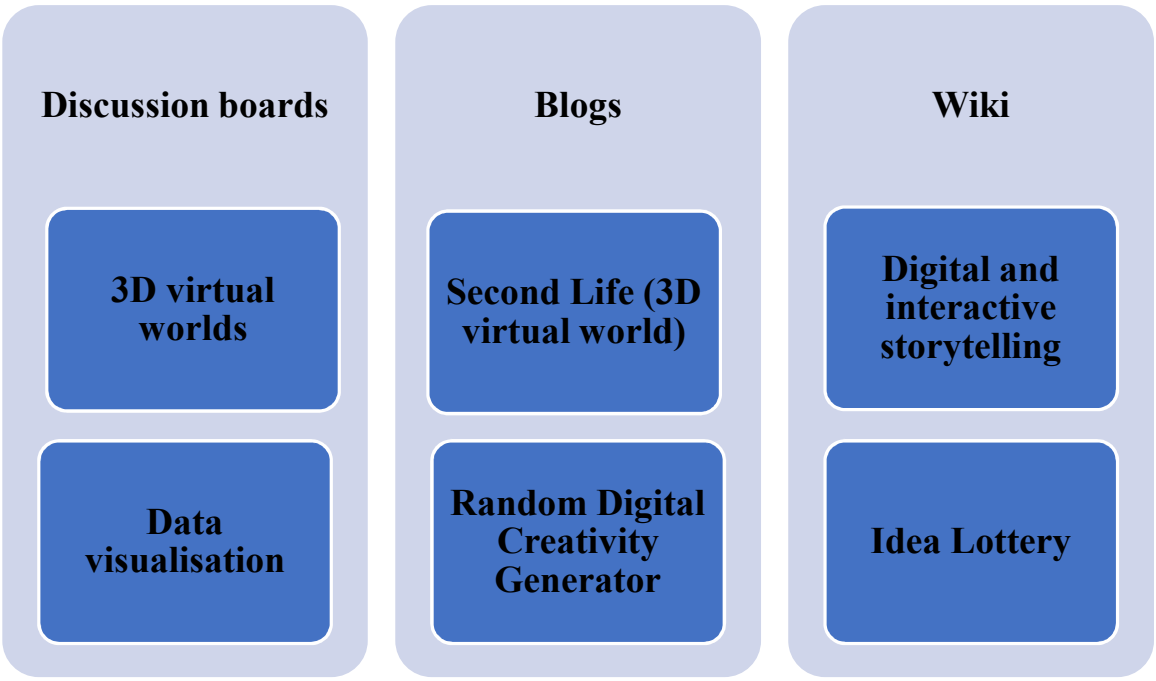
(source: Safety Professionals Chennai
https://commons.wikimedia.org/wiki/File:Mind_map_Strategy.png)

Mind map is an important tool in the hands of a teacher to make content and presentation effective. Teachers must use mind map during teaching process and students must use it for learning purposes.

Digital Creativity

Digital creativity refers to using digital tools and technologies to explore creative ideas and new ways of displaying our thoughts, opinions, views, ideas and research work.

Online Tools to Foster Creativity Among Students



Self-Check Exercise

1. Define Quescussion.

2. What do you understand by mind mapping?

7.6. Pedagogic Practices And Assessing Innovation And Creativity

Assessments that are not just of creativity, but for creativity not only evaluate creativity but also help cultivate it.

Guilford and Torrance found these general abilities put together forms creativity. They are

- Fluency- is the ability to think of a large number of responses.
- Flexibility- is the ability to think of different types of responses.
- Originality- is the ability to think in an original and uncommon way.
- Inquisitiveness- is the ability to raise a number a questions out of curiosity.
- Persistency- is the ability to continue with the problem, even though one is failing from long.
- Elaboration –is the ability to add details to the given situation or problem at hand.

In India Baqer Mehdi and B.K.Passi were the first to develop creativity tests.

Passi's Tests of Creativity have the following sub-tests.

a. Seeing Problems test: This test has 4 questions and students are asked to write the defects and problems of a postcard, chapel and the like.

b. Unusual uses test: This test has 2 questions where students are asked to write usual and unusual uses of a piece of cloth, a bottle

c. Consequences test: In this test, students are asked to write the consequences for improbable situation. Ex: (i) Suppose all people become mad (ii) suppose all females become males, and the like.

d. Inquisitiveness test: In this test, students are asked to write a number of questions on a metronome and a placard.

e. Persistency test: In this test, students are given a set of cubes, half cubes and cuboids. They are asked to construct a number of different shapes out of these given objects.

f. Elaboration test: Students are given incomplete figures and students have to add details to them. A number of other tests have been developed by other researchers based on Torrance, Guilford.

There are Three key paradigm shifts in assessment of creativity

Key #1: Focus on the Creative Process rather than the Product or the Person

There is no such thing as a creative type. We are all creative and we need to focus on creative process. It's just that we often need a bigger definition of creativity. Creativity is not innate or tied to our personality. Instead, creative thinking is a skill that we can develop over time. By focusing on the creative process, we move away from conversations about creative potential and towards the idea of creative momentum. The idea that we do not have a certain amount of creative potential.

key #2: Focus on Growth and Improvement Rather than Achievement

Teachers can provide feedback on the creative process without assigning a specific grade to the assessment. Allowing students to revise and resubmit work might actually lead to greater creative risk-taking. Students will still value the feedback and focus on their creative process but they can do so without worrying about how it will be graded. If students are focusing on growth and improvement, they are likely to do so with a critical eye. So, how do we help students apply a critical lens without falling into self-defeating or self-defeat?

key #3: Empower Students to Self-Assess Instead of Depending on the Teacher

By focusing on the creative process and using feedback rather than grading, I was able to assess student's creativity. In life, most of our major growth is through self-assessment and peer assessment. In some cases, assessment is descriptive and reflective. When students describe their creative process, it can take some of the judgement out of the assessment process.

Pedagogic Practices and Assessment Strategies for Assessing Innovation and Creativity

Brain Storming

Alex Osborn (psychologist) developed this technique. He had studied the way people think. Most of us evaluate our thinking immediately much before the idea is born.

Hence, Osborn divided the thinking into two stages:

c) Ideation stage

d) Evaluation stage.

(Already discussed in the previous section)

Questioning

Teachers and researchers have developed a number of types of questions, which can be used to foster the creativity.

Redefining Questions: In this type of question, children are asked to redefine an object, animal, person or event.

a. Why is a fountain pen like a tap.

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b. A tank is full of crocodiles. A pole is standing in the middle of the tank you have been given a rope and your job is to put a knot to the pole at the centre.

(Already discussed in the previous section)

RADSE

R=Research

A=Analysis

D= Development

S=Solution

E=Evaluation

RADSE is an assessment method currently used in computer animation.

Scamper

Scamper is based on the notion that everything new is some addition or modification of something that already exists. You take a subject and change it into something else.

Scamper Stands for:

S = Substitute

C = Combine

A = Adapt

M = Magnify/Modify

P = Put to other uses

E = Eliminate

R = Rearrange/Reverse

(Already discussed in the previous section)

Riddle Solving

Alexander, the extraordinary, welcomed Indian Rishie to the challenge of puzzle development and riddle settling. Indian culture from days of yore has had puzzles in their writing. Grannies used to request that their grandkids tackle the riddles. Every one of the provinces of India hae riddles in their dialects. Riddle addressing and puzzle development are like two standards of "Synectic", an Creativity encouraging procedures grew abroad. They are 'making the weird natural' and 'making the recognizable peculiar'. The greater part of the puzzles has been created utilizing analogies, might be immediate, basic, symbolic or dream.

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Use Choice Boards

Use choice boards, which can allow teachers to create lessons around a specific learning goal, but offer students voice and choice in how to get it done/demonstrate mastery, etc.

Use Creative Rubrics

Use Creative Rubric is intended to help assess creative thinking in a broad range of areas. The rubric is made up of a set of attributes that are common to creative thinking.

Consequences Situations

Children are given impossible situations and when such a thing happens what would be the consequences. Students enjoy variety of consequences for these just suppose situations some of them work out long and farfetched consequences that even the adults would be astonished.

Jackson et al (2003) believe "students need to be energized, believe in themselves and be motivated by themselves and their peers to create an environment for learning. They suggest that through assessment methods we can 74 encourage this atmosphere - and to carry this through imaginatively and creatively the process may involve doing new things and taking risks, being personally exposed and uncomfortable, having feelings/emotions/conflict/fun and excitement."

Rubric for Creativity

Rubric may support teachers and students in assessing creativity (Brookhart, 2013). The rubric describes four levels of creativity—very creative, creative, ordinary/routine, and imitative—in four different areas—variety of ideas, variety of sources, novelty of idea combinations, and novelty of communication.

	Very Creative	**Creative**	**Ordinary/Routine**	**Imitative**
Variety of ideas and contexts	Ideas represent a startling variety of important concepts from different contexts or disciplines.	Ideas represent important concepts from different contexts or disciplines.	Ideas represent important concepts from the same or similar contexts or disciplines.	Ideas do not represent important concepts.
Variety of sources	Created product draws on a wide variety of sources, including different texts, media, resource persons, or personal experiences.	Created product draws on a variety of sources, including different texts, media, resource persons, or personal experiences.	Created product draws on a limited set of sources and media.	Created product draws on only one source or on sources that are not trustworthy or appropriate

Combining ideas	Ideas are combined in original and surprising ways to solve a problem, address an issue, or make something new.	Ideas are combined in original ways to solve a problem, address an issue, or make something new.	Ideas are combined in ways that are derived from the thinking of others (for example, of the authors in sources consulted).	Ideas are copied or restated from the sources con
Communicating something new	reated product is interesting, new, or helpful, making an original contribution that includes identifying a previously unknown problem, issue, or purpose.	Created product is interesting, new, or helpful, making an original contribution for its intended purpose (for example, solving a problem or addressing an issue).	Created product serves its intended purpose (for example, solving a problem or addressing an issue).	Created product does not serve its intended purpose (for example, solving a problem or addressing an issue).

(Source: From How to Create and Use Rubrics for Formative Assessment and Grading (p. 54), by Susan M. Brookhart, 2013, Alexandria, VA: ASCD. Copyright 2013 by ASCD. Adapted with permission.)

7.7 Lets Sum Up

Being creative helps you become a better problem solver in all areas of your life and work in a more creative way. There is a shift from a teacher-centered approach to a learner centered approach which demands a desired change in our teaching styles. Gone are the days, when teacher rely upon only traditional methods. 21st century learners are more active & participative

and require different innovative strategies to learn and achieve. So, in the classroom where diverse learners are there, teachers must use Innovative Pedagogical strategies.

7.8 Self-Assessment Questions

1. Being a teacher, which strategy you like most and why?

……
……

……

2. How will you assess creative ideas of elementary students in your respective subject?

7.9 Suggested Readings and References

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CERTIFICATE COURSE IN CREATIVITY AND INNOVATION IN SCHOOL EDUCATION

COURSE: INNOVATIVE PEDAGOGICAL STRATEGIES FOR FOSTERING CREATIVITY AMONG SCHOOL STUDENTS AND ITS IMPLEMENTATION (CISE-2)

UNIT 8: CREATIVITY IN THE SCHOOL CURRICULUM

STRUCTURE

8.1 Learning Outcomes

After studying this unit, the you will be able to:

- Explain the Purpose of Creativity in the School Curriculum
- Elaborate the steps to develop a creative curriculum
- Elaborate the techniques to Enhancing Creativity in curriculum

8.2 Introduction

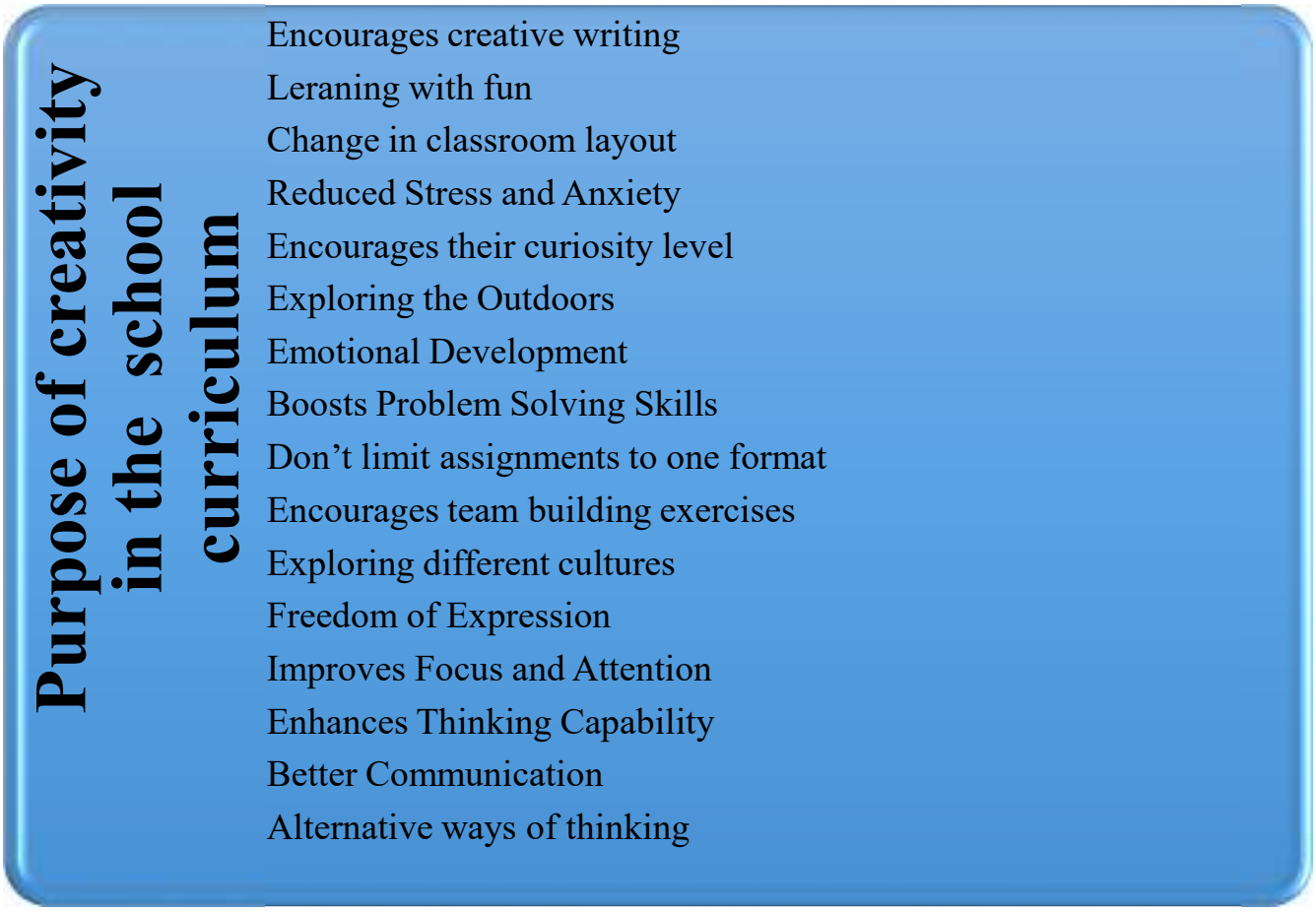
It is very important to visualize as to which is the best arrangement for creative students/learners in Indian school. It is difficult to find an appropriate and definite answer to this challenging and

difficult question. School system and conditions across the nation and states differ with respect to curriculum, infrastructural facilities, accommodation, trained personnel etc. Creativity is a universal human quality. Creative thinking is a process by which a person generates information which he did not possess earlier. Creativity among learners can be manifests in three basic areas i.e. Artistic, Scientific and technical creativity. One of the basic functions of education and teaching learning process is to encourage the development of the creativity amongst the students. The fact remains that the teacher do not like to go beyond the syllabus. Most of the teachers encourage rote learning. No educational programme is more important than the teacher who implements it. Teacher can boost creativity with the help of various techniques but on the most important element is curriculum. Curriculum is the focus of all classroom activities. The focus of this chapter is to explore the purpose of creativity in the school curriculum and how to develop a creative curriculum. It will also focus on How to enhance creativity in curriculum.

8.3 Purpose of Creativity in the School Curriculum

Creativity is described as the ability to think different solutions, develop new and original ideas and make connections. Creativity plays an important role in school curriculum. School curriculum comprises content or syllabus as well as all activities and experiences inside and outside the classroom. Curriculum serves as an interactive system of instruction and learning. It has specific goals, objectives, contents, lessons, strategies, measurement, and resources. Curriculum is summary of whole educational processes and systems. To achieve the objectives of education, curriculum is a path way to achieve educational goal. Curriculum is determined by needs of the society and aims of education. Curriculum is a tool in the hand of teachers. The right amalgamation of creativity along with school curriculum encourages students to be innovative and helps them to learn new things or concept. Creative classrooms and curriculum can transform the way students acquire knowledge, skills and training.

Let us have a look at how important is the role of creativity in school curriculum or purpose of creativity in school curriculum:



Encourages Creative Writing

The main purpose of creativity in the school curriculum is to encourage creative writing. The key things children need to be a great writer is creativity and encouragement from those around them. If children show an interest in writing short stories, one can do all to foster creativity. By this means children will be able to get help with how to structure their stories and make them more appealing. Giving this type of encouragement at a young age is a great way to put children on the right path.

Learning with Fun

The purpose of creativity in school curriculum is to bring fun in learning. Creative classrooms give an opportunity to learners to learn with fun and enjoyment. As we know, Students/learners are always fun loving and if a teacher will include creative activities along with curriculum it

helps to gains their interest for learning. For that, storytelling, drama and skits can be used help the learners to learn without the pressure of learning.

Change in Classroom Layout

In the present scenario classroom design has not advanced in ways that support the type of teaching and learning. Schools need to provide classrooms that place the teacher at the front of the room and students in rows of fixed furniture create conditions for repetitive, individual, and passive work. Accessible technologies allow students and teachers to focus on the content creation and enable them to think outside the boundaries. Different arrangements in the classrooms should be done and always make sure that the classroom set up is to accommodate the learning activities and their work styles. So, the purpose of creativity is also to bring about changes in classroom layout to foster creativity among learners.

Reduced Stress and Anxiety

The stress and worry of the students can be taken away by setting aside some time for creativity. This sense of joy keeps them relaxed and reduces their anxiety level. Encouraging productive discussions and interaction makes the classroom layout more flexible.

Encourages their Curiosity Level

Children's development is more dependent on fostering curiosity than forcing them to learn massive amounts of information. Children are naturally curious. Parents grow to their children as accustomed to being bombarded with endless questions, but it may be best if one doesn’t try to give answers to all of them. Allow child to experiment. Ask them what they think the answer might be. Children's curiosity is used to help them process information and develop their own conclusions.

Exploring the Outdoors

Creativity in school curriculum helps the children to explore in a safe and protected environment. Preschoolers naturally absorb their environment. Young children need to be able to experience the wonder of nature, the beauty of flowers and sun, and the miracles hidden in our earth's processes. Allowing children to help decide which route to take, learning new skills, or sorting

leaves by shape and color gives them the opportunity to exercise their creative minds, build thinking skills and participate in family fun.

Emotional Development

The major purpose of creativity in school curriculum to develop learners emotionally. Creativity gives them freedom to explore the surroundings and learn new things from them. They will be able to show their emotions during interactions and activities.

Boosts Problem Solving Skills

Creativity involves creative ideas for problem solving. The brainstorming activities and interactions can stimulate the skills of problem-solving in children. Creative problem solving can be encouraged among students that help them to think out of the box and be more imaginative and innovative.

Don't Limit Assignments and Work to One Format

The purpose of creativity in school curriculum is to allow them to complete task at their own by using creative ideas. Allowing students to choose the format of their own assignments allows them to explore the task using a format they enjoy the most, making them more naturally inclined to draw on their creativity. Students need to explore and accept the society and their ways of dealing and allowing them to choose their own way of teaching and learning.

Encourages Team Building Exercises

The most important thing about team building exercises is that no answer is right or wrong, just the strategies that allow teams to thrive and think together. Cooperative learning allows students to work together and help them to make decisions based on creative thinking, communication, and collaboration. So, creativity in school curriculum encourages team work.

Exploring Different Creative Cultures

Creativity in curriculum helps to explore different creative cultures. By developing students' ability to consider multiple perspectives is an important part of thinking beyond boundaries. It's likely you'll have students from multiple cultural backgrounds, so celebrate these differences, while also learning from them: invite their unique perspectives into discussions, encourage

students to be curious and allow them the space to bring their own cultural context into tasks in order to diversify the responses to tasks.

Freedom of Expression

Learners get the chance to come out of their shelves and participate in the activities if creative activities would be there in the curriculum. This freedom of expression and participations helps them to stay happy and contended. The creative classrooms provide them the opportunity to express themselves.

Improves Focus and Attention

Creative idea helps to improve focus and attention of the students because they remain busy in thinking, imagination and discussions. Playing memory games, taking regular breaks and intervals can make a lot of improvement in their attention span.

Enhances Thinking Capability

Creativity encourages out of box thinking as well as inside box thinking. So it helps the learners to enhance thinking capability by providing opportunities to come up with ideas and innovations. It stimulates imaginative thinking capability in students. Teacher uses open-ended questions, brain writing sessions, Phillips 66, creative team building activities, brainstorming sessions and debates for the enhancement of these capabilities.

Better Communication

Creativity helps to make communication skills better and effective. Students can make better conversation and stimulate innovative thinking and talking sessions during creativity sessions. They interact with each other, deliberate on it and it helps them to improve communication skills.

Alternative Ways of Thinking

Creative classroom and creative curriculum enables learners to think in innovative and different ways. It helps to boost creative thinking by processing different ideas and alternate way of thinking. It unblocks old patterns or habits of thinking.

8.4 - BOX I

STEPHEN GUISE (2014) HAS GIVEN THE THREE RULES OF CREATIVITY:
Rule #1 – Limit Your Options & Narrow Your Focus

Rule #2 – Believe You're Creative

Rule #3 – Embrace "Bad" Ideas

The new rules of creativity: nine mind hacks to boost your brain by JONAH LEHRER (2012):
Paint the walls blue

Take more breaks

Think like a child

Watch more comedy

How flashes of inspiration work

Embrace your constraints

Don't brainstorm

Prepare to improvise

Work with strangers

8.5 Developing a Creative Curriculum

Curriculum development is a process of developing and improving the curriculum. It can be defined as the step-by-step systematic process used to create positive improvements in courses or subjects or activities offered by a school, college or university. The curriculum development process systematically organizes what will be taught, who will be taught, and how it will be taught. All the components interact with each other. There are three types of curriculum: (1) explicit (stated curriculum), (2) hidden (unofficial curriculum), and (3) absent or null (excluded curriculum).Curriculum can also be Traditional, Thematic, Programmed, Classical, and Technological. Well drafted Curriculum is the central guide for all educators as to what is essential for teaching and learning.

Essential Considerations for Curriculum Development:

1. Identification of issue/problem/need
2. Specify the characteristics and needs of learners

3. Setting of intended outcomes/objectives
4. the important and relevant content
5. methods, procedures to accomplish intended outcomes
6. evaluation strategies for methods, content, and intended outcomes
7. Reporting

Creative Curriculum

The Creative Curriculum is one of the most widely used curricula across the globe. It's comprehensive and research-based in nature. The Creative Curriculum is based on Vygotsky's theories that social interaction is key to children's learning. The Creative Curriculum is research-based and aimed at the development of the whole child. A creative curriculum is one in which learners learn through innovative, creative and active teaching learning strategies. Creative curriculum discourages rote learning and focuses on innovative ideas, imagination, interesting projects, and learners' passions and needs. Research shows that a whole-child approach to education and curriculum —is developmentally appropriate and better prepares children for their life. The major features of creative curriculum are exploration and discovery as a way of learning. The Creative Curriculum includes those goals and objectives for a child which aims at overall development of the learner. The areas covered under creative curriculum are social/emotional, physical, cognitive and language.

The Creative Curriculum:

Catering individual differences

Readiness of the learners to learn new ideas or concepts

Academically rigorous

Promotes social–emotional development

Graded or rated higher than any other preschool curriculum

Inclusive in nature and supporting diverse children or learners

Motivates learners

Generate curiosity

Free from biases

Remove emotional barriers

Creative Curriculum classroom is creative, decorative and lively.

Promote development and learning

Foster social competence

Support children's learning through play

Create rich environments for learning

Developing a Creative Curriculum

The Creative Curriculum was founded in 1988 by a former preschool teacher, Diane Trister Dodge. It includes research-based content and resources that are aligned with state early learning standards. To develop creative curriculum, tteacher must engage in an ongoing cycle of observing, guiding learning, and assessing children's progress. Teachers must interact with children continuously and make decisions about when and how to respond to meet individual and group needs. The process of development of creative curriculum is a challenging task. It requires expertise and knowledge related to innovative techniques and strategies. Building a truly creative curriculum means taking control of the framework and designing creative learning opportunities. It must be based on 'Discover', 'Explore', and 'Create'.

A creative curriculum should include innovative, new and engaging activities that captivate students' attention and arouse curiosity. It must focus on the formulation of an understanding of the big ideas. Teacher may take learners to nearby places and ask them observe surroundings like neighbourhood walk. In general, the more varied activities, experiences and hands on must be incorporate into a unit of study to make the curriculum more creative.

Teacher and Creative Curriculum

Teacher plays a significant role in planning and developing creative curriculum. Variety of activities can appeal to and engage different types of learners. Teachers must keep in mind following innovative ideas while developing creative curriculum:

- Ask students/learners to get outside of classroom or school building.
- Must add innovative strategies and techniques like Phillips 66, brainstorming, A to Z approach etc.
- Teacher need to have knowledge and expertise in curriculum development.
- Must incorporate art, music, dance and/or movement.
- Incorporate simulation, dramatization, role plays and other performances.
- Must follow principles of creative curriculum
- Invite creative personalities, guest experts, family members, or other outside speakers.
- Incorporate technology in regular classrooms.

- Assessment strategies should be defined properly.
- A teacher's daily job involves continual observations of children.

These guidelines can be great starting points for developing activities and creative curriculum.

Assessment and Creative Curriculum

Assessment is a key component of learning because it helps students learn. Assessment has four primary purposes:

- to evaluate students learning and to support learning
- to identify special needs
- to evaluate programs and monitor trends
- to respond to program
- Promotes learning and motivation

The Creative curriculum Assessment Cycle Observing and collecting facts is the first of the four steps in the cycle. The steps are:

1. Observe and Collect Facts
2. Analyze and Respond
3. Evaluate
4. Summarize, Plan, and Communicate Assessment

Nine conditions necessary for teachers to foster student creativity through creative curriculum are as follows*:*

1. *Independence*: Encouraging students to learn independently;
2. *Integration*: Having a co-operative, socially integrative style of teaching;
3. *Motivation*: Motivating students to master factual knowledge, so that they have a solid base for divergent thinking;
4. *Judgment*: Delaying judging students' ideas until they have been thoroughly worked out and clearly formulated;
5. *Flexibility*: Encouraging flexible thinking;
6. *Evaluation*: Promoting self-evaluation in students;
7. *Question*: Taking students' suggestions and questions seriously;
8. *Opportunities*: Offering students opportunities to work with a wide variety of materials and under many different conditions.

9. *Frustration*: Helping students to learn to cope with frustration and failure, so that they have the courage to try the new and unusual

Developing Creative Curriculum Must Focus on:

Creativity & Experimentation

Active participation of learners

Community outreach

Whole School Approach

Include a Joy and Playful element

Extra-Curricular Opportunity

Student Leadership and engagement

Passionate Teachers

Experts' opinions

Observation

Think BIG

Common theme Cross-Curricular Approach

Planning a Creative Curriculum

Planning phase is one of the most important phases in developing creative curriculum. It is important to reflect, connect and evaluate. Administrator must setup a creative curriculum team with staff and students and evaluate current projects within school and discuss how can teacher deliver it with a creative approach.

Principles of Creative Curriculum

- Must aligned with educational goals and objectives
- Cater individual differences and meet individual needs
- Develop and maintain a trusting relationship with each child.
- Implement nurturing, caring and trust-building routines.
- Provide learning experiences that help children feel competent.
- Offer children appropriate choices and challenges.
- Must include appropriate strategies, techniques and methods
- Respond to children's attempts to communicate.
- Help children express their emotions appropriately.
- Helps to motivate them and arouse curiosity

- Flexibility and provide for group dynamics
- Provide many opportunities for play, fun and activities
- Promotes hands on training
- Reduce stress and anxiety
- Social-emotional competence development
- Constructive, purposeful play supports essential learning
- Appropriate the physical environment

What I appreciate the most about the Creative Curriculum is that it is geared to help different levels of students, the typical developed child, the struggling developing child, and the ESL learner. With having such diverse cultures in our schools, having a curriculum that is geared to helping more than one group of students is vitally important (What Works Clearinghouse, 2009).

SELF-CHECK EXERCISE

1. Write a short note on Creative Curriculum
2. Why is creativity necessary in school curriculum?

8.6 Enhancing Creativity in Curriculum

The philosophy of creative curriculum is that learners learn best by actual hands on, practical skills and by active participation. Creative curriculum focused on creativity, imagination, confidence and critical thinking skills. Teacher can raise the level of innovation by encouraging their students to develop skills in generating multiple solutions to problems. There are various techniques that can help individuals or groups in problem solving and idea-formation. Some of the techniques are use of analogies, metaphors, association, Phillips 66, brainstorming etc.

The following are some important points which should be taken into consideration while enhancing creativity in curriculum:

1. Re-word assignments to promote creative thinking (like create, imagine, invent etc.)
2. Be present with students' opinion and ideas and accept their ideas
3. Provide positive feedback to the students on their creativity and new idea.
4. Provide autonomy to think and do

5. Create a compassionate, accepting classroom environment
6. Use creative instructional strategies, models, and methods
7. Protect and support students' intrinsic motivation
8. Make it clear to students that creativity requires effort, time and energy
9. Promotes experiment with activities and hands on where students can practice creative thinking
10. Teacher must provide with new ways of teaching in the classroom
11. Try meditation and yoga practices that encourage creative thought
12. Treat lesson planning as the creative exercise it is.
13. Treat every learner equal
14. Enable learners for Collaboration, risk-taking and learn to be wrong

Cachia et al. [12] conducted research on teacher's perception of creativity and the teaching practices that enhance creativity and innovation in classroom. In their research, they gathered the opinion of (mostly) primary and secondary school teachers from 37 countries in the European Union. To collect their data, they used various means such as interviews with experts in the educational field, analyses of 1200 curricula documents, and online surveys. Results indicate that even if teaching for creativity can be mentioned in school curricula from many countries, it does not mean that schools are developing creative practices. Also, they highlight the fact that teachers do not have a clear understanding on how should creativity be defined or how it should be introduced in classrooms (as learning or assessment), even though teachers recognized the importance and interest of teaching for creativity.

The present curriculum needs improvement and enhancement to develop creativity and innovations among learners. National Education Policy, 2020 aims at fostering innovation and creativity. In order to promote creativity and innovation, institutions and faculty will have the autonomy to innovate in curriculum, pedagogy, and assessment. The creativity can be enhanced in curriculum by following ways:

By introduction of New teaching-learning methods
By Using Innovative pedagogical approaches and strategies
By adding activities which helps to think outside the box as well as inside the box
Experiential learning and exploration
Active participation

Provide autonomy
ICT-empowered pedagogies
Focus on keen observation
Foster a Question-Friendly Environment
Reforms in Assessment Pattern
Avoid excessive use of the internet
Lighter syllabi
Teaching beyond curriculum
Practice Generating More Ideas
Learning under the lap of nature
Model Creativity in the Classroom
Use the Jigsaw Classroom Method.
Encourage New Skills
By arranging more brainstorming/brain writing sessions

8.7 Let Us Sum Up

The vision of the National Policy of Education (2020)is to improve the quality of education by enhancing creativity and innovation among learners. For that, creative curriculum is important. The Creative Curriculum helps teachers interact with children in a friendly manner. It also promotes development and learning and foster children's social competence. Creative curriculum foster children are social/emotional, physical, cognitive and language development, The Creative Curriculum is based on Vygotsky's theories that social interaction is key to children's learning. Teachers and curriculum frame workers must talent into consideration various activities, strategies and techniques to enhance creativity through curriculum.

8.8 Self-Assessment Exercise

1. Differentiate curriculum and creative curriculum.

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2. What points should be taken into consideration while developing creative curriculum for Science subject or social science subject?

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