TEACHING OF MATHEMATICS

D.EL.ED II YEAR
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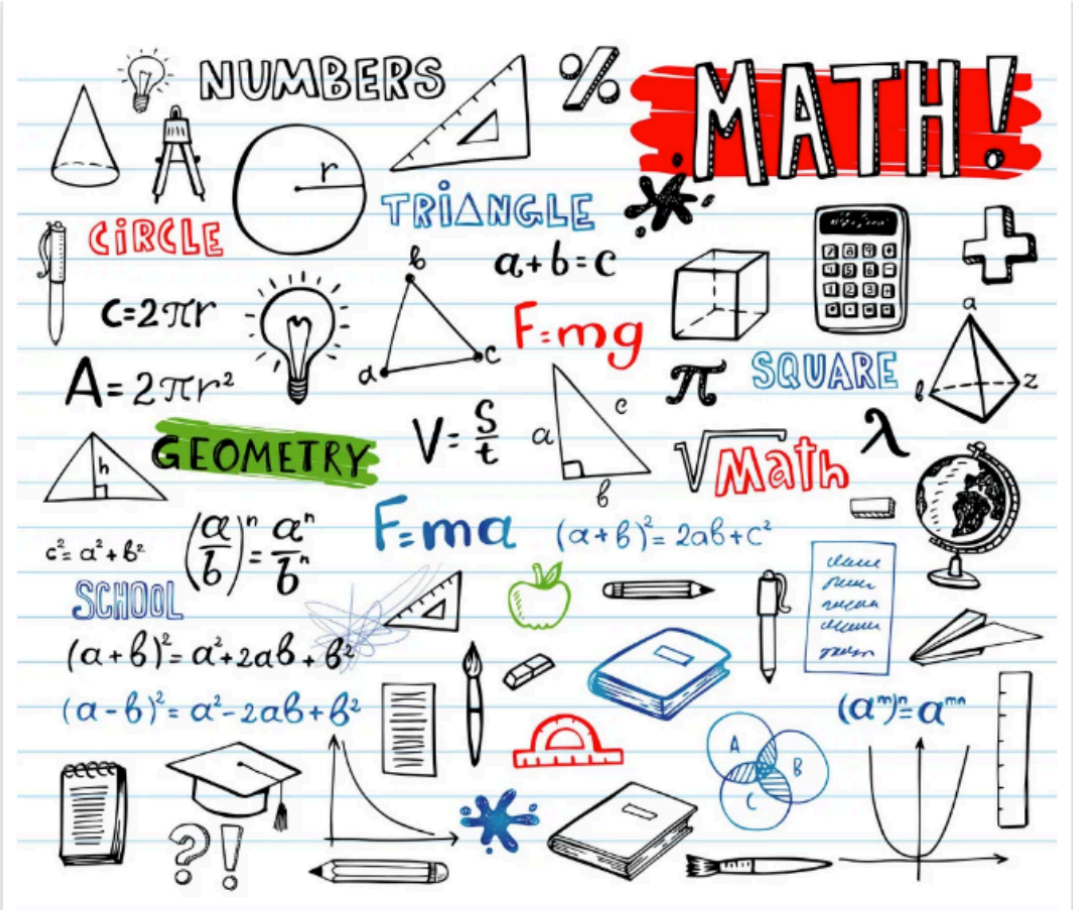
NOTES



EDUCATION AND EDUCATION
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Syllabus Outline

Unit 1 Mathematical Reasoning 15 Marks

- Process of generalization; Pattern recognition and Inductive reasoning
- Structure of Mathematics: Axioms, Definitions, Theorems
- Validation Process of Mathematical Statements: Proofs, Counters Examples, Conjecture
- Problem Solving in Mathematics: A Process
- Creative Thinking in Mathematics

Notes

PATTERN RECOGNITION

Number of patterns are observed in nature, in our surroundings, etc.

EXAMPLE

- Pattern in days of week.
- Pattern in colour of a curtain.
- Geometrical pattern on the wall of a monument.
- Patterns with numerals:

  All such patterns are needed to be recognised properly so that the continuation of pattern is known in advance. People who observe and recognise the pattern really admire the beauty of mathematics. When we come across some pattern, we have to push our brains to recognise the pattern. So, pattern recognition is an important brain task and the first step in the process of generalising the series.

INDUCTIVE REASONING

Inductive reasoning is the process of analysing patterns after recognition to form generalisations.

Inductive Reasoning in Daily Life

For Example

(a) Sujan appeared in a competition test and passed it. He was wearing his green trouser on the day of exam. Again he cleared an interview, wearing the same trouser at the time of interview. So he logically generalised that wearing his green trouser always show success to him.

(b) A boy dropped a ball from a certain height. It bounced to some height. Next time, he dropped the ball from a higher point. This time, the ball bounced higher than the first time. Third ball bounced higher than the first time. Third time, he dropped it from a higher point and observed the ball bouncing to a height higher than the first bounce and second bounce. So, he logically concluded that more the drop-height, more is the height of bounce for a ball.

(C) One day a mom made her kid slept and went to market. The kid woke up in her absence and found the mother missing. The next day again, kid did not find his mother when he woke up. Now the kid was scared of sleeping or he slept only after tightly holding his mother's clothes or nose or ear. This is because he generalised that his sleep will lead to the 'missing of mother'.

Inductive reasoning for Teaching Mathematics

Students try to follow the pattern or concept by using the previous knowledge.

Learning mathematics should involve a constant search for patterns, with students making educated guesses.

The formulae, rules, etc. obtained through inductive reasoning form a sharp impression in the mind of students.

Example:-

(a) Students may use inductive reasoning to discover patterns in multiplying by ten or multiplying by hundred:

3 x 10 = 30	3 x 100 = 300
8 x 10 = 80	8 x 100 = 800
10 x 10 = 100	10 x 100 = 1000
18 x 10 = 180	18 x 100 = 1800
74 x 10 = 740	74 x 100 = 7400

(b) Students are instructed to draw few triangles and measure all three sides of each triangle. They find the sum of any two sides and compare it with the third side, for each triangle. Through inductive reasoning, they reach to the result that 'in a triangle sum of two sides is greater than the third side'.

(c) students are instructed to draw few triangles and measure all three angles of each triangle. The Sum of all angles in each triangle gives them an amazing

result. Through inductive reasoning, they conclude that the 'sum of three angles in each triangle is 180^0'.

There are numerous such examples of inductive reasoning in mathematics that provide concluding statements or results or formulae.

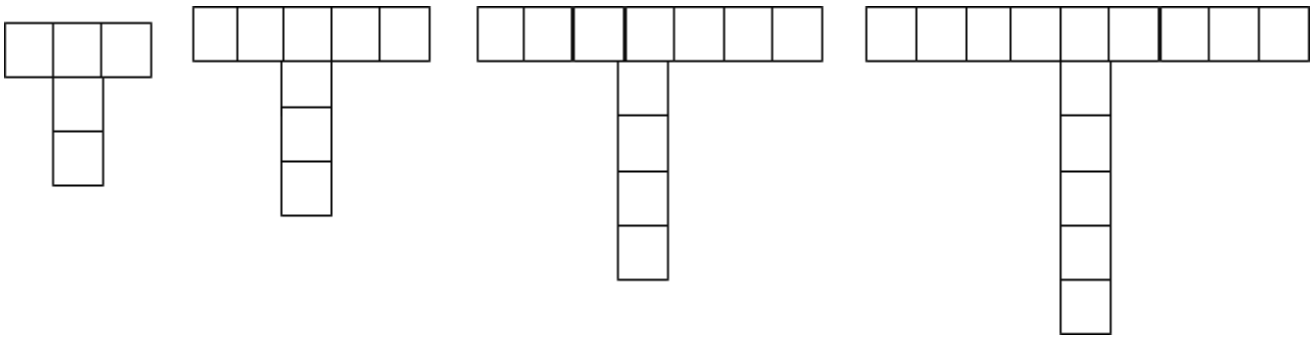
PROCESS OF GENERALISATION

Generalisation:- A general statement or concept obtained by inference from specific cases.

Generalisation of statements or results form formulae, theorems etc.
The steps to attain generalisation are:

- **(a)** Observation
- **(b)** Pattern recognition
- **(c)** Inductive reasoning
- **(d)** Formation of hypothesis
- **(e)** Verification of hypothesis
- **(f)** Generalisation

Example: If the pattern of T-shapes continues in a given figure, how many squares will be in the 100th T-shapes?



We will first reveal the generalisation for the pattern:

(a) **Observation:** The pattern is observed carefully. It is observed that in each subsequent T-shape, one square is added to each of the top left corner, top right corner and at the end of each vertical column in T.

(b) **Pattern recognition.** With such subsequent additions of squares, the pattern is recognised as follows:

T-shape	1	2	3	4	...	*n*	...	100
Number of squares	5	8	11	14	...	...	...	...

(c) **Inductive reasoning:**
Thought process may go as:

	$5 > 1$,	$8 > 2$,	$11 > 3$	… and so on
Or	$5 > 3 \times 1$,	$8 > 3 \times 2$	$11 > 3 \times 3$	… and so on
Or	$5 > 3$,	$8 > 6$,	$11 > 9$	… and so on

(d) **Formation of hypothesis.** The rule for no. of squares in nth T-shape in $3n + 2$.
(e) **Verification of hypothesis.**
For $n = 2$, No. of squares $= 3 \times 2 + 2$
$= 6 + 2$
$= 8$ which is true
For $n = 3$, No. of square $= 3 \times 3 + 2$
$= 9 + 2$
$= 11$ which is true
For $n = 4$, No. of square $= 3 \times 4 + 2$
$= 12 + 2$
$= 14$ Which is true

(f) **Generalisation**. In the given pattern,
For each nth T-shape, no. of square $= 3n + 2$.

Solution of question: Applying the above genralisation rule, no. of square in 100th T-shape $= 3 \times 100 + 2$
$= 300 + 2 = 302$

IMPORTANCE OF PROCESS OF GENERALISATION

(a) The process proceeds logically.
(b) The process encourages the students to observe and think for recognising the pattern.
(c) The process makes the students use previous knowledge for inductive reasoning.
(d) The process empowers the creative ability of students while forming hypotheses.
(e) The process provides satisfaction and trust in mathematics while verifying the hypothesis.
(f) Students feel encouraged and convinced while generalising the result (cognitive development).

AXIOMS AND POSTULATES

There are certain statements, which are accepted without proof. These are known as **axioms** or **postulates**. Those universally accepted assumptions which are specific to geometry are called **postulates**. The assumptions that are used throughout mathematics and not specifically linked to geometry are called axioms.

Some of the basic postulates are as follows:

(a) A line is a set of points containing at least two points.
(b) Two straight lines cannot intersect in more than one point.

Some of the postulates given by Euclid are as follows:

(a) A straight line may be drawn from any one point to aby other point.
(b) A circle can be drawn with any centre and any radius.
(c) All right angles are equal to one another.

Axioms given by Euclid

(a) Things which are equal to the same thing are equal to one another.
(b) If equals are added to equals, the wholes are equal.
(c) If equals are subtracted from equals, the remainders are equal.
(d) Things which coincide with one another are equal to one another.
(e) The whole is greater than the part.
(f) Things which are double of the same things are equal to one another.
(g) Things which are halves of the same things are equal to one another.

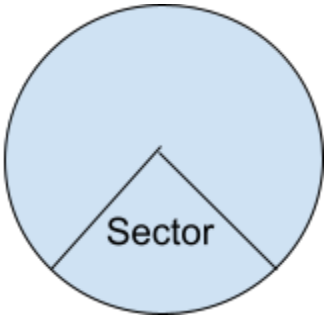
DEFINITION

A statement that provides meaning to a 'word' or 'group of words' is called definition. A definition not only clarifies the specific 'word' or 'group of words', but also formes the base of the whole concept in the mind of students. Figures are also included in the definition if required.

Types of definition:

(a) **Philosophical definitions**
These definitions which are formed by using only words or language. These are difficult to understand. For example- the definition of 'point', 'line' as it is difficult to imagine a point or a line explained only by a few words.

(b) **Explanatory definitions**
These definitions which use well-labelled figures to explain the word or group of words. These are easy to be grasped by students. For example, definitions of vertically opposite angles, sector of a circle etc. including explanatory figures as shown:



(c) **Essential Definitions:** Those definitions that explain basic terms and concepts. These are to be learnt by students. For example, the definition of rectangle, rhombus, trapezium etc.

Characteristics of good definition

(a) Simple: Definition is formed simply by using easy language and known words.

(b) Clear: Definition must be such that it fully explains the relevant term or concept.

(c) Brief: It must be formed of minimum words or sentences that explain the term.

THEOREM

A mathematical statement whose truth has been established is called a theorem. Usually, the statement of a theorem consists of two parts: if….., then….., 'if' part gives information as per previous knowledge, and 'then' part states the truth to be proved.

Various forms of theorems are:

(1) Converse Theorem

A pair of theorem may consist of theorems converse to each other. 'If' part of one theorem is 'then' part of the other and vice versa. For example:

(a) Theorem: In a parallelogram, opposite angles are equal.
Converse: If pair of opposite angles are equal in a quadrilateral, then it is a parallelogram.

(2) Contra-positive Theorem

When 'if' and 'then' parts (known and to prove part) are presented in negative form, it is contrapositive theorem. The negation of the 'if' part is assumed as a hypothesis, the negation of 'then' part is proved.
For example:

Theorem: In a circle, if two chords are equal, then they form equal arcs on a circle.

Contrapositive Form: In a circle, if two chords are unequal, then they form unequal arcs on a circle.

(3) Reciprocal theorem

In a theorem, two nouns are interchanged to form a new theorem, if possible. For example:

Theorem: If two sides and included angle of a triangle are equal to the corresponding side and included angle of another triangle, then the triangles are congruent (SAS congruence)
Reciprocal Theorem: If two angles and included side of a triangle are equal to the corresponding angles and included side of another triangle, then the triangles are congruent (ASA congruence)

AXIOMS TO THEOREMS: STRUCTURE OF MATHEMATICS

We have covered the journey from axioms to theorems. In fact, this journey forms the structure of mathematics. It may be explained as:

(1) Some observations lead to form hypothesis.
(2) A hypothesis is verified through examples.
(3) A verified hypothesis is then named 'axiom'.
(4) Axioms are universally accepted truth without proof.
(5) Formation and verification of hypothesis involve the use of previous knowledge and certain known terms.
(6) Also, previous knowledge and known terms may be used to explain some new terms. This explanation of new terms is named 'definition'.
(7) New statements that can be proved logically using 'axioms' and ' definitions' are called 'theorems'
(8) Most of mathematics is gathered into these axioms, definitions and theorems. So, the structure of mathematics is formed by axioms, definitions and theorems.

MATHEMATICAL STATEMENTS

A sentence that is either true or false but not both is called a **statement**. Those statements which are accepted mathematically are called **mathematical statements**.
For example.

(a) The Square of three is nine.
(b) The Sum of two odd numbers is an even number
(c) The product of two prime numbers is an odd number

Statement (a) is true, (b) is false, (c) is ambiguous i.e. sometimes true and sometimes false. So (a) and (b) are mathematical statements, whereas 9C0 is not.

PROOF

It is a process to prove a given statement. A statement is called a theorem, if it is proved.
Methods to prove mathematical statements are:

(a) Direct method
(b) Indirect method

(a) **Direct method**
The statement is directly proved true in this method. Axioms, definitions and previous knowledge are used for logical reasoning to deduce the proof.

Example-

(1) **Statement:** Sum two odd natural numbers is an even natural number.
Previous knowledge: odd number = $2n + 1$

Proof: odd number + odd number (known)
= (2 n + 1) + (2 m + 1) (previous knowledge)
= (2 n + 2 m) + (1 + 1) (logical reasoning)
= 2(n + m) + 2
=> even number

(b) **Indirect method**
It is difficult to prove each statement by direct method. Those statements that cannot be proved by direct method, are proved by indirect method.

1. **Contradiction method**
Negation of statement is assumed true. Negation of assumption (contradiction) is reached through logical reasoning. This process proves the statement.
For example:
Statement: If n^2 is an odd interger,
then n will also be an odd integer
Proof: suppose n^2 is an odd integer
and n is not an odd integer
=> n is even
=> n = 2k
$n^2 = 4k^2$
$= 2 (2k^2)$
= even integer
=> n^2 is even integer
Which contradicts the assumption
Therefore, n is not even
i.e. if n^2 is an odd integer, then n is also an odd integer.

2. Contrapositive method

The statement is proved in the manner that negation of 'implication' implies negative of 'known part'.

For example:

I. **Statement:** for three natural numbers a, b and c

If $a + b = a + c$, then $b = c$

i.e. $a + b = a + c \Rightarrow b = c$

proof : suppose $b \neq c \Rightarrow a + b \neq a + c$

Thus if $a + b = a + c$, then $b = c$

3. Proving a sttement by disproving its negation

If we prove the negation of a statement as false, it implies that the statement is true.

For example: in order to prove that:

'Each of the other two angles of a right-angled triangle is less than 90^0, we may prove that 'each of the other angles of a right-angled - triangle is not greater than or equal to 90^0.

A simple example is that to prove 'it is hot', one can prove that ' it is not cold'.

4. Proving a statement by proving true the negation of its negation

A statement may be proved by proving the negation of negation statement, for example, look at the following statements:

A: In an isosceles triangle, angles opposite to equal sides are not equal (statement)

B: In an isosceles triangle, angles opposite to equal side are not equal (negation of statement)

C: In an isosceles triangle, angles opposite to unequal side are not equal (negation of statement)

So, in order to prove 'A' true, 'C' can be proved true.

COUNTER EXAMPLE

A single example may disprove the statement. Such an example is called counter example. For example:

(a) **Statement:** All odd numbers greater than 1 are prime.

Counter example: 9 is an odd numenr

$9 > 1$ and $9 = 3 \times 3$

=> 9 is not prime

Although many numbers like 3, 5, 7, 11, 13 etc. prove the statement true but a single example, say 9 disproves the statements.

(b) Statements: The sum of two prime numbers is never prime.
Counter example:

2	+	3	=	5
Prime number		Prime number		Prime number

Although 3 + 5 = 8, 5 + 7 = 12 prove the statement to be true, but a single counter example is sufficient to disprove the statement.

CONJECTURE

A conjecture is a statement that is believed true, based on our mathematical understanding and experience. Such a statement is neither proved nor contradicted. In fact, conjectures are intelligent mathematical guesses that come up by looking for patterns.

Example I: Observing the pattern:

1 + 3 + 5 = 9
3 + 5 + 7 = 15
5 + 7 + 9 = 21
7 + 9 + 11 = 27
9 + 11 + 13 = 33

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Any of the following intelligent guess or conjecture may be formed:

(a) The Sum of three consecutive odd numbers is odd.
(b) The Sum of three consecutive odd numbers is divisible by 3.

VALIDITY OF MATHEMATICAL STATEMENT

A mathematical statement must have any one of the following options:

(a) A statement is proved true i.e. it has a justified proof.
(b) There exists an example that proves the statement false i.e. counter example.
(c) Neither statement is proved true, nor there is found any counter example. So is just an intelligent guess or conjecture.

A statement is valid if it can be proved. It does not matter if it is proved by any method, direct or indirect.

The statement is not valid even if a single counter example is given for the statement In mathematics, counter examples are used to disprove the statement. However, generating examples in favour of a statement does not provide validity of the statement.

In case of conjecture, validity is doubtful. This is because the truth or falsity of a conjecture is yet to be established. It is only an intelligent guess.

PROBLEM-SOLVING PROCESS

Certain problems related to mathematics in daily life are presented before students. They apply logic, thought, reasoning and use appropriate mathematical concepts to solve the problem. The role of a teacher is passive in this process.

Various forms of problem-solving activities or questions are as follows:

- Multiple-choice questions
- Passage based questions
- Coin puzzle
- Logic problem
- Magic square etc.

All the above forms of problem-solving activities may be categorised as:

- Qualitative type or
- Quantitative type

The problems that are based upon definitions, formulas, comparisons etc. are **qualitative** type.

The problems that are based upon numerical calculations and finding solutions are **quantitative** type.

PROBLEM-SOLVING: A PROCESS

The process of problem-solving goes through the following steps:

I. **Identification of known and unknown facts:** Student identifies the given or known facts. Also, he identifies the actual problem i.e. what is asked in the problem.

II. **Relate to mathematical facts:** Such problems do not follow a particular concept or chapter. The student tries to find the mathematical fact that may help to solve the problem.

III. **Find the appropriate method:** After locating the relevant concept, the student utilises his previous knowledge related to the concept and tries to reach the solution.

IV. **Find the solution:** Students follow the working steps and perform the required calculations to find the solution.

V. **Verification of solution:** After calculating the answer, the result should be checked to correct the mistakes of calculations, if any. The habit of

checking the result should be developed in students. A teacher may guide them the method to verify the result.

In the whole process, teacher only acts as guide to students. In this process, student is an active participant whereas teacher is passive participant.

BENEFIT OF PROBLEM-SOLVING PROCESS TO STUDENTS

1. **Relate daily life problems to mathematic**
   The practice of problem-solving makes students think over certain daily life problems in terms of mathematical facts. They try to relate certain relevant daily life problems to mathematics.

2. **Develop an ability to analyse the problem**
   The problem-solving process helps the students to learn 'how to analyse a problem'. This process makes them aware to first analyse the given and asked part of the problem.

3. **Develop thinking and logical reasoning**
   Problem-solving process makes students 'to think upon' at various steps. It also makes them use previous knowledge and deduce the steps through logical reasoning.

4. **Develop self-dependence and self-confidence**
   In the problem-solving process, student move from start to end by themselves. Teachers play only passive role. Students identify, analyse, deduce and reach the solution by themselves. This builds up their self-dependence and reduces their dependence on others.

5. **Cognitive development**
   This process gives memorable learning experiences to students. The concepts, facts etc. learnt during this process form a remarkable print over the mind of students.

The process of problem-solving also brushes up their command over the language. On the whole, this is an interesting and intelligent process.

LIMITATIONS FOR PROBLEM SOLVING PROCESS

1. **Limited concept coverage**
   This process may not be applicable to all mathematical concepts. This is because it is not possible to create such problems/questions/activities for each and every concept of mathematics.
2. **Unavailability of textbook material**
   Very few problems are available in textbooks as per the problem-solving

process, the teacher has to frame such problems themselves for the practics of students.

3. **Time limit for curriculum coverage**

In the present education system, the curriculum has to be covered by teachers in a limited duration. This process is a slow process. It depends upon the speed of students for solving the problem. So it is difficult to cover the curriculum under given time limit with this slow pace process.

4. **Not practical for lower classes**

The beginner and students in lower classes have little previous knowledge. So, it is difficult for them to apply the problem-solving process.

5. **More mental work**

The process develops and gives way to mental work at the cost of behavioural and creative work.

CREATIVITY IN LIFE

'Creativity' means 'doing something in an interesting manner' or 'doing something using new ideas, new art etc.' It fills colour to life. Various designs in clothes, rangoli, various shapes in nature, different shades of colours, so huge and designer buildings, delicious variety in food etc. are examples that impart creativity in life. The creativity in life strengthens our thoughts and work capacity.

CREATIVITY IN TEACHING-LEARNING

It is necessary for students and teachers to follow through the path of creativity in teaching-learning process as it makes the process colourful, bright and effective. Helps to improve the cognitive and psychomotor level of students. It helps teachers to attain their objective easily and effectively.

CREATIVITY IN MATHEMATICS

The word 'creativity' is generally related to art, craft, music, painting, dance, etc. Creativity refers to doing new experiments, forming a new hypothesis, establishing new relations, finding solutions etc. These might be related to any of the fields, say science, culture, geography or mathematics. There are many forms of creativity in mathematics:

- Derive formula through activities
- Introduce concept or rule through examples and activities
- Mathematical concept based games and puzzles
- Geometrical constructions
- Geometrical patterns
- Patterns in number
- Relating daily life problems to mathematics
- Solving problems through alternative methods

HOW TO PROMOTE CREATIVITY IN MATHEMATICS

1. Creative activities related to mathematical concepts must be included as part of the curriculum.
2. Textbooks and study-material must provide more and more, stepwise explained activities related to each and every sub-topic.
3. A classroom must be shaped like a 'workshop'. Teaching-learning must go as self-learning through discussions and activities.
   Solving textbook exercises and sums must be the target of classroom teaching. Rather imparting facts and concepts to students must be the target of classroom teaching.
4. Evaluation must also involve the assessment of concept formation. It should not be restricted to pen-paper tests.

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Education and Education

Arts in Education

"Every child is an artist. The problem is how to remain an artist once we grow up." – Pablo Picasso

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Syllabus Outline

Unit 1 Understanding ‘Arts’ and ‘Arts in Education'

10 Marks

- Meaning and Concept of ‘Arts’ and ‘Arts in Education’
- Understanding aesthetic and its educational relevance
- Arts as Pedagogy of learning and development - understanding Arts (Visual & Performing Arts) and their importance in teaching learning of different subjects at upper primary level of school education.
- Art Integrated Learning: concept, need & importance.
- Educational Thinkers (Indian and of Foreign Origin) on Arts in Education- Tagore, Devi Prasad, Elliot W. Eisner (1933-), Victor Lowenfeld, John Dewey, Howard Earl Gardner.

Meaning and Concept of Art and Arts in Education

Art is a way to express your feeling and thoughts:

The oldest forms of art are visual art which include creation of images or objects in fields including painting, sculpture, printmaking, photography and other visual media.

Art is a universal form of communication and creative expression. It is often a language that expresses our experiences and perception of the world around us, in varied forms.

Elbert Hubbard
Art is not a thing—it is a way.

Vivekananda
Art is – representing the beautiful. There must be Art in everything.

Art, thus, is a multisensory language that incorporates many historical and cultural references.

Importance /Significance of visual and performing art, art at primary level

- **Medium of expressing emotional feelings:** Human beings have numerous emotions and art is a good medium for expressing our thoughts and emotions in many ways such as through dance, drama, music etc. e.g. when a child performs a dance he/she can easily express their feeling such as grief, sorrow, happiness etc.
- **It develops imagination power:** While performing or creating art an individual uses his most of the sensory organs which help them to develop their imaginative thinking which leads to better development of an individual e.g. in painting they express their imagination while drawing some different flowers, trees etc.
- **Mode of personality development:** In art either its visual or performing an individual acquires numerous forms of traits in their personality. An individual grasps the knowledge of social, emotional, and cultural feelings which helps to grooming an individual personality, e.g., better way of speaking, behaving etc.
- **Enhance the feeling of aesthetic or beauty:** Aesthetic and beauty is the part of our soul of mankind and art is the medium to bring out the inner aesthetic and beauty from an individual soul.
- **Art form is universal:** Development of art and performing art in different areas or countries of the world brings people of these countries together, closer and also helps in establishing social relationships.
- **Art provides knowledge about the ancient period:** Art helps in expressing visible and invisible things. It helps in human expression, knowledge about ancient art, life, civilization and culture can be acquired only through this medium. We gain knowledge about our forefathers' thought art. E.g. knowledge about cave paintings etc.

- **Art helps to develop the coordination between various parts of the body:** Art enables better coordination between hand and brain. Generally it focuses on fine motor skills and gross motor skills which comes out through visual and performing art. Ultimately it controls the whole body.
- **Art develops the value among the students:** Art enhances the level of self-analysis, self-esteem and also self-discipline. Such students' stay more motivated and cooperative than others and also tend to develop practical aptitude and facilitate thinking.
- **Inner energies into creative abilities:** Art does not mean to just cultivate rich taste and appreciation of beauty. It also directs the inner energies into creative abilities. Art is a wonderful tool to bring out the inner energies into positive expression by the effective use of leisure time.
- **Academic achievement:** The students who are involved in art perform better in school. According to Gardner's theory of multiple intelligence, students who take art develop an increased capacity to learn because they expand their learning styles beyond linguistic mathematical reasoning in their traditional classes.
- **Making sense of things:** When the students perform arts it enables them to choose better ideas and work on their own by using their senses. In dance they use eyes, mouth, hand etc.
- **Develops sitting power capacity and attention span:** In primary classes, students' attention and concentration level is quite short. Art is a way to increase the sitting power and attention span of primary class students by performing various creative activities.

Art education

Art education is the medium by which students develop many skills and powers in themselves. So that they can express their dreams and desires, feelings, thoughts and imaginary ideas in such a way in which it is understandable by all in an easier way. It is a universal understable language of communication of creative abilities.

The framework of the national curriculum for primary and secondary education, NCERT has emphasized the aim and scope of art education under the sub-title art and creativity.

The aim of art education should be to sensitize the students so that they may learn to respond to the beauty in time, colors and form and movement and sound, study of art and cultural heritage may enable the learner to appreciate and understand each other. The curriculum should aim at developing awareness of it and interest in a wide variety of fine arts both at the same classical and folk level.

Aims and objective of art education

- Understand the underlying values and justification of teaching art and art history within the school curriculum.
- Understand developing strategies to explore and engage with some of the subject criticisms voiced.
- Understand enhancing and supporting pupil engagement with and exploration of these issues.
- Understand extending teaching approaches that incorporate some of these values and ideas.
- To develop creativity and critical thinking, nurture aesthetic sensitivity and build up cultural awareness and effective communication.
- To develop skills, knowledge and positive values and attitudes in the arts.
- To gain delight, enjoyment and satisfaction through participation in art making activities.
- To pursue a lifelong interest in arts.
- Develop the ability of storytelling and self-expression.

Aesthetics in education

Aesthetics is the branch of philosophy dealing with such notions as the beautiful, the egly, the sublime, the comic. The root of the word aesthetic is the greek aisthetike, which means perception through the sense. Aesthetics may be defined narrowly as the theory of beauty, or more broadly as that together with the philosophy of art.

Concept

Aesthetic education is a way of regaining touch with the process of learning something new, of being introduced to a medium never known in a particular way before. It is the incorporation of the arts across the curriculum in a way that fosters a heightened awareness of and appreciation for all that touches our lives.

Aesthetics in Education

Aesthetic education is an approach to teaching and learning that engages students in learning about works of art through hands-on inquiry, questioning, writing, and art making. It “requires that learners must break with the taken-for-granted, what some call the ‘natural attitude’, and look through the lenses of various ways of knowing, seeing and feeling in a conscious endeavor to impose different orders upon experience.”

-MAXINE GREENE (2001)

Education relevance / Importance of aesthetic in education

1. **The ability to perceive aesthetic qualities—**In order for the child to be able to appreciate natural wonders, shapes, shades and pictures, they must be able to first notice them. This is why the development of the ability to notice the

beautiful is the primary task of aesthetic education.

2. **The ability to experience aesthetic qualities—**Aesthetic qualities have to be experienced. This means that they induce feelings of excitement, joy and optimism. Such emotional states ennoble the individual and encourage- him/her to also produce art themselves.

3. **Creative capabilities—** It is essential to allow children to participate in activities that will develop his/her creative abilities.We are not simply born with creative abilities; they have to be developed .As Wallbaum (1996) claims, aesthetic perception is dependent on the relationship between the child and art, in which one's own production is much more important than being exposed to artworks and their interpretations, if this production is, of course, carried out according to aesthetic criteria.

4. **Aesthetic judgement or evaluating aesthetic qualities—**Judging or evaluating aesthetic qualities demands formed evaluation criteria. In order for beauty to reveal its true value, we must be familiar with its particularities and its language.

5. **Aesthetic education is an essential component in upbringing—**It includes the development of aesthetic feelings, interests and taste by perception of beauty and harmony. Aesthetic feelings are formed through the experience of aesthetic impressions (enjoyment, excitement, pleasure, rapture, etc.).

6. **Aesthetic education enables learners to express their views—**Aesthetic education enables an individual to express in the field of arts which can't be expressed orally or even in written form. It provides the field to express an individual's feelings and ideas, develops imagination, creativity, expressiveness and critical spirit.

7. **Aesthetic education is a specific interaction of cognition and emotion—**It develops:-
    - Art and cultural awareness
    - Perception
    - Creativity
    - Emotional intelligence
    - Ability to critical reflection
    - Decision-making ability
    - Cognition, mind and emotions
    - Analysis and intuition
    - Teacher-learner partnership

8. **Aesthetic education is the result of sensory, imaginative perception of reality—** It is focused on the formation of aesthetic feelings, needs and interests, aesthetic beauty and ideals, ability to artistic creation and aesthetic perception of the surrounding world. It is closely connected with all directions of upbringing:

moral, political, legal, labour, economical, environmental, physical and ethical.

9. **Aesthetic education develops the ability to see and feel the beauty and harmony—**It successfully combines mind and emotions, develops skills that lead to proper perception, enjoyment and evaluation of the beautiful in literature, art and life.

10. **Aesthetic education and the Comprehensive development of humans—**The specific purpose of aesthetic education is different from the ones of moral education, mentality education and physical education. Aesthetic education functions where the other educations can't.The purpose of aesthetic education includes three main parts: cultivating the aesthetic faculties, edifying the minds and souls, and raising the decent aesthetic.

11. **Aesthetic education opens up areas of learning—**
    - The power of a work of art to transform children and teachers;
    - The partnership of student and teacher sharing insights;
    - The challenges of taking risks to ask open-ended questions;
    - The excitement of learning to express oneself in new ways;
    - The self-esteem gained from experience that teach self-respect and mutual respect;
    - The exploration of a broad range of human relationships;
    - The opportunity to combine mind and emotion, cognition and sensory experience, analysis and intuition toward understanding something as a whole.

Visual art

When we think of visual art, we think of something tangible, an art form intended to be appreciated or perceived by viewing,

- Such as painting
- Photography
- Printmaking
- Sculpture
- Applied arts

All these termed as visual art.
The ideas and skills in visual art can help in transmission of culture, tradition and customs.
'Visual art' means two-dimensional and three-dimensional things, sculpture and architecture come under separate headings. Likewise, visual works of art stay in one place, unmoving, while we observe them.

Different elements of Visual Art or Fundamental of Arts

1. Line

2. Shape
3. Form
4. Color
5. Space
6. Texture
7. Perspective
8. Rhythm
9. Value

Line

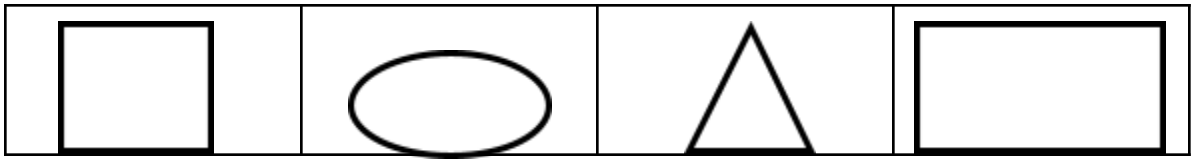
Types of line

Virtual line		Gives: stability, strength and dignity
Horizontal line		For: mental stability
Diagonal line		For: glory, ambition etc.
Angular line		For: shock, confusion etc.
Wavy line		For: rhythm, movement etc.
Spiral Line		For: creation, suspense and motion

Shape

A shape is an area enclosed by a line. Shapes can be either geometric or organic. Geometric shapes are square, circles, triangle etc. On the other hand, organic shapes refer to shapes derived from nature, like flowers, leaves etc. Every object, however complex, can be broken up into simpler shapes. Helping children see these shapes, helps them to depict the object on paper.

Different shapes



Square	Ovral	Triangle	Rectangle

Form
Form is any shape that has a thickness or depth. Some of the forms are sphere, cylindrical, cuboid etc. You can depict a simple form by shading a shape using techniques such as hatching, smudging or stippling to create the third dimension.

Color
Color is seen by the way light reflects off a surface.

Types of colours	Colours
Primary	Yellow, blue and red
Secondary	Green, orange and violet
Warm	Yellow, orange and red
Cool	Mint, blue and green etc.

Space
Space is the area taken up by a particular object. It includes foreground, middle ground and background. There are two types of space: positives and negative space. Positive space refers to the space of a shape representing the subject matter. Negative space refers to the space around and between the subject matter.

Texture
Texture applies to how an object feels or appears to feel. In art there are two types of texture – real and implied texture. Real texture includes sandpaper, cotton balls, tree bark or animal fur. Implied texture is the way the surface on an object “looks” like it feels.

Performing art
The performing arts are those forms of art which can be expressed by some medium such as face expression, gestures, body movements, hand and eye coordination etc.

1. **Dance**
   Dance, the movement of the body in a rhythmic way, usually to music and within a given space, for the purpose of expressing an idea or emotion, releasing energy, or simply taking delight in the movement itself.

   Basic/ Different elements of dance:
   - Movement
   - Rhythm
   - Design
   - Expression

2. **Music**

Music is an art form which combines pitch, rhythm, and dynamic in order to create sound. It can be performed using a variety of instruments and styles and is divided into genres. As an art form, music can occur in live or recorded formats, and can be planned or improvised.

Basic elements of music

- Melody
- Harmony
- Shruti
- Swar
- Pitch
- Beat or laya
- Rhythm

3. **Drama**

Drama is an ancient Greek word meaning ‘act’ or ‘deed’. The ancient Greek philosopher Aristotle used this term in a very influential treatise called the Poetics.

Drama gives us the experience of expressing our thoughts and feelings by wearing the shoes of others. To express what they know, feel, and think is an essential part of the development of children.

Some basic elements of drama

- Speech
- Silence
- Movement
- Stillness
- Light
- Darkness

Art integrated learning

Integration

The dictionary meaning of integration is the act of combining or adding parts to make unified whole. In the context of present unit, integration means combining arts with the teaching of different curricular areas.

Integration means when themes, subject or project are combined, students see more understanding between the subjects.

Benefits from Art Integration

- Focuses on basic skills, content and higher level thinking.
- Encourages lifelong learning.

- Structures learning around themes, big ideas and meaningful concepts.
- Provides connections among various curricular disciplines.
- Provides learners opportunities to apply skills they have learned.
- Encourages active participation in relevant real-life experiences.
- Captivates, motivates, and challenges learners.
- Provides a deeper understanding of content.
- Offers opportunities for more small groups and industrialized instruction.
- Accommodates a variety of learning styles/ theories (i.e., social learning theory, cooperative learning, intrinsic motivation, and self-efficacy) and multiple intelligences.

Educational Thinkers on Arts in Education

Rabindranath Tagore

Born in jorasanko on 7th may 1861, seventh in a family of fourteen. A cultured and wealthy family, and Rabindranath's father, devendranath, was one of the leaders of the Brahma Samaj.

Early life

Spent in an atmosphere of religion and arts, principally literature, music and painting. Learnt drawing in his childhood attracted to the sketches drawn by his elder brother jyotirindranath. At the age of seventeen, his first book of poem was published. In 1878, he went to England for further studies but returned back in just seventeen months. In music Tagore's training was classical Indiar.

Tagore's Achievements

Over one thousand poems; nearly two dozen plays and play-lets; either novels; eight or more volumes of short stories; more than two thousands songs. India's grand old man of letters. Tagor had been immortalized not only by his poetry but also by his paintings and his important contribution to India Art through Viswa-Bharati.

Tagore and arts

in 1924, while writing "Purabi" he started dooldling on the pages of his manuscript. However, rabindra nath tagore's famous world appearance as painter in france in 1930 was not sudden.

Tagore thinking on arts education

- Tagore himself, in his article 'my pictures', explains his paintings as follows "The world of sound is a tiny bubble in the slience of the infinite.
- The universe has its only language of gesture, it talks in the voice of pictures and dance.
- In a picture the artist creates the language of undoubted reality, and we are satisfied that we see. It may not be the representation of a beautiful woman but

that of a common place donkey or of something that has no external credential of truth in nature but only in its own inner artistic significance.

- Love is kindred to art, it is inexplicable. Duty can be measured by the degree of its benefit, utility by the profit and power it may bring, but art by nothing but itself.
- Art is the guest that comes and remains. The dithers may be important, by art, is inevitable."
- In tagore's own words, "The world speaks to me in colours, my soul answers in music". Obviously, the soul was very articulate with colours too.

Devi Prasad

Devi Prasad was born to a middle-class family in the foothills of northern India. He showed skill as an artist, and in 1939 was admitted to the art school at the vishvabharati university at shantiniketan, in eastern India, founded by the poet, noble laureate and social reformer rabindranath tagore. Here he was exposed to the pan-asianist and international arts and crafts practices of this important school. After graduation, he went to work as an arts educator at sevagram mahatma Gandhi's experimental village in central India. One day in the small library in this remote village, he came upon Bernard leach's 1940 masterpiece the studio potter, a book that has had a profound influence on artists the world ever. Prasad was inspired to take up pottery.

Planning lesson based on art intergrated learning

Lesson planning is a vital component of the teaching-learning process. Proper classroom planning will keep teachers organized and on track while teaching, thus allowing them to teach more, helps students reach objectives more easily and manage less. The better prepared the teacher is, the more likely she/ he will be able to handle whatever unexpectedly happens in the lesson.
It is a time when we envision the learning we want to occur and analyze how all the pieces of the learning experience should fit together to make that vision a classroom reality.

Importance of lesson planning

1. lesson- planning gives the teacher greater assurance and greater freedom in teaching. The teacher, who has planned his lesson wisely, enters the class-room without anxiety, ready to embark with confidence upon a job he understands and prepared to carry it to a work-man like conclusion.

2. it provides for adequate lesson summaries, ensures a definite assignment for class, and availability of material for lesson when needed.

3. it stimulates the teacher to introduce pivotal questions and illustrations.

4. since lesson planning establishes proper connections between different lessons or units or study, it provides an encourages continuity in the teaching provides and encourages continuity in the teaching process.

5. it ensures association between various lessons in the same main, unit, the selection and organization of subject-matter, materials and activites.

6. it enables the teacher to know the most desirable types of teaching procedures and to prepare tests of progress and checks for judging the outcomes of instruction.

7. lesson-planning prevents waste because it helps the teacher to be systematic and orderly. It saves him form haphazard teaching.

8. specific art experience activities require group work and time frame i.e., that may require two or more periods for implementation of an assign activity.

9. develops reading habits, consulting reference books and interaction with other teachers and experts in their relevant field.

10. Is a proof that the teacher has taken a considerable amount of effort in his/ her teaching.

Integration of arts with subject

Learning in this way helps to increase knowledge and easy learning of the subject area and also provides a better view of arts. This is what called holistic or complete learning. Arts provide a language for expression. It can be any form of art. Classroom example. For the concepts of different planets students can enact themselves as planet. Such as depict as moon, sun and many more which help better learning in creative manner.

Art integrated with the language learning

Visual art, art can be easily integrated with the grammar part of language. For example while learning the concept of verb such as crying, running, eating etc. student can make the picture of these doing action and easily learn the concept. Performing art while through out the chapter or story a teacher can use different puppets as she can use stick puppet to depict as character of the story and make the learning creative.

Art integrated with social studies

Visual art in social studies we learnt three geography, history and civics for the concept of different zones of earth one can prepare model of earth and learn

through it. Also can make the effective chart of solar system. In the history most related to king which can be depict by puppets.
Performing art many historical and classical dance can only be expressed by performing art. For the concepts of our leader a drama or act is one of the best option in which students depict themselves as leader.

Art integrated with maths

Visual art in maths the students learn the concept of different shapes for this students students can make different shapes with the help of clay and the recognize them. For the concept of ascending and descending order a teacher can use different size of buttons and arrange them in sequence.
Performing art for the concept of clock and time all the students can perform as watch and move according them. Increasing and decreasing order can be teach through the different height of the students.

General objectives

The objectives of learning through arts at the upper primary school stage would be:

1. to make the learners conscious about the good and beautiful in environment, including classroom, school, home and community through an integrated learning approach, which they enjoy.
2. to make children express freely their ideas and emotions about different aspects of life.
3. to develop all the senses of children through observation, exploration and expression.
4. to unable a children to make different sensory exploration.
5. to develop gross and motor skills among the students.
6. to develop better sitting power and concentration level of the students.
7. to develop an understanding towards the appreciation of arts.
8. to develop better understanding the concepts related to other subjects.

Note:- the general objectives would be the same in every lesson plan and the specific obectives would be changed according to the lesson plan.

Organization of materials and space for art experience

To organize teaching learning experience, a teacher needs enthusiasm, strong determination, individual energy, rich aesthetics, wide range of props, better imagination and good communication skills.

Material for visual art

a regular and adequate supply of material and tools is essential for maintaining interest and enthusiasm. It is also important to think about all possible resource.

- Provided by teacher/ school
- Arranged by children/ community

He/ she should organize material from

- Children: while planning the art activities, the teacher can involve the student to collect the material from their surroundings. Use of locally available, low cost/ no cost material should be encouraged. Examples of commonly available material with children are: empty card box, empty bottles, dry leaves and flowers, pebbles, used books etc.
- Parents: parents can provide support for implementation of art by giving some objects and materials. Their active interest in helping their children as far as possible has a significant role. Materials that can be collected from home are old clothes, left over wool, old calendrers, and paper plates, thermocol, glasses, packing material, old sox, ice cream cups etc.
- Museum an galleries: teacher can approach to renowned art galleries for their collections. Like national museum and national gallery have postcards, posters, claendrers and selected reproductions. Teacher and principal can contact the respective museums and galleries in their cities and states and ask for supply of some material for children of the class.
- Community: a connection between school art and art of different community should be made for traditional learning of different arts. For example painters, potters, musical instrument makers, furniture makes, weavers, sculptures, basket makers can collaborate with children by providing required material and skills. Their different occupational skills are a huge resource in providing skilled craft men ship.
- Television and video: program of artist are shown from time to time on T.V. and some are available on video lot of ideas can be incorporated from these T.V. programmes. Programme dealing with some particular techniques are also useful for children.

Material: for performing art

When children make their own props and required material, the music and dance activity becomes more lively, interesting meaningful and whole some as a learning process. Children can make jewelry by using flowers, leaves bangles and feathers. Props can be put to manifold use. For example a dupatta flattered overhead can suggest the breeze, pulled across the face, it can suggest a ghoonghat, pulled from both ends it suggest a rope.

Children can make their own instruments by using blocks, spoon, stones, pots, can or other things. Clapping of hands, tapping on table, can also be used for rhythm. A guitar can be made with the help of shoe box, some rubber bands and piece of wood. Eight glasses filled with different quantites of water can be set up as jal taranga.

Space: for visual art

Children should have space to work in comfort. Furniture should be arranged to facilitate movement and to enable children to view their work from different angles.

Activities that exploit the school environment and acknowledge every child's contribution expand a child's horizon experience of art beyond the confines of the classroom.
Care should be taken to ensure safe and clean place. Lighting should be adequate and the room well ventilated. The physical environment should be visual stimulating and lively and should help develop children's learning in art.

Space: for performing art

To organize classroom or other space, rearrange the desks and chairs to create some empty space and get access to an open space. The children should remove their shoes and put them in a outside in a proper way. They should sit in circles
A part of the school premises can serve as and excellent setting for a play, like staircase, corridor, verandah with pillars, and a place with a tree or a wall in the background wonderfully suitable for stage setting. A proper electric power point should be functional in a classroom.
In the school ground take advantage of the tree and flowers. The children can also imitate elements of music, dance and theatre that they find in nature.

Museums, galleries, historical monuments, work of great artists, films as resource of learning of arts and other subjects

The importance of museums

Museums provide a unique interactive experience of getting up close to thing we usually only see in books, newspapers or on the television. Seeing the mona lisa for example, is a totally different experience to seeing one of the millions of printed versions; the perception you get of something from a second-hand source is often completely different to the one you get when you see something with your own eyes.

10 educational benefits for bringing children to a museum

Encourages a love of history

Whether you bring you child to a children's museum, art gallery, or science museum, history has made a huge impact on the innovation they are witnessing.

Listening to stories

Museum are full of stories, and it is critical for our children to hear those stories. Stories not only teach our children history but also encourage empathy.

Compare and contrast

Museum offer opportunities for children to compare and contrast what is important for them which leads to higher critical thinking skills.

Encourages question

Visiting a museum opens the door for your child's curiosity in the form of questions. Some of these will be questions that have answers, questions that should be encouraged, questions that make you think, and questions that may not have answers. All of these questions should be encouraged, and don't worry if you don't know the answers. Ask your child what they believe the answer is and listen to their reasoning.

Boots language development

For young children, boosting language development revolves around identifying words while for older children the exposure to new concepts and ideas will carry higher level vocabulary.

Encourage new ideas

When we, visit a museum we interact with the exhibit and information but more importantly that we are open to new things whether we are familiar with it or not.

Museums inspire

When you walk into a museum that contains the skeleton of an animal that is taller than your house and has not walked this planet in millions of years, your mind beings to wonder. Museums inspire us to wonder, imagine and dream of possibilities that are beyond what we know.

Fosters family bonding

Museum don't just want to appeal to the more mature visitor because they know that children who enjoy museums will become adults who will want to return. Visiting a museum as a family also gives everyone on opportunity to get to know each other better and engage in meaningful conversation.

Creates lifelong learners

Museum encourage curiosity which is necessary for children to become lifelong learners. Museums seek out unique links and relationships that are not always readily present which offers us, the viewer, something new each time we visit. There is always the possibility for an "ah ha" moment to occur.

Film

Film is a leveller – children can relate to it on matter what their family background or learning abilitie

- Film can be a gateway to exploring complex ideas and open children eyes to other ways of looking at the world.
- Young people are increasingly visually literate and the curriculum needs to reflect this.

Film is a powerful tool that can help learners understand and access their world and other worlds – real and imagined.

ARCHAEOLOGICAL SURVEYS

Archaeology is the study of past ways of life through analysis of surviving physical remains.
Archaeological field survey is the methodological process by which archaeologists (often landscape archaeologists) collect information about the location, distribuation and organization of past human cultures across a large area.

Experimentation with different materials of visual arts

Pastel colour

Tints of hues. Usually considered delicate, feminine and clean.
Pastel colour is in the form of a stick, which consists of powdered pigment combined with a binder.

Types of pastel colour

Chalk pastel

Chalk pastel are like chalk. They are, different than board chalk because they can be smoothed much easier than chalk

Hard pastels