

Details of Module and its structure

Module Detail	
Subject Name	Education
Course Name	Understanding the Learner
Course Code	EDU502
Module Name/Title	<i>Heredity and Environment: Its role in determining individual difference; Developmental stages and tasks; development during early, late childhood and adolescence: characteristics, factors influencing and educational implications with respect to physical, psychomotor, intellectual, language, emotional, social, moral and value development</i>
Module Code	UTL002
Pre-requisites	
Learning Outcome	<p>After going through this lesson, the learners will be able to:</p> <ul style="list-style-type: none"> Analyse the relationship and interaction between the heredity and environment leading to individual differences. Relate the behaviour of students according to different Stages of human development Identify Characteristics according to different stages of development of heredity & environment and its application and corresponding educational implications
Keywords	

1. Development Team

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1. Introduction

There has been a debate regarding the influence of nature and nurture upon the personality development of the child. The exponents of both extremes cite explanations in their support. Is this the inborn nature the chief factor that affects development and solely decides the possibilities to which a child can learn and be educated? The experts of other side claim that this is the environment through which by selective up bringing of the child he/she can become whatever is desired. But it is the relative influence of heredity as nature and environment as nurture that have impact on a growing individual. This module discusses the concept of heredity and environment, their interaction in shaping a personality; human development stages & their characteristics and educational implications for these stages for the all-round development of the child pertaining to physical, psychomotor, intellectual, language, emotional, value, social and moral aspects of personality.

2. Heredity and Environment

The way an individual look, talks, dresses and acts constitute his/her personality. Personality consists of habits and habit systems of some social significance which are stable and relatively resistant to change. With respect to personality there are differences among the persons and these differences may be at individual and environmental level. The persons at individual level may differ from each other with respect to physical structure, attitude, motivation, interest, emotions and intellect etc. The environmental factors influencing the individuals mainly comprise family, friends and culture. In family, as a sub domain of environmental factors, the protection, rejection, assertion, sharing and caring, siblings, relationships among family members, discipline norms of the family etc. shape the personality of the individual. Culture sets its own norms and standards and the individual adheres to it. The personality of an individual is very much influenced by the culture to which he/she belongs. In this living world animals give birth to animal of same species that resembles to its parents in body, shape and other alike features. The off springs inherit the characters from their parents because of heredity. Among humans, children resemble their parents, siblings and even grandparents and sometime there can be individual differences among members of same family also. The cause for such similarities

and dissimilarities is heredity. Heredity consists of all the structures, physical characteristics, functions derived from parents, other ancestry or species **(Douglas and Holland, 1947)**. Through heredity all inborn physical and mental traits are inherited by the individual from the parents and ancestors. The structure responsible for the inheritance of acquired characters by the progeny from the parents is genes. An animal inherits its features and traits from its parents through genes at the time of conception. So, at the time of conception the resultant summative pool arises due to heredity but after conception how does that off spring animal grow and develop is the outcome of interaction between inherited characters through the process of heredity and environment. Thus, the environment is everything that affects the individual except its genes **(Borning, Langfield and Weld, 1961)**. Simply, heredity as an internal and environment as an external force affect the individual.

2.1 Heredity: Its role in determining individual differences

The mental and physical traits of an individual constitute his/her heredity. Heredity covers all those factors that are present in the individual when he/she begins life not at the time of birth but at the time of conception. So, heredity begins to influence an individual right from the time of conception through the transmission of chromosomes and genes of its ancestral genetic pool from its parents. The two invariables associated with an individual are genotype and phenotype. The genetic constitution of an organism is known as genotype and the external appearance of that organism is its phenotype. As far as the genetic pool is concerned, the genes are located on chromosomes and this is the crossing over of these chromosomes that leads to transmission of genes from one generation to another. Chromosomes exist in pairs. Among humans there are 23 pairs of chromosomes or $23 \times 2 = 46$ chromosomes. First 22 pairs are called autosomes and the last pair is called sex chromosome. This is the last 23rd pair of chromosomes that determines the sex of baby born. If it is XX then the individual born is female and if the new born child has XY as sex chromosome, then it is the male baby that has born. During the crossing over this is the male parent that determines the sex of the baby not the female parent as the sex chromosome are identical in female but not in male.

Heredity decides most of the physical constitution and its functioning. Generally blue-eyed parents have blue eyed babies and so on. But there may be genetic

variation in a family also like tall parents have dwarf children. Such deviations from the expected trends are called mutation. Besides the transmission of desired characters from one generation to another through heredity there may be inheritance of some diseases also like haemophilia, schizophrenia etc. These diseases are the result of defects in genes and chromosomes which are passed to another generation.

Sometimes it is observed that in a family the twins and multiples are born. Generally, they differ much from their siblings with respect to many features. Even the twins also differ from their counterparts despite the commonality of genetic constitution. In sexual reproduction, the male gamete is known as sperm and female gamete is called ovum. Normally one sperm fuses with the ovum through the process of fertilization and forms zygote. But sometimes, more than one ovum may be fertilized by the sperms which are always more in number than the ovum. As a result of this two or more than two off springs are born. The twins may be identical and fraternal. Normally one fertilized ovum gives birth to one off spring but the ovum may split also as a result of fertilization. The two divided parts get failed to unite together and as a consequence each part develops into an individual. The twins thus formed are called identical twins. Such twins carry exactly the same genetic information and are of same sex. On the other side, when more than one ovum gets matured simultaneously and each is fertilized by different sperms then two different zygotes are formed. The individuals thus produced are known as fraternal twins. Such twins are also called non-identical twins. So, about the twins, it can be inferred that they differ from the siblings because they inherit different sets of chromosomes and genes. The identical twins reflect too much resemblance due to their common genetic constitution. But it is not mandatory that the identical twins will be replica of each other as they may also exhibit variations and differences in one or other ways. At the time of conception there may be somewhat different type of composition of genes and chromosomes that may create some differences in their genetic structure thus leading to two different individual personalities. The fraternal twins differ from each other because of inheritance of different combination of chromosomes and genes located on them. The role of heredity in determining the individual differences ends with conception.

2.2. Environment: Its role in determining individual differences

Generally speaking, environment is everything that affects an individual except his/her genes. In other words, whatever influences the child apart from himself/herself what is inherited from the parents and ancestors is the environment. In fact, the environment comprises all the outer factors which have acted on the individual since the beginning of the life. After the birth of an individual, all aspects related to the external environment namely physical, social, psychological and cultural etc. influence the growth and development of that individual. In summation, all of these external environmental forces are different with respect to nature as well as their effects. The environment includes the home, neighbourhood, school and peers etc. The individual differs from his/her own past as the environment has changed him/her. For example, two children born in same family may differ in their upbringing as generally the first child gets more attention as he/she brings the husband and wife at the level of parents. Moreover, in our society because of patriarchy the male child, then female child, gets more affection of parents and grandparents. Socially, such practices should be curbed. Even in classrooms, it is not possible for the teachers to devote equal attention to all students specially in our country where the classroom strength of the students is generally fifty plus. Similarly, at a broad level no two individuals can be assured identical social and cultural set ups to grow.

So, all of these environmental forces have bundles of energy in latent forms and influence the individuals in multiple ways as many times in constructive manner but sometimes in destructive forms also.

3. Developmental stages and tasks

Human life cannot be divided into water tight compartments with respect to development stages pertaining to growth and development. But for the sake of simplicity it can be divided as

(i) Early childhood: 0-5 years; (ii) Later childhood: 6-12 years; (iii) Adolescence: 13-19 years

No individual sleeps as child in the night to rise as an adolescent in the morning similarly no adolescent is turned to be a stabilized and pacified adult overnight. There is always a continuity of development in an individual from birth to

adulthood. Growth is so quite gradual, continuous and normal in nature that it cannot be detected during the process of development. The development as a process goes in continuity. Even the persons who are in direct contact with the child can not find any abrupt change in him/her. Growth is gradual, normal and continuous process. Development does not mean growing larger but it is a progressive series of changes set towards the goal of maturity. Development leads to new characteristics and abilities on the part of the individual.

3.1 Characteristics of stages

The journey of life begins from conception and ends with the death. The different stages of human development are associated with distinct characteristics of behaviour and personality and each stage is expected to extend over some years. But there are individual variations and differences among the people also. A study of the regular pattern of these developmental stages supports the educators in formulating a regular plan of action in school curriculum so that the best of an individual may be harnessed. The arbitrary division of the life into different stages gives an age-linked view of these stages.

3.1.1 Early childhood

The period of early childhood is of complete dependence and immaturity. The human baby at this stage differs from the offspring of other non-human species like the human infant takes months to learn to crawl, walk, sit and run but the young one of other animals are born with such skills and tendencies at innate level. So, the human baby depends on others for his/her needs. The only significant thing here is the ability of human child to learn more than other non-human counterparts. The behaviour of the human baby is mostly instinctive. The hard reality obstructs the instinctive tendencies at every step and the child has to take refuge in excessive fantasy and imagination. At this stage the physical development is also very rapid. The weight and height of the child gets substantially increased at the end of this stage.

The behaviour of the child at this stage is purely instinctive as the baby has no control of limbs to begin but through the exercise, he/she learns to use the same. Crying is a sort of exercise and is a normal feature at this stage. The other two significant features of this stage are self-love and self-assertion. The child at this stage is extremely selfish.

3.1.2 Educational implications for early childhood

The tasks pertaining to different developmental stages may be reflected through the educational significance of those stages. The early childhood consists of understanding the hard realities faced by the child at this stage. The sense of self-satisfaction is harmed many times in a day so imagination and fantasy may be harnessed as means of rescue. Thus, storytelling may be an activity to ask a child to imagine. The major task before an educator is to enable the child in developing a control over his/her limbs and muscles so that the child may develop a balanced and graceful posture. Moreover, the intellect of the child is limited so educational experiences must consist of concrete material. So creative and recreational activities supplemented with the concrete experiences must form the basis of all educational experiences at this stage. There is no moral sense among the children at this stage so the conduct of the child is guided by pain and pleasure felt. Hence, reward and punishment may be used judiciously to educate the child. Reward here means introduction of reinforcers and punishment (not at all corporal punishment) stands for withdrawal of reinforcers. A reinforcer is anything that increases the probability of a desired behaviour. The educational experiences must cater to the satisfaction of the urges of submission, self-assertion and self-satisfaction. As the senses grow the child comes to know about his/her immediate environment. The instinct of curiosity gains momentum and must be satisfied.

3.1.3 Later childhood

At this stage the child has solved many difficult problems of the early life. The impulsive child has developed adjustment with the environment. The child is now acquainted with the environment. The realities of life have educated the child some limitations also. Here, the physical growth is very rapid in first three years that is up to nine years of the age of the child. Within next three years, that is up to twelve years of his/her age the physical growth gets stabilized. In this stage, the child is very active and the sense organs are well developed. Thinking power is also increased and he/she intends to know the reasons or causes behind the events. The sense of criticism begins to develop but the instinct of submission is also at its peak. The child has developed a social attitude. By the end of this stage the child begins to lose interest in fairy tales as he/she has come across some hard realities of life. Religion and history replace

the fairy tales. At this stage, intelligence develops very rapidly and memory also grows significantly. The child is somewhat social due to the stimulation of gregarious instinct. The child is more promising to his/her peers than teachers and parents. Play is a very important activity. The sexual instincts are dormant.

3.1.4 Educational implications for later childhood

The tasks pertaining to this stage may be conducted through the educationally significant activities like meeting the curiosity of the child as he/she is more eager for the things and surroundings than before. At this stage the teachers may organize the teaching-learning and co-curricular activities to develop the qualities of social service, selflessness and co-operation etc.

3.1.5 Adolescence stage

A growing individual always changing. Growth stands for the change. Every person is different from his/her past to his/her present and similarly for his/her future also. The word adolescence has been derived from the Greek word “adolescere” which means to grow to maturity. This critical stage of development that lies between later childhood and maturity that is emerging from childhood and merging into adulthood. Adolescence is a stage of uncertainty where everything is in a ferment. This is a period of great stress, storm, strain and strife. In fact, adolescence is a stage at which the nature is preparing a child to be an adult. At adolescent stage, the individual is changing in stature, form, weight, height and interest etc. It is a stage of rapid growth that is noticeable in height and weight. But the growth is not uniform and proportional with respect to body structure, limbs and organs. In earlier phase of adolescence, the child gains height while in later adolescence there is increase in weight. Among the males the voice becomes deeper while the voice of females becomes more pitch oriented. The change in physical forms are apparent. The genital organs and the parts of the body associated with the reproduction grow very rapidly towards completion and perfection. Sex hormones are secreted into the blood and result in significant physical and mental changes. The boys come across nocturnal emissions and girls pass through menstrual courses. The adolescents are shocked and horrified for these sudden and hitherto unseen changes. Pubic hairs grow at the onset of puberty. There is an attraction for opposite sex. Though not immediately clearly visible there is a constant change, growth and development in the mental state of an individual also. Since the adolescent is

neither an adult nor a child but he/she is a blend of opposites so mood fluctuation between quite opposite impulses is evident. The rebellious fellow of today may be an obedient soldier of tomorrow. At times the adolescent is pessimistic, lazy and melancholy but soon the same personality may turn out into an optimistic, active and cheerful one. Child differs from the adult in degrees as well as kind also. The stimuli of the environment may appear appealing to the child but not with similar intensity to the adult. This period is very stormy in the life of an individual as he/she turns to be adolescent. The child is highly emotional. The individual is going to be responsible for his/her own self-preservation. It appears the recapitulation of the first stages in many respects. The child is no more peaceful. In this stage, significant physiological changes also take place. At psychological level, the intellect of the child matures and the intellectual horizon of adolescent as an individual is widened. The adolescent does not accept the things just on faith or believe in fairy tales but may revolt against the authority also. The imaginative tendencies and day dreaming are at rise. The imagination and day dreaming give ways to the pent-up emotions of the adolescents. Interest in adventure also gets heights. The adolescent applies his/her critical abilities to all moral standards and values. This stage is a period of moral awakening. Adolescence is a stage of sentiments also the adolescent is a hero or some model worshipper and tries to copy and follow. But generally, such ideals are short lived.

After the adolescence, there is adulthood which is the stage of full maturity in terms of physical and mental aspects. The individual is now a realist and extrovert and has a stable personality.

3.1.6 Educational implications for adolescence

For the proper physical development of adolescents, the teachers should organise various types of physical exercises, games and sports. There must be a provision for sex education also in schools so that the conflicts and mis concepts pertaining to sex do not emerge. If the word “sex” in sex education seems offending to conservatives, then it may be replaced with some suitable word and the same may be referred as “family education”. The pent-up emotions may be channelized through some constructive co-curricular activities like excursion, drama, dance, singing competitions etc. The teacher should impart guidance and counselling to the adolescents as and when required by maintaining the due

confidentiality so that adolescent does not feel embarrassed or deceived. The teacher should give respect to the personality of adolescent as now he/she is not a baby child. The resource persons from different religion and faiths should be invited in school to interact with the students and orient them with the concept of religion so that acceptance, not tolerance, as moral and religious values develop among the adolescents.

4. Summary

The characteristics of an individual in terms of physical and mental aspects of all of these stages are well marked and distinct in the sense that an infant is different from a grown-up child or an adolescent and an adolescent is different from an individual of any other stage. The developmental stage of an individual differs from other stages of his/her development with respect to interest and taste, temperaments, physical features, inclinations, emotional attitudes etc. The characteristics of one stage are not entirely absent in other stages of development. The difference lies only in the prominence and domination of certain characteristics. The individual in the childhood stage is imaginative and the adolescent takes refuge in day dreaming. The thing to be noted is noted that the characteristic like day dreaming is not exclusively absent from the personality of an individual entirely at any stage of development. Similarly, other emotional impulses or intellectual trusts are also there but they are more or less prominent on different stages. The changes do not appear in all individuals in any definite years of age. Like a child is not supposed to be an adolescent exactly on his/her thirteenth birthday and turn into an adult on twentieth birthday. Development depends upon so many factors like climate, sex, environment, food habits, bodily features etc. An individual is expected to develop to various stages at specific ages.

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Glossary:

- ***Adolescence:** the period between childhood and adulthood.
- ***Chromosomes:** thread like structures found in pairs in the nucleus of cell.
- ***Environment:** everything that affects the individual except its genes.
- ***Genes:** the structures located on the chromosomes which carry genetic information from one generation to another.
- ***Genotypes:** the genetic constitution of an organism.
- ***Heredity:** all the structures, physical characteristics, functions derived from parents, other ancestry or species.
- ***Phenotype:** the external appearance of an organism.

Quadrant: IV Self-Assessment

Description: In self-assessment Question No. 1 to 5 consist of multiple choice questions in which learners are required to select the correct one out of the four alternatives and Question No. 5 to 10 has five statements in which learner has to identify about true/false statements and Question No. 11 to 15 give answer in 50-60 words.

1. Adolescence stage ranges between
 - a. early childhood and late childhood
 - b. late childhood and adulthood
 - c. early childhood and adulthood
 - d. adulthood and maturity
2. Fertilization is
 - a. fusion of male and female gametes
 - b. splitting of ovum into two halves
 - c. birth of an individual
 - d. crossing over of genes
3. In humans, the sex chromosome is
 - a. 22nd chromosome
 - b. 21st Chromosome
 - c. 20th chromosome
 - d. 23rd chromosome
4. Genes are located on
 - a. sperm
 - b. ovum
 - c. chromosome
 - d. zygote
5. The number of autosomes in humans is
 - a. 20 pairs
 - b. 21 pairs
 - c. 22 pairs
 - e. 23 pairs
6. The most relaxed stage of human life is adolescence.
7. The diseases like haemophilia are genetical in nature.
8. Identical twins may not be of same sex.
9. Adolescence is the stage of most dependence on others.
10. The instinct of submission is at its peak in early childhood.

11. Define the term genetics.

Answer: Heredity consists of all the structures, physical characteristics, functions derived from parents, other ancestry or species.

12. What are identical twins?

Answer: Generally, one fertilized ovum gives birth to one off spring but the ovum may split also as a result of fertilization. The two divided parts get failed to unite together and hence each part develops into an individual. The twins thus formed are called identical twins.

13. What is development?

Answer: Development is a progressive series of changes set towards the goal of maturity. Development leads to new characteristics and abilities on the part of the individual.

14. Define the term growth.

Answer: Growth refers to the quantitative aspects of a stage like size, height, weight etc.

15. How does environment influence individual differences?

Answer: The environment comprises all the outer factors which have acted on the individual since the beginning of the life. All aspects related to the external environment namely physical, social, psychological and cultural etc. influence the growth and development of an individual. All of these external environmental forces are different with respect to nature as well as their effects.

Answers: 1b, 2a, 3d, 4c, 5c, 6 False, 7 True, 8 False, 9 False, 10 False,