

Physical developments in adolescence



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Introduction

Adolescence occurs at different ages for different cultures, while generally considered to be between the ages of 13-18 it is actually the developmental stage in a human's life cycle between childhood and adulthood. During this time the body undergoes many changes quite rapidly much akin to infancy, where drastic growth takes place in a small period of time, however it is less obvious just how much is going on in adolescence. Puberty causes a great many changes as the bodies development of secondary sexual characteristics begins to take place, the brain changes which leads to expanded cognition and streamlined neural pathways. The new developments in the brain cause an influx of hormones into the body which sets off many of these changes, the physical growth has many socioemotional affects as well. These developments impact the child's learning directly through the changes to its brain and indirectly due to socioemotional changes that puberty can have on a child. The implication of these changes must be taken into account when planning classes and teaching strategies for secondary school students who are going through puberty and in the midst of adolescence.

Milestones:

- The key development during adolescence is puberty.
- Adolescence can be different depending on culture but is broadly defined as ' the period between childhood and adulthood' as defined by Duchene and McMaugh in Educational Psychology for Learning and Teaching 5th edition.

- Puberty is 'the biological changes associated with sexual maturity' as defined by Duchene and McMaugh in Educational Psychology for Learning and Teaching 5th edition.
- Males and females present different physiological changes during puberty and adolescence.
- Puberty normally starts during adolescence, usually around the age of 13, however it can occur earlier.
- Females can often start puberty at an earlier age than males.
- Limbs grow quickly at the start of puberty which can consequentially lead to clumsiness
- Both sexes experience an increase in height and weight which is followed by menarche in females and semenarche in males.
- Menarche is the first menstruation in females and semenarche is the first ejaculation of males.
- The start of puberty in girls is marked by a drastic increase in height and weight along with the start of breast development, there is a 40% increase in body fat by the end of these changes.
- Males start puberty by having changes occur to the testes and scrotum, this is followed by the appearance of pubic hair and the growth of the penis.
- Later during pubertal growth in males, the height and weight changes occur, there is a significant increase in muscle, far more than occurs in females who instead develop more body fat.
- Towards the end of pubertal development males undergo further changes, the larynx lengthens and their voice deepens, facial hair becomes more abundant.

- The brain undergoes several changes during adolescence that occur with the onset of puberty.
- Nerve cells called neurons that are responsible for transmitting and storing information within the brain.
- Neurons transmit information along axons, jumping a synapse via a chemical neurotransmitter before continuing on to another neuron.
- By the time a human reaches adulthood it has only half the neurons that it generated through its developmental stages.
- Some neurons die off and others are pruned, the brain has produced many more neurons and synapses than what are needed, this removes the 'clutter' allowing for faster and more efficient transmission of information along with the space for new connections between neurons to be made.
- The neural connections that are left and used often undergo a process called myelination which is where an axon is coated in an insulating fatty sheath that greatly increases the speed of information transmission.
- The 'use it or lose it' approach as stated by Geidde, where whatever the child is doing and learning through repetition will become stronger in the brain while unused or less used neural pathways may eventually be pruned.
- During adolescence, the prefrontal cortex is still developing, it will not complete growth until sometime in the third decade of life, maybe not until 25 years of age.
- Reward centres of the brain are activated early in the adolescent developmental stage.

- The late development of the pre-frontal cortex and its linking to the amygdala can lead to risk taking behaviour.
- The rise in melatonin in the brain during development will change the sleeping patterns in adolescence, adolescents will require more sleep or can suffer from memory loss.
- The amygdala is responsible for emotional memories and learning, it is also plays a part in the fear response.
- The hippocampus is important to recent memories, helping sort the when, where and what of events.

Implications:

- Due to the emotional memory centres being more prominent in adolescence it means that teachings that emotionally resonate with students will stick with them easier. Lessons that have meaning or cause emotional responses are best.
- The changes in height and weight along with sedentary lifestyles of teenagers can lead to obesity, encouraging healthy eating habits and physical exercise can help combat this.
- The lengthening of limbs and enlarging of hands and feet leads to clumsiness, growth of secondary physical sexual characteristics such as breasts, facial hair and lengthening of the larynx (causing the voice to break), acne and the increase in complex thought and emotional depth can lead to many adolescents becoming very self-conscious. Teachers should be very careful not to make students feel self-aware or 'picked on' as any damage to self-image or feelings of being singled out will be felt very keenly.

- Due to the development of the hippocampus and the link between it and the prefrontal cortex leads to an increased amount of things that can be held in mind at once. This means teachers can give learners easily digestible chunks of information and they should be able to hold them in mind to apply them to topics.
- Due to the self awareness direct competitions between students should be discouraged. However sports and physical exercise is important and is inheritably competitive, the exercise should be promoted but our best to keep students spirits up. Team building exercises both on the sports field and in the classroom are important to allow students to use their newly developed brains to focus

Pedagogical strategy

Due to the many drastic changes that adolescence undergo it is important to implement strategies that help them become comfortable with these changes and use knowledge of them to maximise a student's learning. Due to the changes in the brain in adolescence students will want to develop a sense of self, take part in their learning and have contact with their peers. All of these things are useful to help teenagers become accustomed to working with others, expressing themselves and grow their confidence, however, student directed learning can be chaotic so planning and control needs to be paramount. The developments in body and brain can lead to students being self-conscious and to question themselves, it is important to make sure that any teaching strategy does not put students in competition with each other.

The teacher will give a topic or theory to guide the class, study groups then enable the children to have freedom to grow and form their own opinions.

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Breaking students up into small groups to talk over ideas and have each write ideas down and then discuss them with the class would allow all of these changes to help maximise their learning. If student groups are mixed up every week so that they can see each other's strengths and learn from each other, helping develop social skills and expand their ideas. This self-discovery will mean any ideas they have will have meaning to them and any praise for their thoughts will be felt more keenly and it is expressed in front of peers. This approach will help encourage each individual's skills and knowledge within a small group, again, it is important to make sure never to make groups vie for dominance, or make a class a competition.

The importance of healthy eating and physical exercise means that anything that can be done to make the class active is important. In early adolescence students are all at different stages of puberty and their strength, skill and coordination will all be very different as their bodies change. While sports tend to be inherently competitive, it is very important to make sure that students do not feel like they are competing with each other as it can lead to embarrassment and disappointment, a fear to fail in the future which can have people remove themselves from physical exercise so as to not have to experience these feelings again.

Conclusion

The many and rapid changes that adolescents undergo through puberty lead to a diverse classroom that needs a different approach for different students. The physical development throughout adolescence are inseparable from the cognitive, social and emotional changes that puberty leads to. While a lot of

obvious changes occur with the body such as height and weight gain, lengthening of limbs and changes to the sex organs, the most interesting changes occur within the brain with the release of hormones. The changes in the brain lead to changes in cognition, social development and emotions, they can lead to the risky behaviour that is often associated with teens and is why such care needs to be taken with the teaching strategies employed with adolescent students. Adolescence can prove to be a fragile time so care is taken to teach in a way that benefits the developing brain and to not cause any lasting 'scars'. Repetition of good behaviours will myelinate to be used more often and quicker.