Physical and Cognitive Development in Middle and Late Childhood

Learning Outcomes

At the end of the study topic, you will be able to:

- Discuss the milestones of physical development in middle and late childhood.
- Identify the main characteristics of cognitive changes.
- Explain the different views of intelligence.
- Identify challenges faced by children with special needs.
Middle and Late Childhood

Physical Development: Body Growth & Change

- The period of middle and late childhood (6- to 11-year olds) involves slow, but consistent growth.
- This is a period of calm before the rapid growth spurt in adolescence.
- Proportional changes are among the most pronounced physical changes in middle and late childhood.
- Children's head circumference, waist circumference, and leg length decrease in relation to body height.
- Bones continue to ossify, but yield to pressure and pull more than mature bones.
- Muscle mass and strength gradually increase, as 'baby fat' decreases.
- Boys are usually stronger than girls because of their greater number of muscle cells.
Physical Development: The Brain

- Total brain volume stabilises by the end of middle and late childhood, but significant changes in various structures and regions of the brain continue to occur.
- Brain pathways and circuitry – prefrontal cortex continues to increase which is linked to improved attention, reasoning and cognitive control, problem solving.
- As children develop, activation of some brain areas increases while others decrease.
- One shift in activation is from diffuse, larger areas to more focal, smaller areas. This shift is characterised by synaptic pruning, in which areas of the brain not being used lose synaptic connections and those being used show an increase in connections.
- Such activation changes accompanied by increased efficiency in cognitive performance, especially in cognitive control (attention, reducing interfering thoughts, inhibiting motor actions, and being flexible in switching between competing choices).

Physical Development: Motor Development

- During middle and late childhood, children's motor skills become much smoother and more coordinated than they were in early childhood.
- Running, climbing, skipping rope, swimming, bicycle riding, and skating are just a few of the many physical skills elementary school children can master.
- As children move through the elementary school years, they gain greater control over their bodies and can sit and attend for longer periods of time.
- However, elementary school children are far from having physical maturity, so they need to be active.
- Have you notice that elementary school children become more fatigued by long periods of sitting than by running, jumping, or bicycling?
- An important principle of practice for primary school children, therefore, is that they should be engaged in active, rather than passive, activities.
- Have you ever notice that there is a gender difference in terms of fine motor skills during the elementary school years? Take a moment to ponder on this issue and see what you can conclude.
Motor Development: Exercise & Sports

- Exercise plays an important role in children's growth and development.
- Exercise is linked to children's cognitive development; e.g., a recent study revealed that aerobic exercise was linked to increases in 'planning' (an important cognitive activity) among overweight 9-year-old children (Davis & others, 2007).
- Can you think of some ways to get children to exercise more?
- Participation in sports can have both positive and negative consequences.
- Children's participation in sports can provide exercise, opportunities to learn how to compete, self-esteem, and a setting for developing peer relations and friendships.
- However, sports also can have negative outcomes for children: the pressure to achieve and win, physical injuries, a distraction from academic work, and unrealistic expectation for success as an athlete.
- For example, there is a special concern for children in high-pressure sports settings involving championship play with accompanying media publicity.
- Some clinicians and child developmentalists observe that such activities not only put undue stress on the participants but also teach children the wrong values – namely, win-at-all-costs philosophy.

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Cognitive Development in Middle and Late Childhood

Cognitive changes in middle and late childhood can be explained from the following perspectives:

1. Piaget's Concrete Operation Stage

According to Piaget (1952), the preschool child's thought is *preoperational*, which involves the formation of stable concepts, the emergence of mental reasoning, the prominence of egocentrism, and the construction of magical belief systems.

- As such, thought during the preschool years is still flawed and not well organised.
- The **concrete operational stage**, Piaget's third stage of cognitive development, which lasts from approximately 7 to 11 years of age, is made up of operations – mental actions that allow children to do mentally what they had done physically before.
- Children can perform operations and logical reasoning replaces intuitive reasoning as long as the reasoning can be applied to specific or concrete examples.
- Concrete operation also involves actions that are **reversible**.
- A classic test of reversibility of thought involving conversation of matter is as follow.
  - The child is presented with two identical balls of clay. The experimenter rolls one ball into a long, thin shape; the other remains in its original ball shape. The child is then asked if there is more clay in the ball or in the long, thin piece of clay.
Piaget’s Concrete Operation Stage (cont.)

• By the time children reach the age of 7 or 8, most answer that the amount of clay is the same. To answer this problem correctly, the child has to imagine the clay rolling back into the original shape, a ball. This type of imagination involves a reversible mental action.

• Concrete operations allow the child to coordinate several characteristics rather than focus on a single property of an object.

• Piaget’s theory proposed that the concrete operational child will be able to perform classification, seriation, and transitivity tasks.

• An example of reversibility can be seen here:
  1. Visit www.youtube.
  2. Search and view the video entitled “Piaget - Stage 3 - Concrete – Reversibility”.

• Piaget proposed that concrete operational thought does not appear until about the age of 7.

• However, Piaget may have underestimated some of the cognitive skills of preschool children.
  – For example, by carefully and cleverly designing experiments on understanding the concept of number, it was demonstrated that some preschool children show conservation, a concrete operational skill.

Information Processing

• Among the important changes in information processing during middle and late childhood are those involving memory, critical thinking, creative thinking, and metacognition.
Memory - Information Processing - Memory

• LTM (long-term memory) is going through particularly rigorous expansion.
• An especially important influence on memory is the knowledge and expertise the individuals have about a particular topic. When individuals have knowledge and expertise about a particular subject, their memory also tends to be good regarding material related to that subject. Older children usually have more expertise about a subject than younger children do, which can contribute to their better memory for the subject.
• Better memory is often associated with better strategies in memory.
• Strategies refer to cognitive processes that do not occur automatically but require work and effort. These processes are under the learner’s conscious control and can be used to improve memory. They are also called control processes.
• Two important strategies are creating mental images and elaborating on information. Elaboration is an important strategy that involves engaging in more extensive processing of information.
  ➢ For example, thinking about personal associations with information makes the information more meaningful and helps children to remember it.

Critical & Creative Thinking

• Critical thinking involves thinking reflectively and productively, as well as evaluating the evidence.
• Deeper understanding occurs when students are stimulated to rethink their previously held ideas; and such cognitive processes help increase children’s LTM.
• Brook and Brook (2001) argue that in order for critical thinking to take place in the classroom, teachers should ask students to analyse, infer, connect, synthesise, criticise, create, evaluate, think, and rethink rather than to recite, define, describe, state, and list.
• Creative thinking is the ability to think in novel and unusual ways and to come up with unique solutions to problems.
• It is important to note that children will show more creativity in some domains than others (Runco, 2004).
  ➢ For example, a child who shows creative thinking skills in mathematics may not exhibit these skills in art. What do you think are some of the most ‘lethal killers’ of student’s creativity in the elementary classrooms?
Information Processing - Metacognition

Metacognition is defined as ‘cognition about cognition,’ or ‘knowing about knowing.’

- The majority of developmental studies classified as “metacognitive” have focused on metamemory, or knowledge about memory.
- This includes general knowledge about memory, such as knowing that recognition tests are easier than recall tests.
- By 5 or 6 years of age, children usually know that familiar items are easier to learn than unfamiliar ones, that short lists are easier than long ones, that recognition is easier than recall, and that forgetting is more likely to occur over time.
- According to Michael Pressley (2000), the key to education is helping children to learn a rich repertoire of strategies that result in solutions to problems.
- Good thinkers routinely use strategies and effective planning to solve problems; as well as know when and where to use strategies (metacognitive knowledge about strategies) – resulting in the learner’s monitoring of the learning situation.

Intelligence

- Intelligence is defined as problem solving skills and the ability to learn from and adapt to life’s everyday experiences.
- Interest in this area has often focused on individual differences and assessment. For example, an intelligence test purports to inform us about whether a student can reason better than others who have taken the test.
- The most influential of such test is:
  - The Binet Test, developed by Alfred Binet in 1904; later known as the Stanford-Binet test.
  - Another set of widely used tests is called the Wechsler scales, developed by David Wechsler.
- These intelligence tests focus on a child’s general intelligence.
- Is it appropriate to think of a child’s intelligence as a general or as a number of specific abilities?
- Recently, the research for specific types of intelligence has heated up – leading us to the multiple intelligences approach.
Sternberg’s Triarchic Theory states that intelligence comes in three forms:

- **Analytical Intelligence**: This refers to the ability to analyse, judge, evaluate, compare, and contrast.
- **Creative Intelligence**: This consists of the ability to create, design, invent, originate, and imagine.
- **Practical Intelligence**: This involves the ability to use, apply, implement, and put ideas into practice.

Gardner’s Eight Frames of Mind (also known as 8 types of intelligence)

1. **Verbal skills**: the ability to think in words and to use language to express meaning (authors, journalists, speakers).
2. **Mathematical skills**: the ability to carry out mathematical operations (scientists, engineers, accountants).
3. **Spatial skills**: the ability to think three-dimensionally (architects, artists, sailors).
4. **Bodily-kinesthetic skills**: the ability to manipulate objects and be physically skilled (surgeon, craftspeople, dancers, athletes).
5. **Musical skills**: sensitivity to pitch, melody, rhythm, and tone (composers, musicians, and sensitive listeners).
6. **Interpersonal skills**: the ability to understand and effectively interact with others (teachers, mental health professionals).
7. **Intrapersonal skills**: the ability to understand oneself and effectively direct one’s life (theologians, psychologists).
8. **Naturalist skills**: the ability to observe patterns in nature and understand natural and human-made systems (farmers, botanists, ecologists, landscapers).
Sternberg’s and Gardner’s Approaches

- Sternberg’s and Gardner’s approaches have stimulated teachers to think more broadly about what makes up children’s competencies.
- They have also motivated educators to develop programs that instruct students in multiple domains.

As a person in the helping relationship position, what are your thoughts on these? How do issues such as heredity and environment, and ethnicity and culture come into the picture of describing children’s intelligence?

Mental Retardation

A condition of limited mental ability in which an individual has a low IQ usually below 70 on a traditional test of intelligence, and has difficulty in everyday life.

Giftedness

Having above-average intelligence (an IQ of 130 or higher) and/or superior talent for something.
During middle and late childhood, changes take place in the way children select words. They become more analytical and logical in their approach to words and grammar. In terms of grammar, children now better understand comparatives and subjectives. They become increasingly able to relate sentences to one another to produce complex descriptions, definitions, and narratives that make sense.
How should children be taught to read? Currently debate focuses on the whole-language approach versus the basic-skills-and-phonics approach. Which of the following two approaches do you think is most effective for teaching children to read?

- **Whole-language approach**: An approach to reading instruction based on the idea that instruction should parallel children’s natural language learning. Reading materials should be whole and meaningful. Thus, a class might read newspapers, magazines, or books, and then write about and discuss them.

- **Basic-skills-and-phonics approach**: The idea that reading instruction should teach both phonics and the basic rules for translating written symbols into sounds. Only after children have learned the basic rules should they be given complex reading materials, such as books and poems.

It is widely known that learning a second language is easier for children than for adolescents or adults. In the US, bilingual education aims to teach academic subjects to immigrant children in their native languages (most often in Spanish) while gradually adding English instruction. Researchers have found that bilingualism does not interfere with performance in either language. Children who are fluent in two languages are found to be performing better than their single-language counterparts on tests of control of attention, concept formation, analytical reasoning, cognitive flexibility, and cognitive complexity.
Reflective Questions

Intelligence: IQ test? Multiple Intelligence?

- What is your personal definition of ‘intelligence’?
- Do you consider yourself an intelligent person?
- Why or why not?

Self-Test

Quiz – 5 questions

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Properties

- On passing, ‘Finish’ button: Go to Next Slide
- On failing, ‘Finish’ button: Go to Next Slide
- Allow user to leave quiz: Anytime
- User may view slides after quiz: Anytime
- Show in menu: Multiple Items

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Summary

In this topic, you learnt that:

- Physical growth (body and brain) in middle and late childhood is slowing down compared to those of early childhood, but the growth is consistent.
- Children at middle and late childhood, thought still active, are able to sit and learn for a period of time.
- Cognitively, children begin to be able to reason using concrete materials.
- Looking at the issue of intelligence through the lens of IQ test is not sufficient. The new conception of intelligence includes many other types of intelligence besides IQ; e.g., practical intelligence, musical intelligence, naturalistic intelligence etc.
- Learning a second language is easier as a child than as an adult.

References and Additional Learning Resources

- Note: All references not listed here are based on the text in Santrock (2013).