Chapter 12
Middle Childhood: COGNITIVE DEVELOPMENT

I. Building on Theory

Piaget

A. Concrete operational thought

- Piaget's term for the ability to reason logically about direct experiences and perceptions
- The school-age child, no longer limited by egocentrism, performs logical operations but cannot reason about abstract ideas and possibilities. Children apply their new reasoning skills to concrete situations.
- What develops during middle childhood is the ability to use mental categories and subcategories flexibly, inductively, and simultaneously.

B. Hierarchy of Categories

- **Classification**
  - Organization of things into groups (or categories or classes) according to some characteristic they have in common
  - By age 8, most children can classify
- **Transitive inference**
  - Is ability to figure out the unspoken link between one fact and another
  - Linked to maturation of hippocampus which reaches critical point around age 7
- **Seriation**
  - Includes knowledge that things can be arranged in logical series.
  - Eventually begin to understand that there can be categories and subcategories can be hierarchical, overlapping, separate

Piaget: significance of findings

- Accepted
  - School-age children can use mental categories and subcategories more flexibly, inductively, and simultaneously than younger children.
- Disputed
  - No sudden shift exists between preoperational and concrete operational logic.

Vygotsky and school age children

Role of Instruction:

- Education occurs everywhere and knowledge is acquired from social context.
- Guiding each child through zone of proximal development is crucial.
- Children are apprentices in learning.
- Language is integral as a mediator for understanding and learning.
• Even when children currently live in the same settings and attend the same schools, they follow family cultural traditions in the way they learn

II Information Processing

A. Information-processing theory
• Compares human thinking processes, by analogy, to computer analysis of data
• older children are much quicker thinkers than younger children
• speed in thinking increases memory capacity
• the increases results of increased mylenation in the brain and learning/experience

B. Like computers, people sense and perceive large amounts of information
• Seek specific units of information (as a search engine does)
• Analyze (as software programs do)
• Express their conclusions so another person can understand (as a networked computer or a printout might do)

C. Learning the number system (Siegler)
• Number understanding accrues gradually.
• New and better strategies for calculation are tried, ignored, half-used, abandoned, and finally adopted.
• Practice with number lines help with other math concepts.

D. Major steps in the memory process are affected by maturation and experience
• sensory memory The component of the information-processing system in which incoming stimulus information is stored for a split second to allow it to be processed. (Also called the sensory register.)
• working memory The component of the information-processing system in which current conscious mental activity occurs. ( Formerly called short-term memory.)
• long-term memory The component of the information-processing system in which virtually limitless amounts of information can be stored indefinitely.

• Working memory improves steadily and significantly.
• The capacity of long-term memory is virtually limitless by the end of middle childhood.
• Memory storage expands over childhood, but more important is retrieval.
• As the prefrontal cortex matures, children are better able to use strategies.
Extensive *knowledge base* makes it easier to master new, related information.- a body of knowledge in a particular subject

A. Factors influencing knowledge base  
   • Experience  
   • Current opportunity  
   • Personal motivation  

B. Control processes  
   • Emotional regulation  
   • **Selective attention**- the ability to screen out irrelevant stimuli and concentrate on relevant information

1. **Metacognition**  
   • "Thinking about thinking"  
   • Involves ability to evaluate a cognitive task to determine how best to accomplish it, and then to monitor and adjust one's performance on that task, they can assess if something will be easy or hard  
   • Improves with age and experience  

2. **Control processes**  
   • Require the brain to organize, prioritize, and direct mental operations  
   • Are often called executive process; ability to use these is called executive function  
   • Improve with age and experience  

3. **Executive function**  
   • Is learning foundation in early and middle childhood  

III. Language

A. **Vocabulary**  
   • *By age 6, children*  
     ▪ Know most of the basic vocabulary and grammar of their first language  
     ▪ May speak a second or even a third language  
   
   • *School-age children*  
     ▪ Learn as many as 20 new words a day and apply grammar rules they did not use before  
     ▪ Become more flexible and logical  
     ▪ Can understand prefixes, suffixes, compound words, phrases, metaphors, and figures of speech  

B. **Understanding metaphors**  
   • School-age children comprehend and enjoy puns  
   • unexpected answers to normal questions, and metaphors because their new cognitive flexibility and social awareness make them funny  
   • They create secret languages  
   • The exact meaning of each word becomes better understood
C. Learning in School: context
   • Adjusting vocabulary to the context
     • Pragmatics
     • Ability to use words and devices to communicate in various contexts
     • Allow children to change formal and informal codes to fit audience-code switching
     • increased ability to think logically increases the understanding of grammar
     • schoolage children are more teachable due to greater understanding

D. Learning in School- Bilingual education
   • Code changes are obvious when children speak one language at home and another at school.
     • Almost 1 out of 4 U.S. school-age children speak a language other than English—often with an English dialect at home than differs.
     • All these alternate codes have distinct patterns of timing, grammar, and emphasis, as well as vocabulary, so all require much more than literal translation.
   • English Language Learners (ELL)
     § Children in U.S. whose proficiency in English is low—usually below a cutoff score on an oral or written test.
     § Many children who primarily speak a non-English language at home are also capable in English; they are not ELLs.

   • Teaching approaches
     § Immersion
     § Bilingual schooling
     § Initial instruction in first language

   • Differences in Language Learning
     § Family poverty
       • Strong correlation between academic achievement and socioeconomic status
     § Causal factors of low achievement in middle childhood
       • Limited early exposure to words
       • Teachers’ and parents’ expectations
       • Children from low-SES families usually have smaller vocabularies and simpler grammar

   • Teaching and Learning
     § Learning a second language: What works?
       • Research not yet clear as to which approach is best
       • learning a second language increases a child’s overall linguistic and cognitive development if it occurs before puberty

     • Criteria for method success
       • Literacy of the home environment (frequent reading, writing, and listening in any language helps)
       • National culture
• Warmth, training, and skill of the teacher
  ▪ the best time to teach a 2nd language is during early or middle childhood because of the child’s interest in language and their grasp of logic
  ▪ the best time to learn a 2nd language is through experiences in early childhood
• Strategies for teaching another language
  a. immersion – the learner is placed in an environment where only the 2nd language is spoken
  b. reverse immersion – taught in native language and then after several years taught in 2nd language
• in US 3 approaches
  a. ESL – English is only language of instruction and students speak a variety of languages goal is to learn basics in 6 months
  b. Bilingual education – teach in native language and English
  c. Bilingual bicultural education – preserves and responds to child’s culture as well as language

• Success depends on personality traits, not just on intellect.
  • With parent support and encouragement, the child almost always masters basic elementary school skills and rarely are crushed by life experiences.
  • Instead, the child has sufficient strengths to overcome most challenges.

IV Learning in school

A. International testing
  ▪ Over the past two decades, more than 50 nations have participated in at least one massive international test of educational achievement.
  ▪ International Achievement Test Scores
    o Progress in International Reading Literacy Study (PIRLS)
    o Trends in Math and Science Study (TIMSS)
  ▪ National and cultural contexts affect test scores.
    o U.S. ranking has risen over the past two decades, but it is still below several other nations in Eastern and Western Europe and Asia.
    o Most developing nations in Africa or South America do not give these tests, but when they do, their scores are low.
    o Finland’s educational reforms resulted in dramatic ranking increases from 1990 to 2011.
      ▪ Finland’s reforms included changes over several years.
      ▪ Abolishment of ability grouping (1985)
      ▪ Curriculum reform to encourage collaboration and active learning (1994)
      ▪ Strict teacher requirements (top 3% admitted to teachers’ college); five year program at no charge and master’s degree in theory and practice of education
      ▪ More classroom autonomy for teachers
      ▪ More time and encouragement to work with colleagues (1990)
- Buildings designed to foster collaboration that reflect hidden curriculum regarding teacher professionalism
- Teacher’s union
- Assumption that every child has strengths and weaknesses that teacher uses to foster learning; almost no child designated for special education

- **Gender differences in school performance**
  
  **PIRLS**
  - Girls ahead of boys in verbal skills in every nation
  - Boys ahead of girls in math and science

  **TIMISS**
  - Gender differences in math narrowed or disappeared (Gender-similarities hypothesis)

- **Classroom**
  - Girls have higher grades overall; grades dip at puberty

- **Achievement within the U.S.: National standards**
  - **No Child Left Behind (NCLB) Act**
    - U.S. law enacted in 2001 that was intended to increase accountability in education by requiring states to qualify for federal educational funding by administering standardized tests to measure school achievement
  - **National Assessment of Educational Progress (NAEP)**
    - Ongoing and nationally representative measure of U.S. children's achievement in reading, mathematics, and other subjects over time; nicknamed "the nation's report card"
  - **Common Core of high standards**
    - Dozen or more specific expectations in each subject for every grade development due to doubts about state assessments
    - Child's achievement more influenced by income and ethnicity with widening gap
    - Standards, more rigorous than most state standards, are quite explicit, with half a dozen or more specific expectations for achievement in each subject for each grade; adopted by 44 states in 2013

- **As of 2014 in the U.S., the nation’s public schools have become “majority minority”**.
  - In middle childhood, every child develops cognitively with specifics dependent far more on individual, particular experiences than on ethnic background.
  - Children are ready to learn whatever their social context teaches them.
  - Barring severe impairment, all school-age children can learn a second language, become skilled in math, reading, and writing if taught logically, step-by-step.