Chapter 4

Understanding

Student Differences
Overview

• The Nature and Measurement of Intelligence
• Using New Views of Intelligence to Guide Instruction
• Learning Styles
• Gender Differences and Gender Bias
The Nature and Measurement of Intelligence

• The Origin of Intelligence Testing
  • In 1904 Alfred Binet created a test to predict which children would succeed in a regular classroom and which would need special education
  • In 1916 Lewis Terman revised Binet’s test and included a summary score called the intelligence quotient, or IQ
    • Terman’s revision was called the Stanford-Binet
What Traditional Intelligence Tests Measure

- Spearman’s Two Factor Theory of Intelligence
  - General factor
    - Affects performance on all intellectual tests
  - Specific factor
    - Affects performance only on specific intellectual tests
Limitations of Intelligence Tests

• The appraisal of intelligence is limited by the fact that it cannot be measured directly.

• Intelligence tests sample intellectual capabilities that relate to classroom achievement better than they relate to anything else.

• Intelligence test scores can be improved with systematic instruction.

• Anything that enhances classroom performance will likely have a positive effect on intelligence test performance.
Contemporary Views of Intelligence

• David Wechsler – Global Capacity View

• Robert Sternberg – Triarchic Theory

• Howard Gardner – Multiple Intelligences Theory
David Wechsler’s View of Intelligence

• Global capacity of individuals to act purposefully, think rationally, and deal effectively with the environment in which they find themselves
The Three Components of Sternberg’s Triarchic Theory of Intelligence

Sternberg’s Triarchic Theory of Intelligence

Practical ability
- Adapting to one’s environment

Creative ability
- Solving novel and unfamiliar problems

Analytical ability
- Using prior knowledge and cognitive skills to solve problems and learn new information

Analytical ability
- Selecting a different environment

Creative ability
- Shaping one’s environment

Practical ability
- Adapting to one’s environment

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# Gardner’s Multiple Intelligences

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<thead>
<tr>
<th>Intelligence</th>
<th>Core Components</th>
<th>End-States</th>
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<tbody>
<tr>
<td>Logical-mathematical</td>
<td>Sensitivity to, and capacity to discern, logical or numerical patterns; ability to handle long chains of reasoning.</td>
<td>Scientist, Mathematician</td>
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<tr>
<td>Linguistic</td>
<td>Sensitivity to the sounds, rhythms, and meanings of words; sensitivity to the different functions of language.</td>
<td>Poet, Journalist</td>
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<tr>
<td>Musical</td>
<td>Abilities to produce and appreciate rhythm, pitch, and timbre; appreciation of the forms of musical expressiveness.</td>
<td>Violinist, Composer</td>
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<tr>
<td>Spatial</td>
<td>Capacities to perceive the visual-spatial world accurately and to perform transformations on one’s initial perceptions.</td>
<td>Sculptor, Navigator</td>
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<tr>
<td>Bodily-kinesthetic</td>
<td>Abilities to control one’s body movements and to handle objects skillfully.</td>
<td>Dancer</td>
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<td>Athlete</td>
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<td>Interpersonal</td>
<td>Capacities to discern and respond appropriately to the moods, temperaments,</td>
<td>Therapist</td>
</tr>
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<td>motivations, and desires of other people.</td>
<td>Salesman</td>
</tr>
<tr>
<td>Intrapersonal</td>
<td>Access to one’s own feelings and the ability to discriminate among them and</td>
<td>Person with detailed</td>
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<td>draw upon them to guide behavior.</td>
<td>accurate self-knowledge</td>
</tr>
<tr>
<td>Naturalist</td>
<td>Ability to recognize and classify the plants and animals of one’s environment</td>
<td>Botanist</td>
</tr>
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<td></td>
<td>and their relationships on a logical, justifiable basis.</td>
<td>Entomologist</td>
</tr>
</tbody>
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Triarchic Theory and Instruction

• Design lessons and assessments that call for the use of analytical ability, creative ability, practical ability, and memory ability for all subjects
Multiple Intelligences Theory and Instruction

- Design lessons and assessments that call for the use of several intelligences for all subjects
Learning Styles

• A learning style is a consistent preference over time for dealing with intellectual tasks in a particular way

• Three types of styles
  • Reflectivity and Impulsivity
  • Field-Dependence and Field-Independence
  • Mental Self-Government Styles
Reflectivity vs. Impulsivity

• Reflectivity
  • In a problem solving situation, the student prefers to spend more time collecting information and analyzing its relevance to the solution before offering a response

• Impulsivity
  • In a problem solving situation, the student responds quickly with little collection or analysis of information
Field-Dependence vs. Field-Independence

• Field-Dependence
  • A person’s perception of and thinking about a task or problem are strongly influenced by such contextual factors as additional information and other people’s behavior

• Field-Independence
  • A person’s perception of and thinking about a task or problem are influenced more by the person’s knowledge base than by the presence of additional information or other people’s behavior
Sternberg’s Mental Self-Government Styles (1994)

- Legislative
- Executive
- Judicial
- Monarchic
- Hierarchic
- Oligarchic
- Anarchic

- Global
- Local
- Internal
- External
- Liberal
- Conservative
Learning Styles and Instruction

• Design lessons and assessments that, taken together, emphasize all major styles so that all students have an opportunity to demonstrate what they have learned
Gender Differences

- Males tend to outscore females on the following tests:
  - Visual-spatial ability
  - Mathematical reasoning
  - College entrance
- Females tend to outscore males on the following tests:
  - Memory
  - Language use
Gender Differences

- Possible reasons why gender differences in cognition and achievement exist:
  - Hormonal differences
  - Differences in brain structure
  - Peer pressure to exhibit gender-typed behaviors
  - Differences in self-discipline
What is Gender Bias?

• Gender bias is…
  • Responding differently to male and female students without having sound educational reasons for doing so
Sources of Gender Bias

• Likely sources of gender bias include:
  • Gender-role stereotypes of teachers
  • School curricula that reward gender stereotyped behavior
  • Gender-role stereotypes of classmates
How Gender Bias Affects Students

- Course selection
  - Math and science courses
- Career choices
  - Familiarity with and interest in tools of science, perceived self-efficacy, competence-related expectations communicated by parents and teachers
- Class participation
  - “Loss of voice”
Working Toward Gender Equity in the Classroom

• Use work arrangements and reward systems that encourage all students to value a subject
• Emphasize concrete, hands-on science, math, and technology activities
• Incorporate math, science, and technology concepts into other subjects
• Talk about the practical, everyday applications of math and science
• Emphasize materials that highlight the achievements and characteristics of women and women’s groups.
• Create a reading list that is appealing to boys
Reducing the Gender Gap in Technology

- Demonstrate that computers are equally important to both genders
- Embed computer technology in various subjects, not just in math and science
- Provide role models of female computer users in schools and in the workplace
- Establish a telementoring program that puts females in touch with women professionals