Effect of Student Characteristics on Performance on Intelligence Tests

Acculturation

Background experiences & opportunities to learn in formal/informal educational settings

Increases with time spent in a particular environment (e.g. United States public school system)

Test items vary in their connection to culture

For example: Asking students to compare hail and sleet

Must seriously consider student factors when interpreting information from intelligence tests

Q: How does schooling affect intelligence?

A: Schooling is an important factor that affects intelligence. By schooling, one can improve knowledge of specific facts for intelligence tests, familiarity with testing practices, concentration and attention span, and verbal problem-solving skills. Therefore, there is no doubt that schooling helps raise one's IQ.
On the other hand, research has indicated that children who do not attend school or who attend intermittently eventually have poorer scores on IQ tests than those who attend regularly. At the same time, children who move from low-quality schools to high-quality schools are more likely to show improvements in IQ scores. Besides transmitting information to students directly, schools teach problem solving, abstract thinking, and how to sustain attention, which are all skills required to score well on IQ tests.

A few more truths about schooling and IQ (which may surprise anyone who views it as a measure of innate intelligence): Although intelligence does influence the decision to stay in school, staying in school itself can raise IQ or prevent it from dropping.

IQ is affected by delayed schooling. A drop in IQ is seen when schooling is delayed.

> Each additional month a student remains in school may increase her/his IQ above what would have been expected had he dropped out.
> IQ is affected by remaining in school longer. The longer a student stays in school, the higher her/his IQ. Dropping out of school can also decrease IQ.
> IQ is affected by vacations. The longer the vacation, especially when the child's time is spent on least "mind-stimulating" activities, this decline is evident. (So, parents – make sure your child's holidays are filled with learning experiences in a fun way; e.g., visiting places of interest, enrichment programs, family-bonding activities, etc.)

In short, schooling has a long-term effect on the level of intelligence. Education increases a student's capacity to deal with the problem-solving tasks typically found in intelligence tests; therefore, a student who has mastered those skills at school will inevitably do well on an IQ test.

Behavior Sampled by the WISC IV

The WISC IV has been normed on normal peers and for special education populations:
Intellectual Disability (ID), Attention-Deficit / Hyperactivity Disorder (AD/HD), Learning Disabilities (LD), both AD/HD and LD, Traumatic Brain Injury (TBI), etc.

WISC-IV is an update of the WISC-III and indicates how e understand cognitive abilities.
Time Required: Administered between 65 and 80 minutes, the WISC-IV contains 10 core subtests and 5 additional subtests.
These are four summed indexes or categories of abilities in the WISC IV

Verbal Comprehension Index (VCI)

Measure: Verbal concept formation.
It assesses children's ability to listen to a question, draw upon learned information from both formal and informal education, reason through an answer, and express their thoughts aloud. It can tap preferences for verbal information, a difficulty with novel and unexpected situations, or a desire for more time to process information rather than decide "on the spot."
Note: This index is a good predictor of readiness for school and achievement orientation, but can be influenced by background, education, and cultural opportunities.

Perceptual Reasoning Index (PRI)

Measure: Non-verbal and fluid reasoning.
It assesses children's ability to examine a problem, draw upon visual-motor and visual-spatial skills, organize their thoughts, create solutions, and then test them. It can also tap preferences for visual information, comfort with novel and unexpected situations, or a preference to learn by doing.

Working Memory Index (WMI)

Measure: Working memory.
It assesses children's ability to memorize new information, hold it in short-term memory, concentrate, and manipulate that information to produce some result or reasoning processes. It is important in higher-order

thinking, learning, and achievement. It can tap concentration, planning ability, cognitive flexibility, and sequencing skill, but is sensitive to anxiety too. It is an important component of learning and achievement, and ability to self-monitor.

Processing Speed Index (PSI)

Measure: Processing speed.

It assesses children's abilities to focus attention and quickly scan, discriminate between, and sequentially order visual information. It requires persistence and planning ability, but is sensitive to motivation, difficulty working under a time pressure, and motor coordination too. Cultural factors seem to have little impact on it. It is related to reading performance and development too. It is related to Working Memory in that increased processing speed can decrease the load placed on working memory, while decreased processing speed can impair the effectiveness of working memory.

Alternative method of listing scores on clinical report

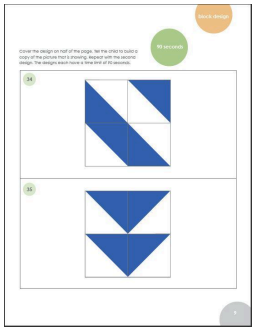
1	**organicity**
1-2	**profoundly deficient**
3-4	**very deficient**
4-5	**deficient**
6-7	**mild-borderline**
8-11	**average**
12-14	**high average, etc.**

WISC IV

Block Design measures an individual's ability to analyze and synthesize an abstract design and reproduce that design from colored plastic blocks. Spatial visualization and analysis, simultaneous processing, visual-motor coordination, dexterity, and nonverbal concept formation are involved. The students use logic and reasoning to successfully complete the items.

Block Design sub-test is a timed core Perceptual Reasoning sub-test.

Children are given bi-colored blocks and must arrange them to duplicate a printed image or modeled design.



Similarities measures logical thinking, verbal concept formation and verbal abstract reasoning. Two similar but different objects or concepts are presented, and the student is asked to tell how they are alike or different.

Similarities is an untimed core Verbal Comprehension sub-test.

Examples:
How are whales and lions similar?
How are anger and delight similar?
How are boys and girls similar?

Digit Span measures short-term auditory memory and attention. The digits have no logical relationship to each other and are presented in random order by the examiner. The student must then recite the digits correctly by recalling them in the same order. On the second part of this subtest the student must remember the order in which digits are presented, but recite them in reverse order.

Digit Span is an untimed core Working Memory subtest.

Examples:
For Digit Span forward tester would read numbers like "2, 3, 9, 1"
and child would respond with the same numbers
For Digit Span backward the tester would read numbers like "24, 3, 7, 12"
and child would respond "12, 7, 3, 24"

Picture Concepts measures categorical, abstract reasoning. Students are asked to look at two (or three) rows of pictured objects and indicate (by pointing) the single picture from each row that shares a characteristic in common with the single picture(s) from the other row(s).

Picture Concepts is an untimed core Perceptual Reasoning Subtest.

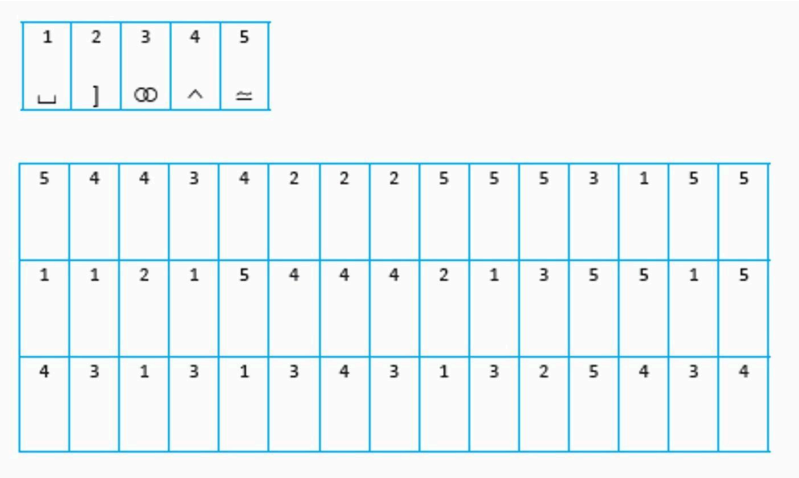
Example:
Pick one picture from each row that go together

Coding measures visual-motor dexterity, associative nonverbal learning, and nonverbal short-term memory. Fine-motor dexterity, speed, accuracy and ability to manipulate a pencil contribute to task success; perceptual organization is also important.

Coding is a timed core Processing Speed subtest.

For children aged 6-7 the test is picture based. Children are given a worksheet like the example below. The first line contains the key. They must place a mark within all the other figures so that they match the key.

For children aged 8-16 the key consists of boxes containing a numeral in the top line and a symbol in the bottom line. They must write the symbol corresponding to each numeral in the worksheet provided.



Vocabulary measures the students' verbal fluency and concept formation, word knowledge, and word usage.

Vocabulary is an untimed core Verbal subtest

Example:
Children are shown pictures or a word is said aloud. They are asked to provide the name of the object or to define the word.

What is this?

What does simple mean?

Letter-Number Sequencing measures attention span, short-term auditory recall, processing speed and sequencing abilities. The task involves listening to and remembering a string of digits and letters read aloud at a speed of one per second, then recalling the information by repeating the numbers in chronological order, followed by the letters in alphabetical order.

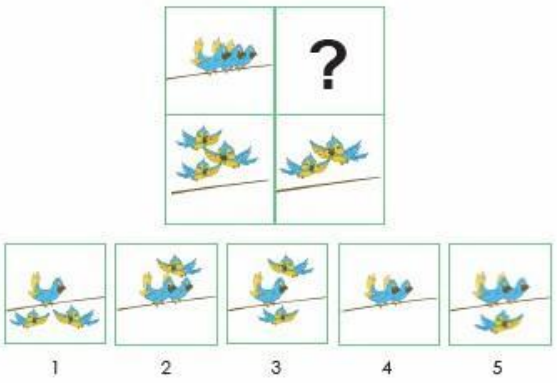
Letter- Number Sequencing is an untimed core Working Memory subtest.

Example: A - 7 - X - 2 - M - 4
Response: 2, 4, 7, A, M, X

Matrix Reasoning measures visual processing and abstract, spatial perception and may be influenced by concentration, attention, and persistence.

Matrix Reasoning is an untimed core Perceptual Reasoning subtest.

Children are shown colored matrices or visual patterns with something missing. The child is asked to select the missing piece from a range of options.



Comprehension measures common-sense social knowledge, practical judgment in social situations, and level of social maturation, along with the extent of development of their moral conscience. Children are asked to explain situations, actions, or activities that they'd be expected to be familiar with.

Comprehension is a core Verbal Comprehension subtest.

Example: Why do we turn out lights when we leave a room?

Symbol Search requires the student to determine whether a target symbol appears among the symbols shown in a search group. Memory is not a primary requirement for success on this task; perception and recognition are the two prime requirements, in addition to speed, accuracy, attention, and concentration. The symbols are geometric forms, rather than familiar letters or numbers.

Symbol Search is a timed core Processing Speed subtest

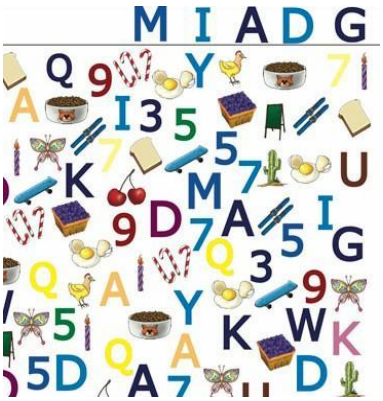
Picture Completion measures a student's ability to recognize familiar items and to identify missing parts. The student's task is to separate essential and nonessential parts from the whole. It is necessary to observe each item closely and concentrate on picture detail. Students must name or indicate the missing part by saying the name of the part or by pointing to it.

Picture Completion is a timed supplemental Perceptual Reasoning subtest

Cancellation measures visual vigilance/neglect, selective attention, and speed in processing visual information in accordance with previous attempts along the same line.

Cancellation is a timed supplemental Processing Speed subtest

Children scan a two-page spread of relatively small colorful pictures. The pictures include animals and objects and the child's task is to identify all the appearances of the target animal. The illustration below shows a similar type of exercises where the child's role is to identify target letters amongst the clutter.



Information measures general cultural knowledge, long-term memory, and acquired facts. Children are asked questions about different topics like geography, science and historical figures. The questions shouldn't be difficult for a child with a well rounded education but they do encompass a wide range of knowledge.

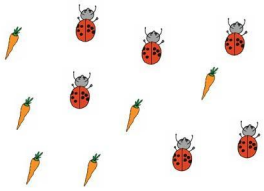
Information is a supplemental Verbal Comprehension subtest.

Example: Who was Queen Elizabeth I
Example: What do your lungs do?
Example: What is photosynthesis?

Arithmetic measures numerical accuracy, reasoning and mental arithmetic ability. Mental arithmetic and story problems play an important part in the student's success.

Arithmetic is a supplemental Working Memory subtest.

Example: How many carrots are there in this picture?



Example: Michelle is 2 years younger than Peter and 5 years older than Sam. If Sam is 6 how old is Michelle?

Example: Kathy's lunch bill was $22.50. If she leaves a 15% tip how much money does she need to leave?

Word Reasoning measures verbal abstract reasoning requiring analogical and categorical thinking, as well as verbal concept formation and expression.

Word Reasoning is a supplemental Verbal Comprehension subtest.

Children are asked to identify the object described by clues they're given.

Example: An item of clothing which you sleep in.