Intelligence Testing
Testing & Evaluation > Intelligence Testing

Abstract

This article focuses on intelligence tests and how they are used to assess children in the public schools. Descriptions of some of the more commonly used intelligence tests in individual and group settings as well as the history of intelligence testing are also included. The article reasons why it is important that only people who are trained in appropriate test administration procedures conduct testing and why only school counselors and school psychologists should administer the non-standardized, individual tests.

Overview

Intelligence is the ability to think, analyze, solve problems, and understand. There are two primary forms of intelligence, verbal and nonverbal. Verbal intelligence deals with language-based problems and the ability to understand and solve those problems. Nonverbal intelligence revolves around visual and spatial problems and the ability to understand and solve those types of problems. Intelligence is known by many different names; among them are intelligence quotient, cognitive functioning, intellectual ability, and general ability. Intelligence testing attempts to determine a student’s intellectual functioning level (Logsdon, n.d.).

Alfred Binet, a French psychologist, created the first modern intelligence test in 1905 with the assistance of Theodore Simon. This was spurred by the passage of a law in 1904 that required all children to attend school. The French government needed to figure out what to do with the children who could not keep up with regular classroom work. Alfred Binet and Theodore Simon developed the Binet-Simon Intelligence Scale in order to identify those children who would not be able to keep up with classroom work so that they could receive additional assistance or be placed in an alternative classroom. The Binet-Simon test was designed to measure students’ vocabulary and ability to understand simple concepts and identify relationships between words. An age level was assigned to each task based on the age at which approximately 70 percent of children could successfully complete the task. The individual scores were totaled to give a child’s mental age, which was then subtracted from their chronological age. A difference of two or more indicated mental retardation. The test was revised in 1908 and again in 1911, shortly before Alfred Binet died.

In 1912 a German psychologist William Stern coined the phrase
‘intelligence quotient,’ sometimes better known today as IQ (Intelligence Tests, n.d.). Lewis Terman, an American professor of psychology at Stanford University, revised the Binet-Simon Intelligence Scale in 1916. This revision had students demonstrate competency in many different areas, including language comprehension, eye-hand coordination, mathematical reasoning, and memory. He also used William Stern’s intelligence quotient theory that an individual’s intelligence could be measured by dividing mental age by chronological age and multiplying it by one hundred so there would be no decimals. He named this combination of theories and his revisions the Stanford-Binet Intelligence Scale, a test which is still widely used today (Intelligence Tests, n.d.).

Achievement and aptitude tests are sometimes mistaken for intelligence tests because they all have commonalities and similar formats. While intelligence tests sample behavior already learned in an attempt to predict future learning, achievement tests attempt to measure what children already know about specific content areas such as mathematics and English. The Iowa Test of Basic Skills and the ACT test, which is used for college entrance, are examples of achievement tests. Aptitude tests are used to try to predict future performance. The Differential Aptitude Test and SAT Reasoning Test are examples of aptitude tests. Whichever assessments are chosen, it is appropriate to select instruments that work well with the child’s strength and can collect achievement, aptitude, and intelligence data in varying degrees. The amount of verbal content on a test is also of special consideration when working with children who have English as their second language or who come from culturally diverse backgrounds (Selecting the Test, n.d.).

Applications

Intelligence tests are used for a variety of reasons, including to help identify students who may have learning disabilities and to help screen and identify students who may qualify for gifted and talented programs in school. Intelligence tests have also helped the nation understand that all students can learn but that they may learn in different ways. They have also helped show that some students learn more easily than others and some students learn certain things more easily than others. This reinforces the concept that teachers need to be able to present course materials in different ways to accommodate students’ various learning styles because some students are visual learners, some are auditory learners, some are tactile learners, and some can use a combination of styles. It is important that assessments take into consideration the various learning styles, and multiple measures should be used when assessing intelligence in order to produce valid results (Law, 1995).

Types of Individual Intelligence Tests

Individual intelligence tests are generally comprised of open-ended questions and must be administered by a trained psychologist or testing professional who is capable of interpreting the responses as well as the behavior of the test taker during the testing session and in the classroom. Individual intelligence tests can be used for the purpose of identifying learning disabilities, usually in conjunction with other instruments.

Kaufman Assessment Battery for Children

The Kaufman Assessment Battery for Children is a clinical instrument that assesses children between the ages of 3 and 18. This newly revised test can be used to determine if there are learning disabilities, and it can also aid in identifying giftedness. The original standardized test was relatively new to the assessment field and was created to better address certain testing needs, such as learning disabilities and appropriateness for cultural and linguistic minorities. There are a variety of core subtests grouped by mental processing and achievement as well as supplementary subtests. A mental processing test consists of two subtests, sequential processing and simultaneous processing. It takes approximately 25-70 minutes to complete the test, and the time it takes is dependent upon the student’s age and number of subtests given. Test scores may be expressed as percentiles and age or grade equivalents. The test has a norm score of 100 and a standard deviation of 15 (Kaufman Assessment Battery, n.d.).

Stanford-Binet Intelligence Test

The Stanford-Binet Intelligence Test is a standardized test that assesses children at least two years of age. This test can be used for school placement, determining if there are learning disabilities, and for tracking intellectual development. Its 1986 revised edition was designed to be more representative of gender and race. The Stanford-Binet assesses verbal reasoning, quantitative reasoning, abstract/visual reasoning, and sort-term memory. These subjects are covered by 15 subtests, which include vocabulary, comprehension, copying, number series, and various memory exercises. It takes approximately 45-90 minutes to complete the test, and the time it takes is dependent upon the student’s age and number of subtests given. Scores are based on the number of items answered and are then converted into a standard age score that corresponds to age group. The test has a standard score of 100 and a standard deviation of 16 (Stanford-Binet Intelligence Scales, n.d.).

Wechsler Intelligence Test

Wechsler Intelligence Scales are a series of standardized tests

Keywords

Group Testing
Individual Testing
Intelligence Quotient
IQ Testing
Stanford-Binet Intelligence Test
Wechsler Intelligence Test
used to evaluate abilities in children. There are three scales of Wechsler tests: the Wechsler Intelligence Scales for Children, the Wechsler Preschool and Primary Scale of Intelligence, and the Wechsler Adult Intelligence Scales. These tests can be used for school placement, determining if there are learning disabilities, and designating children as gifted. Every Wechsler scale has six verbal and five performance subtests. It takes approximately 60-90 minutes to complete the test, which gives both verbal and performance IQ scores, which then comprise a full IQ score. The Wechsler Intelligence Scale for Children is now in its third edition and includes two optional symbol search and mazes performance subtests. The Wechsler Preschool and Primary Scale of Intelligence is designed to be used with children age 4-6.5 years old. The Wechsler Adult Intelligence Scales can be used for people age 16-74. The scales have a mean standard score of 100 and a standard deviation of 15 (Wechsler Intelligence Test, n.d.).

**Types of Group Intelligence Tests**

Group intelligence tests can come in several forms, but they usually consist of a test booklet, multiple-choice questions, and scoring sheets that can be scanned for simplified, consistent scoring that eliminates human scoring error and can be done in a lot less time. Group intelligence tests tend to assess academic areas and can also include a cognitive measure. With their standardized nature, these tests can be administered by anyone who is familiar with proper testing techniques—teachers, school counselors, school psychologists, etc. While these tests are not recommended for the purpose of identifying learning disabilities, they can help determine whether additional testing should be undertaken and can also provide information on a child’s academic history.

**Cognitive Abilities Test**

The Cognitive Abilities Test is designed to assess students’ abilities in reasoning and problem solving by using verbal, quantitative, and nonverbal symbol assessments. It can be used with students from kindergarten through the twelfth grade. The three assessments take anywhere from 30-60 minutes per session to complete depending on the level, and there are two or three subtests. Scores are reported as a normalized standard score, a standard age score, and a percentile rank (Cognitive Abilities Test, n.d.).

**Multidimensional Aptitude Battery-II**

The Multidimensional Aptitude Battery-II is a comprehensive assessment of intellectual abilities for students who are at least 16 years old and have at least a fifth-grade reading level. The test takes 80-100 minutes to complete. There are two main categories (verbal and performance) broken down into 10 subtests resulting in a verbal IQ, a performance IQ, and a full scale IQ, as well as 10 subscale scores. The Multidimensional Aptitude Battery-II may also be administered on an individual basis (Multidimensional Aptitude Battery-II, n.d.).

**Preliminary Scholastic Assessment Test**

The Preliminary Scholastic Assessment Test is a standardized test that measures students’ ability in critical reading, mathematics problem solving, and writing skills and is usually taken by tenth and eleventh graders. The test takes two hours and ten minutes to complete. Scores are provided as three different scores on a scale of 20 to 80 and as national percentiles (About PSAT/NMSQT, n.d.).

**Woodcock-Johnson Test of Cognitive Ability**

The Woodcock-Johnson Test of Cognitive Ability is a standardized test that measures general intellectual ability and specific cognitive abilities in children two years of age and older. Depending on the number of tests given, the test can take between 35 and 65 minutes to complete. A summary report is printed, which contains a brief narrative of test performance. Information is presented by age, grade, standard score, and percentile rank (Woodcock-Johnson III Tests, n.d.).

There are many other testing instruments available for use for different age ranges and groups. Among them are the Das-Naglieri Cognitive Assessment System (for ages 5 to 17), the Detroit Tests of Learning Aptitude (for ages 6 to 17), the Differential Ability Scales (for ages 2.6 to 17.11), the Comprehensive Test of Nonverbal Intelligence (for ages 6 to 90), Gifted and Talented Evaluation Scales (for ages 5 to 18), the Naglieri Nonverbal Ability Test (for grades K to 12), the Otis-Lennon School Abilities Test (for grades K to 12), the Reynolds Intellectual Assessment Scales (for ages 3 to 94), Scales for Identifying Gifted Students (for ages 5 to 18.11), Screening Assessment for Gifted Elementary & Middle School Students (for ages 5 to 14.11), the Slosson Intelligence Test (for ages 4 to 65), the Structure of Intelect Learning Abilities Test (for grades 2 to adult), Tests of Mathematical Abilities for Gifted Students (for grades K to 6), Tests of Nonverbal Intelligence (for ages 6 to 89.11), the Universal Nonverbal Intelligence Test (for ages 5 to 17), and the Wide Range Intelligence Test (for ages 4 to 85). With all the choices that exist for testing, it is important to make sure that an appropriate instrument is chosen to match testing criteria (Commonly Used Testing Instruments, n.d.).

**Viewpoints**

Along with all the good that intelligence testing can bring, there are also a few negatives. Intelligence testing evaluates student intelligence at a fixed point in time. This means that students who are developing at a slower pace run the risk of being branded as learning disabled or slow to learn, a label that may follow them the rest of their school lives. Although research has shown that students learn at different paces, there is still a tendency for instructors to assign the same homework and expect the same level of work from all students. Lower intelligence testing scores can help justify to the instructor that some students are incapable of learning and there is no real need to try to accommodate their needs because they simply cannot learn the material. Instructors, schools, and school districts with testing practices that do not use multiple assessment measures help confirm the belief that some students are incapable of learning, and in these cases testing prac-
Intelligence testing falls into two basic categories: those that are administered to individuals and those that are administered in a group setting. The Stanford-Binet Intelligence Test, the three scales of Wechsler tests, and the Kaufman Assessment Battery for Children are all assessments that require one-on-one consultation with the child. Although they all provide an overall IQ score, their verbal and nonverbal subtest scores and measures can also provide trained professionals valuable information about the child being tested and help with diagnosing any possible developmental disabilities. Individual testing provides the best opportunity for a professional to study a child and his or her behavior during the assessment process, and it also provides an opportunity for the testing professional to select which subtests are more appropriate to administer, providing a flexibility that cannot be attained in group testing situations.

In order to receive special services, Intelligence testing can be important for learning disabled students. They, in turn, need to work with instructors to help develop teaching strategies that can help each child learn (Benson, 2003).

Some examples of group tests are the Multidimensional Aptitude Battery, the Cognitive Abilities Test, and Preliminary Scholastic Assessment Tests. Group tests tend to consist of multiple-choice items but are still broken down by verbal and nonverbal categories. Many tests have separately timed subtests. In an attempt to diminish the possibility of cultural and gender bias, there has been a recent trend to move away from verbal and mathematical items and go more with nonverbal problems represented by pictures. There are both advantages and disadvantages to group testing. Among the advantages are that testing in groups allows a large number of students to be tested at once, the test examiner does not need to be a trained psychologist or psychiatrist, scoring would be more objective than subjective, and the large representative samples can lead to better established norms. Some of the disadvantages of group testing include that the test examiner will not be able to readily establish a rapport with the test takers, maintain their interest, or get the test takers to take the assessment seriously. The examiner will not be able to easily determine if test takers are ill, anxious, or should otherwise not be taking the assessment on a particular day. Other potential disadvantages of group testing are that many children do better testing in a one-on-one situation, multiple-choice assessments restrict test takers’ responses, and students must take all subtests when testing in a group setting (Individual vs. Group, 2003).

Intelligence testing can be important for learning disabled students for several reasons. In order to receive special services, intelligence testing is required by special education regulations in most cases to help confirm or to rule out mental disabilities and to establish an IQ for the purposes of diagnosing a learning disability in students. An intelligence test can also provide trained professionals with useful data that can be used to determine how students think and process information and what would be appropriate instruction techniques in order to help them succeed. This data can also aid in developing each student’s Individualized Educational Program–IEP (Logsdon, n.d.).

Continued research and more modern theories regarding testing and intelligence lead to the discussion about whether intelligence testing should still be used in schools. There is some consensus that intelligence tests should not be used to diagnose learning disabilities. However, most assessments already assert that they should not be used as the sole instrument to determine intelligence and students’ current capabilities and should be used in conjunction with other assessment tools as well as observations of trained professionals. Learning disabilities have been diagnosed in children whose achievement scores are at least one standard deviation below their IQ scores. This is commonly known as the IQ Achievement Discrepancy Model. According to Benson (2003), one of the reasons schools are moving away from using this model is that it cannot give any useful information about what may help learning disabled students learn, and a child’s classroom and home behavior tend to be better indicators of ability than something as abstract as an intelligence test. Using different assessment methods can help ensure that appropriate services are provided. However, many of those trained in intelligence testing agree that intelligence tests should not be used to identify learning disabilities, but that they are just one more instrument that can be used to give a more well-rounded view of the child. If these tests are properly administered and interpreted, they can be useful. Therefore, while those intelligence tests that are meant for testing in groups are standardized and administered in such a way that a teacher can give the assessment, a trained psychologist is necessary to assess the patterns of performance on these tests and use clinical observations to assist learning disabled students. They, in turn, need to work with instructors to help develop teaching strategies that can help each child learn (Benson, 2003).

Although intelligence testing can provide valuable information, the validity of results for such testing can be compromised when other factors unrelated to intellectual functioning affect students’ performance (Armour-Thomas, 1992). This is one reason why it is important that only people who are trained in appropriate test administration procedures conduct testing and why only school counselors and school psychologists should administer the nonstandardized, individual tests. These professionals have had a minimum of master’s level courses on such subjects as tests and measurements and testing and have had instruction and supervised practice in the administration, scoring, and interpretation of a variety of measures of intelligence. In addition, they have familiarity with the psychometric characteristics of major standardized measures of intelligence, which should help them decide which instruments are appropriate to use depending on each situation and various student characteristics.

Terms & Concepts

Age & Grade Equivalent Scores: Age- and grade-equivalent scores are estimates used to describe a student’s score in terms of a grade or age level in which the student is functioning. For example, if a fourth grade student receives a grade equivalent...
score of 8.1 on the reading portion of a grade-level achievement test, it means the student reads fourth grade material as well as the average eighth grader would read it and not that the fourth grader is reading at an eighth grade level.

**Assessment**: Assessment is the gathering of information for making decisions about individuals, groups, programs, or processes.

**Cognitive**: Of or pertaining to the mental processes of perception, memory, judgment, and reasoning as opposed to emotional processes.

**Intelligence Testing**: The estimation of a student’s current intellectual functioning through performance of various tasks designed to assess different types of reasoning. Scores may be presented as an IQ (intelligence quotient), a mental age, or on a scale.

**Norms**: Norms are a normative or average score for a particular age group.

**Percentile Rank**: Indicates the percentage of students in the same age or grade group whose scores fall below the score obtained by a particular student, meaning a student scoring at the 85th percentile did better than 85% of those in the norming sample.

**Raw Scores**: Raw scores indicate the number of items answered correctly on a test.

**Standard Deviation**: Standard deviation is a measure of the distribution of scores around the average (mean). In a normal distribution, 95 percent of all samples will fall two standard deviations above and below the average.

**Standard Scores**: Standard scores are raw scores that have been translated using a conversion table provided with the test so a student’s performance can be compared to others of the same age or grade level.

**Standardization**: Standardization is the process of determining established norms and procedures for a test to act as a standard reference point for future test results.

**Standardized Test**: A test designed to be administered, scored, and interpreted according to a prescribed set of rules or instructions so that the results can be interpreted through comparisons to a specific reference group who were administered the test under the same conditions.

**Bibliography**


Suggested Reading


Essay by Sandra Myers, M.Ed.

Sandra Myers holds a Master’s in Adult Education from Marshall University and is the former Director of Academic and Institutional Support at Miles Community College in Miles City, Montana, where she oversaw the College’s community service, developmental education, and academic support programs. She has taught business, mathematics, and computer courses; and her other areas of interest include adult education and community education.