

# SOI OVERVIEW

It began during World War II. The Army Air Corps was training pilots, navigators, and bombardiers. The need for trained personnel was urgent, yet the Air Corps was losing more than one of every three men who entered the program - although carefully selected, these men could not complete the training satisfactorily. They "washed out."

## IQ AND PERSONNEL SELECTION

The Air Corps used three criteria for personnel selection: good health (with an emphasis on vision), the ability to operate under stress, and high intelligence. Doctors screened for health. Performance measures were used to evaluate the ability to handle stress.

IQ tests were used to screen for intelligence. The cutoff score was 120, which, at the time, was considered adequate for college entrance. All of the flight school cadets met these criteria, but, even so, many of them were not graduating.

The washout rate stood at about 35%. The Air Corps needed to improve. They were satisfied with the health and stress measures, so they focused on improving the measure of intelligence. They called upon Dr. J. P. Guilford to find a better measure.

## A NEW WAY OF MEASURING INTELLIGENCE

Guilford began with a set of job descriptions for pilots, navigators, and bombardiers. From these job descriptions he drew up a set of intellectual functions required for each job, and then constructed paper-and-pencil tests that he thought would measure the required abilities.

He used this "long" test on two sets of men - those who had successfully completed the training, and those who had not. The results were analyzed to

determine which items discriminated between the two groups.

If the successful group tended to get an item correct while the unsuccessful group tended to get it wrong, then that was a discriminating item. Items that did not discriminate were thrown out. Using this method, he was able to retain only the best items for selection and thereby reduced the long test to one of practical length.

## SUCCESS OF THE GUILFORD INTELLIGENCE MEASURE

Guilford now had tests that could be used to select personnel with the most intellectual potential for the training. The test was so successful that the washout rate dropped more than 25% - he had reduced the failures from more than 1-in-3 to less than 1-in-10.

Guilford went one step further. He analyzed the items by a (then) new statistical technique called "factor analysis," a technique that identified clusters of related items called "factors." In this way Guilford was able to identify those abilities (intelligence factors) required for Air Corps training.

This was the key to his stunning success. He replaced a general intelligence measure (IQ) with a differentiated measure of intellectual abilities. This was the first step toward the development of the Structure of Intellect.

## CONTINUING RESEARCH

The Air Corps (and all of the Armed Services) were very impressed with what Guilford was able to do with this new way of measuring intellectual abilities.

The Defense Department could see many applications for this technique because technology was creating jobs that were entirely new and for

which it had no prior experience with either training or selection. The Defense Department funded Guilford for the next twenty years (1945-1965) in the Aptitudes Project at the University of Southern California.

During that period, Guilford and his students identified many different intellectual abilities (aptitudes). As more abilities were identified, a model began to take shape; the model that finally emerged was called the Structure of Intellect. The model, in its final form, identified ninety different factors of intelligence.

The Structure of Intellect model itself is called "SI"; the application of the model to education is called "SOI."

## THE HISTORY OF THE SOI

The SOI development began in the early 1960s by Dr. Mary Meeker, then Guilford's doctoral student and a school psychologist. She saw the potential of the Structure of Intellect, especially for diagnosing learning difficulties.

As a first step, she developed templates that translated the protocols of well-known IQ tests (Stanford-Binet and WISC) into Structure of Intellect terms. In this way she was able to provide classroom teachers with information that was relevant to how their teaching could meet the different needs of their students. These SOI profiles were much more relevant for teachers than were general IQ scores.

She soon found that certain intellectual abilities were closely related to basic learning: reading, arithmetic, higher math, and creativity. These insights (gained from studies - 1962 to 1974) became the basis of the SOI Test of Learning Abilities (SOI-LA).

## INTELLIGENCE CAN BE TAUGHT

Dr. Meeker's most important contribution to the SOI was the realization that intellectual abilities could be taught. Thanks in large part to her work, this is

well-accepted today, but in 1963 it flew in the face of conventional wisdom which held that IQ scores were invariant - once a 109, always a 109 ( $\pm 7$ )!

The possibility that intellectual abilities could be taught added a new dimension to Guilford's work. He had found a better way of assessing intelligence, the SI theory - and redefined intelligence in the process - but he had concentrated on measurement for the purpose of selection.

He and his students said, "Tell us what task needs to be done; we will tell you which abilities are needed for the task, and how to select personnel who will best learn to perform the task."

Their project advanced factor-analytic science and increased the efficiency of personnel selection, but all of that is little consolation for those who were not selected (because they lacked the requisite abilities).

In other words, Guilford could explain why individuals might fail training, but he did not consider how to help them develop the abilities so they could succeed.

Once the possibility that intellectual abilities can be taught is considered, however, the results of assessment take on a new, much more positive, meaning.

Now we can say, "Tell us what task needs to be done; we will tell you which abilities are needed for the task, and how you can train personnel so they will best learn to perform the task."

## SOI IS UNIQUE

This close coupling between assessment and training is what makes SOI unique. The SOI tests are used to measure intellectual abilities; SOI training materials are used to develop intellectual abilities that are weak and further enhance abilities that are strong.

The SOI test is diagnostic; it leads directly to treatment. The assessment and the treatment are both based on the same Structure of Intellect theory. The theory has been applied to education, especially to the diagnosis and treatment of learning problems in school and on the job.

## EDUCATIONAL DIAGNOSES & PRESCRIPTIONS

The SOI provides the first practical opportunity for educational therapy. Here is the basis:

- The Structure of Intellect “maps” the different kinds of intellectual abilities.
- Identifiable intellectual abilities are prerequisite for learning in different content areas. Specific Structure of Intellect abilities have been related to basic learning areas: reading readiness, reading, arithmetic, mathematics, and creativity.
- Students fail in learning situations - often because they do not have the prerequisite intellectual abilities. In other words, a learning disability is most often the absence of a learning ability.
- The Structure of Intellect learning abilities can be assessed. In other words, we can test to measure the extent of development of the specific abilities required for learning.
- Underdeveloped learning abilities can be taught. We can develop those abilities that have been neglected, ignored, or inhibited by factors such as poor health, perceptual problems, or emotional barriers.

By satisfying each of these points, we create the necessary conditions for educational therapy. The SOI tests give us assessment. Knowing which abilities

relate to which areas of academic performance, gives us the basis of diagnosis. Knowing how to teach abilities that have not been developed gives us the basis of treatment.

The combination of specific assessment, specific diagnosis, and specific treatment provides the foundation for a very comprehensive system of educational therapy.