Human Differences and Operator Potential

Paul Freedman

Not everyone is born with the same musical ear as a professional musician. Indeed, we all know people who can't sing well. The poor souls, they can practice forever and never improve. The same is true of sports – not everyone is born with enough natural ability to become a professional athlete. The fact is, people born with more natural ability not only attain higher levels of performance (in music, sports, etc.), but they also "take to things" faster. Learning seems to be easier for them.

Well, what about operating cranes? Studies indicate that becoming a skilled heavy equipment operator also requires natural abilities that cannot be taught, just like musical or athletic talent. And that's why performance on the jobsite, even among experienced operators, can vary widely.

Psychometric tests

The fact is that once training ends, the differences in how skilled people become have everything to do with the differences in their natural abilities, which is why looking for "operator potential" is so important. Indeed, in talking with Simlog's operator training school customers, at first in Canada and later elsewhere in the world, we have learned that in a typical class of 10 students, there are always two or three who don't quite catch on and fail to learn the necessary skills well enough to pass the proficiency test at the end of the program.

If natural abilities are so important, then what are they? Research by industrial psychologists has identified just three:

- Psycho-motor – The ability associated with manual dexterity and hand-eye coordination;
- Perceptual – The ability associated with depth perception; and
- Cognitive – The ability associated with spatial orientation (knowing, and keeping track of, what's around you, what's in front, what's behind, etc.).

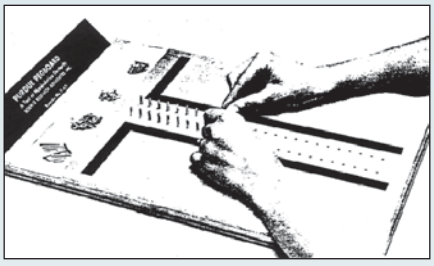
Now that we know what to look for, evaluating these natural abilities can help us maximize the percentage of correct hiring decisions (i.e., accepting suitable job candidates and rejecting unsuitable ones), and at the same time, identify predictors of an individual's ability to perform on the jobsite.

To do that, industrial psychologists developed psychometric tests. Psychometric testing became popular in the 1950s in the blue collar, or factory, trades and became formalized under the name "Generalized Aptitude Test Battery." They are standardized in the sense that there is:

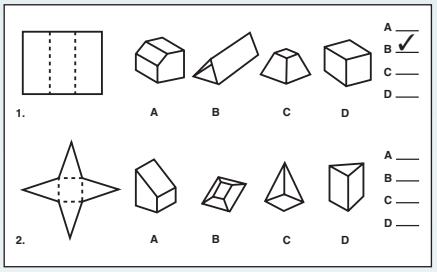
- Standardized content, in which everyone does the same things;
- Standardized delivery, in which everyone is asked to do things in the same way; and
- Standardized scoring, in which everyone's results are evaluated in the same way.

The trick, of course, is to evaluate natural abilities using surrogate work, which can be much more easily measured than real work and correlates well with true on-the-job performance. More generally, a psychometric test must have four important properties:

- Good *reliability* – Each time you take the (same) test, your score should be the same;
- Good *predictive validity* – A good test score is predictive of good on-the-job performance, while a poor test score is predictive of poor on-the-job performance;
- Good *face validity* – People believe that the test is evaluating key aspects of doing the real work well; and
- Good *construct* validity – People who do the real work well will have better test scores than people who do the real work poorly.



Pegboard test



Paper-folding test

Two well-know psychometric tests are shown above. The pegboard test (top) is designed to evaluate psycho-motor ability, such as making your fingers move quickly to assemble small arrangements of metal pegs and washers. The other is an imaginary paper-folding test, which is designed to evaluate perceptual and cognitive abilities.

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Operator training simulation

The world has changed since the1950s, and training simulation has entered the world of heavy equipment, including cranes. Today, there are a variety of crane simulator products available that offer different amounts of sophistication at different prices. And although it's tempting to think that training simulation should do a better job than psychometric testing, but when it comes to evaluating operator potential, is that really true?

A few years ago, Simlog decided to find out by enlisting the help of trainers and students at a local heavy equipment operator training school to compare the relative merits of these two psychometric tests and Simlog-style training simulation for evaluating operator potential.

To begin, we found good agreement between the two psychometric tests: Students who scored well, or poorly, on one test also scored well, or poorly, on the other. Then we also double-checked the construct validity of the training simulation and observed that the trainers, who were already skilled at the real work, had much better simulation results than the students.

But more importantly, we noticed that students with good psychometric scores did not always have good simulation scores (but students with good simulation scores always scored well on the psychometric tests). So, should we be trusting of the psychometric tests or the training simulation?

The answer became evident when the students left the classroom for real seat-time, and their on-the-job performance was evaluated by the trainers. In this way, we discovered that training simulation was best at predicting on-the-job performance in the sense that poor simulation results always meant poor performance in the woods. After a more careful analysis of simulation results, we also discovered that we could identify those students who would continue to do poorly on the job after just three to four hours of simulator-based work!

The fact is training simulation is a better predictor because it essentially mimics the real work, and as a result, is better at testing the combination of psycho-motor, perceptual, and cognitive natural abilities that are important when compared to psychometric testing. In addition, training simulation offers much better face validity. And because the simulation results include measures of how quickly and how carefully the simulated work is done, the portrait is much more comprehensive.

Just one final note: Although all kinds of people continue to "come up through the ranks," at Simlog, we think that it's time to start taking operator potential into account. That's because training costs continue to rise, along with the demands on crane operators. And just like we're not all born with the talent to become a professional musician or athlete, we're not all born with the talent to become heavy equipment operators. Training simulation offers a cost-effective means to observe operators before putting them behind the wheel.

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Some enterprising employers are doing just that. By enlisting the help of consultants equipped with training simulators to evaluate job applicants, they can then identify those with the best simulation results for operator training.

Of course, training simulation also can be used to pre-qualify new hires. I remember hearing an old hand say that some job applicants are so gifted that they could "talk a cat off a fish boat." Sadly, a study conducted just last year by a company providing pre-employment background checks found that more than 25 percent of job applicants are not entirely truthful with prospective employers.

So rather than ask your applicant to climb into the cab of your crane, you might want to consider having him spend time at a training simulator. ■