

You're a what?

Psychometrician



Catherine McClellan knows how to ace the test. That's because she designed it.

Catherine is a psychometrician. Like many in this occupation, she designs, scores, and analyzes data from exams.

Psychometrics is the science of measuring psychological attributes, such as intelligence or understanding. Tests are one way to assess these intangible qualities. And psychometricians' work ensures that each test is reliable and that all test results are valid.

Specific job tasks vary with the type of exam a psychometrician develops. Catherine specializes in constructed response, a form of testing that includes essays, art portfolios, and other tests scored by humans. Other psychometricians develop computer-scored exams.

When creating a test, psychometricians might start by determining its basic structure: which format to use, such as multiple-choice or short-answer questions; how many questions to ask; and the levels of difficulty of the questions. Psychometricians then set the time that will be allotted to take the test and make decisions about scoring, such as how many points to assign each question.

Like most psychometricians, Catherine works with subject-matter experts to identify what a test taker should know to be competent in a particular discipline. The subject-matter experts write questions and answers. Then, everyone works together to make sure that the test covers the right material and conforms to the plan. For Catherine, collaborating with these specialists is among the best parts of her job. "It's endlessly fascinating because I get to

work with such a wide range of people," she says.

After new test content has been created, psychometricians make sure that it is sound. They might do this by conducting pilot trials—essentially, a test of the test. "We go out and have people respond to the questions, and then we analyze the data to see if the test is working," says Catherine. Often, she says, a good test points out differences in test takers' abilities.

Catherine spends a lot of time training and overseeing the people who score the exams, too, to be sure that they are grading the exams fairly. One way she verifies that raters are following the proper guidelines is to randomly insert prescored tests into the group of tests that a rater has to score. If the rater's result matches the already assigned score, it's an indication that he or she is following the right procedures.

Psychometricians also analyze test results. For example, they make scores comparable from different versions of a test. And they use score data to create reports or make recommendations—such as suggesting curriculum changes for improving student performance.

Many of the assessments that psychometricians work on have significant implications for test takers. Some psychometricians, for example, design the licensure exams that give teachers, lawyers, and others permission to work in their fields. Other psychometricians design instruments to evaluate factors ranging from career interests to mental health, all of which can affect decisions about the future.

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Photo courtesy of Catherine McClellan

Still other psychometricians, including Catherine, create tests that measure student aptitude or knowledge. Results of these tests can influence a student's options for college or a school's level of funding. "This is high-stakes stuff," says Catherine of her work. "Sometimes, I think, 'Wow, this changes people's lives.'"

Helping to shape people's futures through objective measurement requires lots of math and statistics. For example, psychometricians use math to calculate test takers' percentile rankings. And they use statistics to determine variances, correlations, and other measures of a test's reliability.

Psychometricians need good communication skills to explain the results of their work to others. And attention to detail is essential.

Problem-solving and research skills also are important. When choosing statistical methods to assess a test's validity, for example, Catherine might need to do significant research. "If I don't like one method, I need to research what to do to develop a better one," she says. "It rarely ever gets routine."

Most psychometricians work for testing companies and for federal, state, or local government. Other employers include hospitals, mental health clinics, universities, and large corporations. Catherine works for a nonprofit testing company that produces and scores well-known assessments such as the SAT Reasoning Test, Advanced Placement (AP) exams, and Graduate Record Examination (GRE).

The U.S. Bureau of Labor Statistics does not collect employment or wage data specifically on psychometricians. According to the Psychometric Society, however, there are several thousand of these workers in the United States. The Society estimates that annual wages can range from about \$50,000 to \$100,000, although some workers earn more.

Workers' pay is high, in part, because of the investment required to become proficient in the field. Many psychometricians have a Ph.D., usually in a subject such as educational measurement, quantitative psychology, or statistics. Others have a master's degree. There are no undergraduate programs specifically in



psychometrics and only a few graduate-level ones. Most people enter the discipline from a related field, such as statistics, mathematics, computer science, or psychology.

A former math teacher, Catherine first learned about the occupation while earning her master's degree in secondary math education. "I really liked my measurement classes, and one day my teacher told me, 'You know, you can get a degree in this.'" Catherine completed her math education program and then went on to get her Ph.D. in research and evaluation methodology in education. She has since worked on numerous projects, including a nationwide assessment of U.S. students' academic knowledge and experiences.

Catherine enjoys the role she now has in improving education through exams. "I take what I do very seriously," she says. "By helping to make a good test, you feel like you can change things for the better."

Psychometricians, such as Catherine McClellan, above, use statistics to determine whether a test is reliable.
