Megatrends in Personnel Testing: A Practitioner's Perspective

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Applied psychological testing programs, having long been utilized, impact the lives of millions of people every day (Lyman, 1998). Some major testing applications include placement in school or on the job, assessment of knowledge and achievement, professional certification and licensure, selection and promotion of employees, determination of learning and development needs, career counseling and guidance, and basic and applied research. Different types of tests are used with each of these of applications. Types of tests include standardized achievement, work skills, performance, aptitude, simulations, attitude, interest inventories, and clinical personality. There are also a variety of modes for administering tests. A test taker may be required to respond to items in a standard paper-and-pencil format, perform a task, role-play or simulate a situation, or respond to items in a computer-based format (e.g., computer adaptive or web-based testing).

The prevalence of applied psychological testing and the variety of testing purposes and formats call attention to the importance of quality and efficient test development, administration, scoring, reporting, and interpretation. In addition, test developers and publishers must also build innovative assessments that rely on recent advances in psychometrics and technology. Therefore, the purpose of this paper is twofold. First, this paper briefly reviews current testing trends, as documented in the literature, that seek to address the needs for high-quality, fair, and efficient tests. Second, as its primary purpose, this paper summarizes a number of important megatrends that are directing the personnel testing industry. These megatrends, presented from a practitioner's perspective, often are not immediately reflected in the traditional scientific journals because of a lengthy publication lag-time.

Futurist John Naisbitt (1982) has defined *megatrend* as a "broad outline" or "direction" that will come to shape and direct an industry. These broad outlines serve as gateways to conceptualization and development of new product platforms and service offerings. Examples of a few megatrends professed by Naisbitt in 1982 included the shift from an industrial society to an information society, the movement from national economies to world economies, and corporate model shifts from hierarchical structure to informal networking. Before proposing 10 megatrends in the personnel testing industry, the authors briefly review some relevant articles from the professional literature to provide both a context and a baseline for this paper.

INDUSTRY SURVEY

Assessments significantly influence the lives and careers of a large number of individuals in organizations (Silzer & Jeanneret, 1998). For example, in a 2000 survey the American Management Association (AMA) found that 69 percent of surveyed organizations conduct job-specific skills testing for various purposes (e.g., selection, evaluation, career development, or training). This is very similar to the percentages of organizations who were testing for job-specific skills in 1998 (65 percent) and 1999 (71 percent).

Of the organizations that test for specific job skills, 60 percent test applicants and 40 percent test employees. The AMA survey also revealed that 43 percent of the responding organizations test applicants for basic literacy and math skills in selected positions. This is similar to the 1998 and 1999 percentages of 39 percent and 41 percent, respectively. The survey indicated that manufacturers are more likely than service providers to employ basic skills tests.

The AMA survey also found a decrease in the use of psychological measures (cognitive ability, interest inventories, managerial assessments, personality measures, and physical simulations) from 52.3 percent of the surveyed companies in 1998 to 33.4 percent of surveyed companies in 1999 and 33.0 percent in 2000. Within the five categories of psychological measurement included in the AMA survey, usage dropped from 1998 to 1999 for applicant and employee testing. However, from 1999 to 2000, usage has slightly increased for managerial assessments and physical simulation of job tasks, and the other categories (cognitive ability, interest inventories, and personality measures) have remained at the same level as 1999.

The AMA suggests this decrease from 1998 might be due to tight labor markets, expanding workforces, and skill shortages so severe that companies made less use of these measurements in their need to fill open positions. However, even at 33 percent, a substantial number of organizations are using psychological measures with applicants and employees. In addition, as discussed, even more organizations are conducting job skills and basic skills testing.

TESTING EXPERTS' FOCUS

Testing experts have discussed several recent shifts and developments in the types of personnel testing being conducted. As early as 1991 and again in 1996, Dr. Robert Guion reported a shift toward more job-specific personality tests such as integrity and customer service orientation tests and away from the general personality assessments. In regard to personality tests, applicants may be less willing to take general personality tests if they do not see a clear relationship with the job or find some of the questions to be excessively invasive (Sullivan & Arnold, 2000). Not surprisingly, test publishers are starting to offer a relatively new class of job-analytic questionnaires that focus on job-related personality constructs (Jones, 1996).

The area of global testing is developing in recognition of a diverse workforce and the launching of human resource assessment systems globally (Silzer & Jeanneret, 1998). As global testing in organizations increases, so will the need to adapt assessment tools and

techniques for different cultures. Investigation into the measurement equivalence of assessments across cultures has begun, and more research into adapting tests across cultures is needed (Ghorpade, Hattrup & Lackritz, 1999). This trend is further supported by the International Test Commission (ITC), which stresses the importance of developing guidelines for adapting tests for international use and establishing global networks of psychologists. ITC released the *International Guidelines for Test Use* in 2000.

The development of voluntary professional certifications has grown steadily over the last 30 years (Hale, 2000). Certification requirements generally include minimum levels of education and/or experience and a standardized examination. McKillip and Owens (2000) found that of 1,000 professional certifications, 92 percent required examinations. With certifications it is important to establish a relationship between certification requirements and job performance that distinguishes certified and noncertified performers (Hale, 2000; McKillip & Owens, 2000). As long as the link between certification and job performance can be made, development of certifications will likely increase because certified individuals are more marketable.

TECHNOLOGY TRENDS

Computer-based testing (CBT), including PC-based, web-based, and computer adaptive testing, has seen a continuous increase since the 1980s (Lyman, 1998). In fact, computer administration and scoring of tests have become general practice (cf. Silzer & Jeanneret, 1998). The Association of Test Publishers (ATP) has even developed CBT standards (Harris, 2000). CBT offers the opportunity for multimedia test items such as video- and audio-based items (Hanson, Borman, Mogilka, Manning & Hedge, 1999; Stanton, 1999). One study compared examinees' reactions to paper-and-pencil, computerized, and multimedia versions of a test (Richman-Hirsch, Olson-Buchanan & Drasgow, 2000). The study found that managers completing the multimedia version rated the assessment as more face valid and had more positive attitudes toward the test than did managers completing the other two versions of the test. Perhaps because technology is so ingrained in the work lives of most people, there is an expectation that valid personnel tests will reflect that use of technology. The increase in computerized testing has led to research into the equivalence of paper-and-pencil tests and computerized tests, with generally positive results regarding equivalence (Clarke, 2000; Donovan, Drasgow & Probst, 2000; Neuman & Baydoun, 1998). However, if computer versions of certain tests are not equivalent, then developing tests specifically for computer administration may be necessary (Stanton, 1999).

Although computer-adaptive testing (CAT) was first introduced in 1970, use has substantially increased in recent years (Meijer & Nering, 1999). CAT differs from computerized testing in that item selection and test length vary based on examinee answers. Benefits include shorter tests and enhanced measurement procedures (i.e., CAT methods construct the optimal test for each examinee), along with immediate scoring and reporting. However, initial costs are high, and item banks continually need updating. Meijer and Nering suggest that one area for future use of CAT is with personality tests, to

detect faking through inconsistencies in item responses and through additional items administered to adjust for or identify those inconsistencies.

Web-based testing offers 24-hour access to testing, immediate scoring, and a more limited need for test administrators, leading to convenient, cost-effective, and efficient testing (Jones, 1998). Web-based testing may be either a traditional test that relies on examinees to complete all test items online or an adaptive test that varies items by examinee. However, the increase of web-based testing has introduced new testing concerns of unequal access, test and personnel information security, faking/cheating, and computer familiarity confounding scores for cognitive ability tests (Stanton, 1999). These concerns are made worse when web-based testing is occasionally conducted in uncontrolled environments.

Test publishers expect that with time, use, and experience these issues can be overcome or at least reduced via testing standards and end-user training. For example, Stanton (1999) suggests using passwords for access to tests and using adaptive testing to address test security and cheating issues. The state of California has put the civil service examination for staff service analysts on the Internet (Coffee, Pearce & Nishimura, 1999). That the test is also available on the phone alleviates problems with unequal access to the Internet. The authors claim that the web-based test has significantly improved the effectiveness and efficiency of civil service testing procedures. However, the article did not discuss empirical data on the comparability of the Internet-based and telephone-based systems. In addition, many professional certification examinations are becoming available on the web.

Finally, because of the prevalence of testing in education, clinical, and personnel settings, information gained from all these sources can be applicable to and important for developing high-quality tests. Thelwall (2000) states that computer-based assessment (CBA) has become common in United Kingdom universities. Instant marking and feedback are often more educationally effective than feedback delivered after a delay. Student perceptions of the statistics test at the end of the semester provide relevant information regarding the general acceptance and value of CBA. Thelwall found that 55 percent of students preferred CBA, 12 percent did not prefer it, and 34 percent were undecided. In addition, 86 percent found the CBA easy to use, and 91 percent found the feedback useful. These are relevant findings for computer-based personnel testing for training and development purposes, and they provide further evidence of the prevalence and growing acceptance of CBA.

Based on the above literature review, personnel testing obviously is an important part of companies' selection and development systems. In addition, effort has been made to develop fair, valid, and efficient tests. This includes incorporating available technology into the development, administration, scoring, and reporting phases of the testing process. However, technology and assessment tools are always evolving, and awareness of emerging practices is important.

PERSONNEL TESTING MEGATRENDS

The primary purpose of this paper is to summarize 10 megatrends that unquestionably are impacting the personnel assessment market space. However, almost none of these megatrends is clearly identified and delineated in the published research literature, which often suffers from extreme publication lag-times (cf. Naisbitt, 1982). Therefore, the following megatrends are based on the first author's professional experience as (1) a psychology journal editor who reviews hundreds of applied-testing article submissions each year (e.g., *Journal of Business and Psychology* editor for 15 years), (2) an author of personnel testing textbooks (e.g., Jones, 1996), and (3) a former chair of the Association of Test Publishers' Testing Standards Committee (1995–1997). The first author has also heard these trends repeatedly discussed by test publishers and test users attending practitioner-focused trade conferences and seminars. In addition, this paper updates a listing of personnel testing megatrends that were identified by the first author in 1997.

As a contextual backdrop for this paper, the first author identified 10 personnel testing megatrends in 1997. The majority of the megatrends were different in nature than the newer megatrends listed below. In fact, the megatrends identified in 1997 dealt more with professional standards and test user responsibilities than with technology breakthroughs. For example, the 1997 list focused on the following themes:

> New professional standards. This trend described the imminent release of the new *Standards for Educational and Psychological Testing* (AERA, APA & NCME, 1999), along with the emergence of niche standards for specific classes of tests.
>
> Test user responsibility. A greater clarification in the marketplace emerged on the distinct roles of test publishers and test users with respect to developing and implementing psychological testing programs.
>
> Strategic-fit and job relevancy. Companies placed a growing emphasis on the desire to use psychological tests and batteries that had a clear relevance or link to their corporate strategies.
>
> Niche assessments. Somewhat related to megatrend 3, it was discovered that established test batteries often needed to be supplemented by contemporary niche assessments such as computer aptitude tests and even service orientation tests.
>
> Fairness and usability. Industrial/organizational (I-O) psychologists increasingly focused on the "fairness" factor. That is, demand was growing for tests to be job relevant, noninvasive, and time efficient, in addition to being fair to protected subgroups of the population.
>
> Integrated theories. The test user community became increasingly interested in the theoretical underpinnings of psychological tests. For instance, users wanted to know about the theory and research behind professionally developed integrity tests. Test theories of "can do"

(cognitive ability and skills testing) and "will do" (job-specific personality and attitude testing) were also increasingly relied upon. In addition, certain theories that originated in basic research (e.g., the Big-5 Personality Theory) were now being more eagerly adapted and applied for workforce assessments.

Competitive decision rules. Test users became quite knowledgeable about the pros and cons of standard cut-scores and decision rules. While making every attempt to ensure that their decision-making models always complied with the Equal Employment Opportunity Commission (EEOC) guidelines, companies also realized that cut-scores had to be adjusted in tight labor markets, even if such action increased the company's risk exposure.

Expanded applications. Psychological tests were used for prescreening purposes and also to assess global work competencies. Test users embraced new assessments, such as multirater assessments and measures of practical intelligence for managers.

Virtual HR. With the advent of powerful and affordable central processing units (CPUs), client-server technologies, and computer telephony systems, companies increasingly perceived testing as an extended application to their human resource information system (HRIS). If HR was going paperless, then testing programs eventually had to do the same.

ROI and utility analyses. Finally, companies wanted minimally to estimate the return on investment of their testing programs, using utility analysis and standard ROI studies.

The list of 1997 megatrends will always be relevant to the personnel testing industry. Yet, with the rapid acceptance of the Internet as a universal e-business platform, the time is right to update the list of personnel testing megatrends. While a few of the 1997 megatrends made it to the 2001 list, in actuality very little overlap occurs between the two lists. In fact, the 10 megatrends for 2001 that appear below are more reflective of the present sentiment and have started to gain more discussion at professional conferences such as the Annual Conference of the Society for Industrial and Organizational Psychology (SIOP) and the regional seminars and conferences of ATP. These 2001 megatrends are also gaining increased coverage in trade publications such as *Internet Week*, *Info-World*, *Business 2.0*, and *Fast Company*, to name a few.

Of course, any list of megatrends can be challenged, but the authors' goal with this list is to stimulate thought and research in these areas. In fact, the following 10 contemporary megatrends are categorized as either "technocentric" (N = 5) or "content specific" (N = 5). The greater loading on technology themes is probably the greatest difference between the 1997 and 2001 megatrend listings. Also, the authors made a concerted effort to focus on the emerging trends rather than on specific products and services that are starting to be

offered in this market space. Ideally, this paper and the list of 2001 personnel testing megatrends will be used for an industry status check and not as a marketing piece.

TECHNOCENTRIC MEGATRENDS

Virtual career centers as electronic job marketplaces. Job boards such as Monster.com, Headhunter.net, and others are creating efficient "supply-demand" opportunities that seamlessly bring together hiring companies and job seekers (both passive and active). In fact, these "virtual career centers" have created a large and growing industry, with millions of job seekers using these types of recruiting websites each month. A variety of novel personnel assessment strategies are being offered by these online career centers. First, applicants are encouraged to post their resume(s) online using a standardized resume-building template. A newer service that is being piloted allows these same applicants to take brief employment screening tests that are embedded as Java applets in the hiring company's online job posting. These centers are often free to applicants, but recruiting companies pay a monthly subscription to post their jobs. Ironically these types of electronic job "marketplaces" have evolved largely without the direct involvement of I-O psychologists, who need to investigate the impact (e.g., fairness, validity, utility) that these career centers and the assessments they administer have on employers and employees.

Integrated personnel assessments and processes. Innovation with Internet-based assessments is leading to a seamlessly integrated personnel assessment platform. Companies can use the Internet to administer prescreening questionnaires, job application blanks, structured behavioral interviews, and brief selection tests. Applicants can also provide permission while online for a company to conduct background and reference checks. Moreover, these types of integrated assessments can be offered globally, nationally, or locally using a 24 x 7 Internet service. Hence, companies can use integrated assessments to capture all essential qualification information from job candidates. Such Internet-based platforms are also easier to maintain (e.g., test administrators need to change norms only on one server versus multiple desktop PCs), they have a broader reach (e.g., global assessments), and they can seamlessly score and report results across a variety of diverse assessments.

Internet-age access and fairness concerns. The Internet, as applied to personnel testing and assessment, is radically changing the current landscape and even the future-scape of testing. This reflects factors such as 24 x 7 access, ease of use, and more profitable cost structures. In fact, the Association of Test Publishers has recently written professional guidelines for this class of technology-driven assessments (Harris, 2000).

Listed below are key logistical issues that need to be properly managed to ensure fairness with Internet-based testing (cf. Stanton, 1999):

> Protected subgroups of the population must have equal access to computer and Internet resources.
>
> The applicants' computer resources must be compatible with an organization's computer resources. One method to increase compatibility is through the use of Internet-ready test centers, especially for high-stakes testing.
>
> Fail-safe procedures are required for verifying an applicant's identity. This is obviously more important for high-stakes testing than for low-stakes testing such as taking a career interest inventory online.
>
> Security measures must be implemented to protect test item security following an online test administration.
>
> An applicant's test results that will ultimately reside in Internet-accessible databases must be protected.

Media-rich assessments via broadband delivery. Media-rich assessments are a slowly emerging megatrend, reflecting limitations of both broadband delivery requirements and test drivers. The most sophisticated type of media-rich item would be to immerse an applicant into a virtual reality (VR) simulation (cf. Adams, 2000). For instance, a nursing applicant's response to a VR-based surgery support simulation could be measured, scored, and then validated for personnel selection (or certification) purposes. A less sophisticated media-rich assessment needing broadband delivery might include Internet-based video clip simulations that require a scorable response from applicants. These media-rich assessments should be high in realism, face validity, and empirical validity.

Strategic data warehousing and mining. With HR lifecycle assessments (see below), companies can include in HR databases a broad range of test scores that can be statistically analyzed (i.e., mined) for strategic value. Of course, applicants and employees should be informed of this application of testing data, and their privacy rights should always be protected. However, "data miners" can analyze these HR databases to determine the knowledge, skills, abilities, and competencies that are statistically more likely to lend themselves to revenue growth, expense reductions, and increased profitability.

CONTENT-SPECIFIC MEGATRENDS

Certification testing programs. The certification testing market has experienced extraordinary growth in recent years, primarily because of the increased demand for skilled professionals (e.g., information technology professionals). For example, certification testing has been a major cornerstone of the technical worker self-development model that arguably has helped to reduce the shortage of technical professionals. Parenthetically, the shortage problem has not been completely reduced by certification testing. In fact, each year for the last several years Congress has agreed to allow over 500,000 IT professionals into the country to help with the high tech personnel shortage. Even this supplement leaves a sizeable need for the IT community. However, certification tests can still be used to document the skill sets of this addition of IT professionals.

Certification testing programs also provide individuals with credentials to obtain more secure and higher-paying jobs. In addition, certification testing is used to confirm that job applicants have the knowledge, skills, and competencies for increasingly dynamic jobs. Certification testing programs are especially relevant in tight labor markets, where the attention is as much on developing and retaining employees as it is on finding qualified job applicants. Finally, low stakes certification tests, that might measure general IT aptitude, can be administered to liberal arts majors. Candidates scoring favorably on these low stakes IT tests can then be changed to an IT track, leading to high stakes certification examinations, thus growing the IT applicant pool.

Twenty-first century testing constructs. Personnel testing has come a long way since the days of focusing exclusively on job-related knowledge, skills, and abilities. A major breakthrough occurred when industrial/organizational psychologists discovered that job-related personality constructs such as integrity, service orientation, and conscientiousness helped to statistically differentiate highly productive and dependable workers from counterproductive and irresponsible workers. Assessment constructs that have recently surfaced include emotional intelligence, technology readiness, and job loyalty, to name a few. I/O psychologists and psychometricians alike realize that innovative test measures are always well received by the marketplace as long as they are job related, valid, and fair and they lead to a clear strategic advantage.

HR lifecycle assessments. That professionally developed testing systems are more job related, valid, and fair than alternative selection procedures (e.g., scored application blanks, interviews, resume ratings) is well known. Well-developed personnel tests are also extremely cost and time efficient. Therefore, companies are finding they can save time and money, while increasing accuracy and fairness, if they administer tests and assessments across the entire HR lifecycle (i.e., from recruitment to retirement). For example, professionally developed tests can be used for prescreening and

recruitment, selection and placement, promotion and development, and even certification. An HR lifecycle assessment model, with its scientifically sound and standardized underpinnings, can benefit both the organization and the employees.

Technology-friendly tests and measures. As mentioned above, a dominant megatrend is the rapid proliferation of web-based assessments. A parallel and related trend is the need to convert traditional, paper-based tests into "technology-friendly" tests. Technology-friendly tests are needed when, for example, tests are to be administered via interactive voice response (IVR) systems or Internet-based platforms. The major challenge is to adapt the original test so that it is shorter, it has a lower reading level, its items have fewer response options, and, most important, it is adaptive to IVR and/or web administration. Such adaptation is needed to better control telephony costs and the quality of screen presentation. Fewer response options and lower reading levels are also needed for IVR administration. Most important, both the traditional, paper-based test and the technology-friendly derivative should be highly and significantly intercorrelated. Comparability studies are vital if paper-based tests converted into technology-friendly tests are to be considered valid and fair measures.

Impact studies and ROI analyses. Finally, a growing number of companies that are implementing workplace assessment programs want to move beyond validation studies and related utility analyses. That is, these companies still need validity and utility research, but they also want to know the actual impact that their personnel assessment programs have on revenue growth and bottom-line profit. The preferred research design in these situations is a time-series study that compares a stable, pretesting program phase against a posttesting phase of comparable duration. Advanced time-series statistical analyses can be used to show that the difference is statistically significant. Multiyear time-series analyses have analyzed monthly measures of turnover, service complaints, shrinkage, and accidents (e.g., Huff & Jones, 2000). Obviously, with posttesting program evaluation, an average reduction in losses is predicted. Impact studies can also focus on measures of revenue growth, profit margins, and even stock prices and dividend rates. One would hypothesize that increases in these metrics would be found after the implementation of a valid and reliable testing program. In brief, purchasers of corporate-wide testing programs want to gauge, within a smaller band of error, the impact of their testing programs on their company’s bottom line.

CONCLUSION

The brief literature review presented in this paper suggests that, although a few personnel testing megatrends are discussed in the professional literature, most are not. The reason

for this is twofold. First, most journals experience a lengthy publication lag-time that can range from 8 to 18 months. Second, academics, more often than practitioners, publish their research and perspectives in scientific journals. Unfortunately, the authors would argue, the practitioners are closer to the front line of applied testing than academics. In fact, the practitioners might be better able to identify emerging megatrends related to personnel testing as they apply their assessment technologies in the marketplace. This paper can help bridge the gap between the research literature and those emerging marketplace megatrends. In addition, it should help provide a basis for dialogue between I-O psychology practitioners and academics along with other professionals who are interested in becoming involved with cutting-edge testing applications and technologies.

In conclusion, this paper summarized 10 emerging megatrends that relate to testing technology and content issues. Five megatrends were classified as technocentric, and five were classified as content-specific. Technocentric themes were related to virtual career centers, integrated assessment platforms, media-rich assessments, data warehousing and mining, and a number of Internet-age access concerns. Content-specific trends were related to 21st century test constructs, certification testing, HR lifecycle assessments, technology-friendly tests, and bottom-line impact and ROI studies. That the personnel testing industry is keeping its hands on the pulse of the 2001 megatrends seems obvious, but history has repeatedly shown that another set of emerging megatrends is right around the corner. Therefore, to optimally adapt to a fast-moving marketplace, the test publishing community needs not only to provide professional guidance in addressing the 2001 megatrends but also to keep its attention on future megatrends.

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