

PES NEWS

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Computer-Based Testing Is It Right for You?

Computer-based testing (CBT) offers a variety of benefits to credentialing organizations, and many have successfully transitioned to CBT from paper-and-pencil administration. Yet, as established as the technology may be, no two credentialing organizations experience the transition in the same way.

This issue of *PES NEWS* offers some insight into the range of issues, both practical and strategic, that a credentialing organization faces in considering and ultimately navigating the transition to CBT. The first article offers a useful look at how a CBT feasibility study can help an organization to assess the value and viability of a move to CBT before beginning such a complex and costly transition.

The second article explores the impact that the transition to CBT has had on two successful credentialing organizations in terms of stakeholder reactions, candidate volume, program finances, operational issues, and security challenges.

Finally, our third article chronicles the step-by-step process taken by one credentialing organization to ensure the successful transition of its certification examinations from paper-and-pencil administration to CBT.

PES NEWS is published in support of PES's nonprofit mission to promote the public welfare by communicating and demonstrating the value of credentialing. Because our clients include licensure and certification sponsors across a broad range of professions, we are able to identify and report on the shared issues and common concerns of credentialing organizations. The newsletter highlights some of the practical solutions implemented by PES clients and other credentialing sponsors as they respond to changes in the credentialing environment. We hope you find the articles in this edition interesting and informative, and invite you to contact us at pesnews@proexam.org with your comments or questions.

I. Leon Smith, Ph.D.
President & CEO



P • E • S

60 years of pulling together . . . has set us apart.

Assessing the Feasibility of CBT Measure Twice and Cut Once

Transitioning a credentialing program from paper-and-pencil to computer-based testing (CBT) can offer many benefits to stakeholders, but there are potential drawbacks, including cost. A feasibility study is a useful way to assess the value and viability of a move to CBT before beginning such a complex and costly transition. Information obtained from the study can also be helpful in planning the steps needed to make a smooth transition. Moreover, a feasibility study provides a useful mechanism for involving stakeholders in the decision-making process and for achieving a consensus before moving forward with CBT.

The Board of Certification, Inc. (BOC) offers the only accredited credential for entry-level athletic trainers in the United States—the certified athletic trainer (ATC[®]) program. Its three-part examination process, comprising a multiple-choice test, a practical examination, and a simulation, is currently used by 38 states as one of the mechanisms for regulation. The BOC has been considering a move to CBT for several years, and in 2003 began working with PES on a feasibility study to assess the potential benefits and drawbacks of CBT.

Asked about the BOC's decision to conduct a feasibility study, Denise Fandel, Executive Director, said, "We were looking for an independent organization to take an outside look at our program and give us some objective data on which to make a decision about CBT. Because of the complexity of our examination process, we felt it was important for us to learn more about the options available and to hear the recommendations of disinterested experts." PES's work in conducting a feasibility study for the AICPA before its move to CBT persuaded the BOC to partner with PES to evaluate the feasibility of transitioning the ATC[®] program to computer.

Feasibility Methodology

Feasibility studies typically address a number of critical issues, in four main areas: stakeholder needs, psychometric viability, financial viability, and time frames.

Stakeholder Needs

PES works with sponsors to identify key stakeholder groups, including employers, educational program directors, and state regulators, as well as candidates. A number of methodologies are used, such as focus panels, phone interviews, and paper-based and online surveys, to identify stakeholder needs and concerns regarding CBT. For example, the study might evaluate candidate perceptions regarding possible fee changes and more frequent testing opportunities. For a licensure program, the study might also address the regulatory and policy changes that states will need to make to pave the way for CBT. Speaking about the BOC study, Fandel says, "The quality of the ATC[®] examination program is well established and not in question; rather it is whether CBT will meet the varied needs of our stakeholders."

Psychometric Viability

Item bank readiness is an important part of the feasibility study. For fixed-forms (linear) multiple-choice testing, a larger number of test forms are typically required for CBT, to control for the increased item exposure that results from more frequent test administration. Moreover, test items are often calibrated to an item response theory (IRT) model so that there is no delay in score reporting whenever a new form is administered: a move to CBT may therefore require pre-testing of test items and pre-equating of test forms.

PES assesses the feasibility of alternative models of CBT, such as linear multiple-choice, computer-adaptive testing, or computer-mastery testing, for the specific program being studied. PES determines whether the sponsor's item banks are adequate to support the models of CBT under consideration, and if not, what additional work needs to be done to prepare the banks for CBT. In addition, PES evaluates the sponsor's current item-writing and examination development procedures and determines what changes need to be made to support CBT. PES also works with sponsors to determine how many new items need to be pretested each year, to control for item exposure under CBT, and to consider whether the projected candidate volume is large enough to support this level of pre-testing.

In the case of the BOC, since the ATC[®] examination includes practical and simulation components, as well as a standard multiple-choice test, a key issue to be addressed in the feasibility study is what models of CBT would allow the BOC to assess the same skill sets that are currently assessed, and what the pros and cons are of these various models.

Financial Viability

Feasibility studies typically explore the initial capital outlay as well as the long-term, ongoing costs of a move to CBT. Initial set-up costs include:

- item bank preparation;
- software or hardware upgrades that the sponsor will need to make to its computer systems to manage CBT;
- set-up and pilot testing of the CBT delivery system;
- development, production, and dissemination of outreach materials to all stakeholders; and

- legal costs associated with the development, preparation, and negotiation of new contracts.

Ongoing costs include:

- item and test development activities to support CBT;
- pretesting of examination items and pre-equating of examination forms, if necessary;
- CBT network seat time, and related scheduling and delivery costs; and
- administrative changes that the sponsor will need to make to process ongoing test administrations and score reporting.

Is CBT right for you? Some questions to consider

Stakeholder needs

- Does CBT address the needs of stakeholders, including candidates, employers, educational institutions, and state regulators?
- Will your candidates pay the likely increased cost of CBT?

Psychometric viability

- Is your item bank large enough to develop a greater number of test forms, to control for increased item exposure?
- Are the items in your bank calibrated to IRT to facilitate prompt score reporting?
- Will your item-writing and examination assembly procedures support the ongoing need for larger numbers of test forms?
- Do you have procedures in place and the projected candidate volume to pretest examination items and pre-equate test forms on an ongoing basis?

Financial viability

- Does your organization have enough capital to support the one-time costs of moving to CBT, such as conducting a feasibility study, item bank preparation, in-house software and hardware upgrades, CBT network set-up and pilot testing, stakeholder outreach, and legal costs?
- Will your projected candidate volume generate enough revenue to support the ongoing costs of CBT, including the development of a larger number of test forms, CBT network seat time and related delivery costs, and the additional administrative costs of more frequent testing?
- Will your organization be able to manage any changes in cash flow that may result from a move to CBT? *Keep in mind that some credentialing organizations have seen a drop in candidate numbers following a move to CBT.*

This list assumes linear multiple-choice CBT and is not intended to be exhaustive. PES recommends that credentialing sponsors conduct a comprehensive study to assess the feasibility of a move to CBT.

Regarding the BOC study, Fandel emphasizes, “A potential increase in the costs of running the ATC[®] program must be considered in the context of the benefits that a move to CBT will offer to candidates and other stakeholders.” For example, the BOC’s current one-day testing program requires some candidates to travel long distances to reach a test center: under CBT, a large network of test sites will be available to certification candidates, reducing the need for this travel.

Time Frames

Feasibility studies also determine the steps and the time needed to make the transition to CBT, including the time required to prepare the sponsor’s item banks, and an appropriate lead time to educate stakeholders. Fandel argues, “It’s important to allow enough lead time for stakeholders to feel comfortable with a change from paper-and-pencil to CBT, so that candidates do not feel disadvantaged by any change in testing modality.”

BOC Deal Breakers

For the BOC feasibility study, PES will analyze the information collected to identify the “make and break” issues in relation to the specific concerns of stakeholders and the projected costs of CBT. PES will prepare a written report for BOC evaluating the feasibility of a move to CBT. According to Fandel, “PES will present its findings in a face-to-face meeting with the Board, which will have an opportunity to ask questions. We will then see if the Board is ready to make a decision or if it needs additional information.” The feasibility report will also include an implementation schedule identifying the key tasks and associated time frames if the BOC decides to adopt CBT.

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The Impact of Computer-Based Testing Fact and Fiction

The Association of State and Provincial Psychology Boards (ASPPB) and the National Board for Certification in Occupational Therapy, Inc. (NBCOT) both began offering their examinations on computer in 2001, through Prometric's network of 320 centers in North America and the U.S. Territories. This article examines the motivation behind each organization's decision to move to computer-based testing (CBT) and explores the impact the transition has had on their respective credentialing programs in terms of stakeholder reactions, candidate volume, program finances, operational issues, and security challenges. Taken together, these case studies show that the decision to move to CBT is a complicated, multilayered one, and that such a transition is likely to impact an organization and its examination program in both positive and negative ways.

Association of State and Provincial Psychology Boards

According to Amy Hilson, ASPPB's Associate Executive Officer, "When we began thinking about CBT in 1993, it seemed like it was the future of testing: it promised greater convenience for candidates, who would be able to test any time instead of just twice a year. It would also lighten the workload on state boards, and improve security." A number of years before, ASPPB had had exams stolen, forcing them to retire all the stolen items at great cost to the organization, so examination security was a priority. Below, we explore the impact on ASPPB's licensure program.

Finances

In planning for the transition to CBT, ASPPB's financial projections assumed stable candidate volume and an increase in development and administration costs, which were to be covered in part by an increase in candidate fees. When candidate volume dropped by 30 percent in the year of the transition, ASPPB was tested both financially and organizationally. Even with an increase in candidate fees, the

reduced candidate volume resulted in a 15 percent loss of revenues from examination activities in the first fiscal year after the transition to CBT.

Hilson notes, "It was fortunate that we had diversified streams of income, otherwise we would have been in a terrible fix. We cut back on all of our activities, and in the Spring of 2002 implemented an austerity budget." ASPPB not only cut back on travel and the costs of committee meetings, it also took steps to improve the efficiency of its examination development activities. These changes, combined with an increase in the number of continuing education workshops, and the revenues generated by a grandparenting process for ASPPB's Certificate of Professional Qualification in Psychology, which closed in 2001, helped to offset the drop in examination revenues.

Psychometrics

ASPPB moved to an IRT model in preparation for CBT and began pre-testing items in 2001 and pre-equating test forms in 2002. ASPPB was fortunate in having a very large item bank prior to moving to CBT, but the Examination Committee did

need a push to ensure adequate numbers of items in each area of the bank and to develop additional test forms for the first year of CBT. In subsequent years of CBT delivery, ASPPB has developed two new test forms a year, the same as it did for paper-and-pencil testing.

The organization has worked to improve the efficiency of its item-writing procedures to reduce item attrition. In addition, ASPPB is very targeted in its item development activities, focusing on areas of weakness in the item bank or emerging areas of practice. These changes have helped ASPPB to control its item development costs, and to offset the increased costs of pretesting and pre-equating examination forms.

Security

Hilson comments that, despite the promise of greater security under CBT, "We have found that there is more item exposure than ever before." Hilson explains, "CBT makes it easier to memorize test items; year-round testing, combined with the relative privacy of sitting in a cubicle, provide enhanced opportunities for candidates to memorize items." Hilson also notes that the Internet makes it easy for test takers to share information with others. As well as exploring the ways items are exposed, ASPPB is currently investigating a number of very low scores—lower than expected by chance—where candidates repeat the test multiple times. In addition, the CBT vendor videotapes examination rooms and ASPPB monitors Internet chat rooms.

Operations

Asked about the impact of CBT on operations, Hilson points out that with paper-and-pencil testing there is a lot of activity for 2 or 3 weeks before and for 2 to 3 weeks after an examination. With CBT offered all year round, that activity is spread out over 52 weeks. Overall, Hilson's assessment is that there is less work for

ASPPB: they have less contact with candidates, candidate complaints have gone down, and PES manages the relationship with the delivery vendor. Similarly, for state boards, under paper-and-pencil testing, they were responsible for setting up and proctoring test sites; with CBT, the delivery vendor has taken over these responsibilities. Hilson notes, however, that “Nothing has changed for the Examination Committee. Its work is the same as it was under paper-and-pencil testing.”

Stakeholders

According to Hilson, “We have received far fewer complaints. In general, CBT is more convenient for candidates and for member jurisdictions.”

Key Challenges

Asked about the challenges of the move to CBT, Hilson says, “With the increased development and administration costs that come with a transition to CBT, it’s important to have a firm understanding of your program’s projected candidate volume. By passing on some of that increase to our candidates, we were able to withstand the lower-than-expected testing revenue that resulted from our loss of candidate volume.” She goes on, “In our move to CBT, such contingency planning proved to be critical.”

National Board for Certification in Occupational Therapy, Inc.

NBCOT® initially began offering its two examination programs—Occupational Therapist Registered OTR® and Certified Occupational Therapy Assistant COTA®—on computer during four three-week windows, but since 2003 has moved to continuous on-demand testing. According to Paul Grace, NBCOT President and CEO, “Graduates from accredited OTR or COTA academic programs become eligible to test at

various times of the year. With the examinations being administered only twice a year at just over 60 established North American locations under paper-and-pencil testing, candidates had to wait for the next testing opportunity before being able to apply for a license to practice. This delay could affect job opportunities for new graduates. CBT offers greater convenience by providing continuous testing at a greater number of geographical locations. Successful candidates can secure employment quickly, and employers can fill critical openings in this in-demand profession.”

Stakeholders

Asked about the impact of the move to CBT, Grace comments, “The initial challenge revolved around getting all stakeholders on board. Students and academic programs were concerned about how CBT would work: How complicated was the testing procedure? Would they be able to go back and look at questions and change their answers? So an educational campaign was a strong priority for NBCOT.” Nevertheless, despite the initial anxiety, Grace points out that stakeholder reaction has been very positive, “Candidates like the flexibility to schedule the test whenever they want, and the jurisdictions like the more frequent access to score reports for temporary and permanent licensure decisions.”

Psychometrics

According to Grace, “The greatest ongoing impact has been in the area of examination development.” Under paper-and-pencil testing, NBCOT developed two new forms a year for each of its two examination programs. “With CBT we need to publish additional new examination forms each year to keep test forms fresh and to provide for more frequent retake candidates.” This adds considerably to the workload of the examination development committee.

In addition, with its move to CBT, NBCOT also began pretesting and pre-equating examination forms. With this model of testing, all new examination forms have known psychometric properties, and the passing point is established before test administration, so that NBCOT no longer has to wait to collect data on a large group of candidates before scoring new test forms. This also adds to the work of the examination development committee, whose members must develop pretest item blocks for administration in conjunction with regular test forms.

Finances

Asked about the impact CBT has had on NBCOT’s finances, Grace says, “CBT, as we provide it, is more expensive than semiannual paper-and-pencil test administration. However, the increase in cost is offset by the increase in convenience for candidates.” According to Grace, the net effect on NBCOT’s finances has been minimal, largely because when NBCOT transitioned to CBT, it raised its examination fees to cover the increased cost of testing on computer.

Security

Item exposure has proved to be an issue for NBCOT, as it has for ASPPB. Grace notes, “This is the ‘dark side’ of CBT. Because the examinations are made available over longer periods of time, we have found that some candidates share test items with subsequent test takers. NBCOT has hired private investigators to track down some candidates who were sharing examination items on the Internet.”

Advice to Others

Asked what advice he would give to other credentialing organizations considering a move to CBT, Grace offers, “Conduct an in-depth analysis to make sure this move is sound from a

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Steps to a Successful Transition

The Human Resource Certification Institute (HRCI) began offering its first credentials in 1976. Since then, the organization has certified more than 70,000 individuals. In May 2004, HRCI began administering its Professional in Human Resources (PHR) and Senior Professional in Human Resources (SPHR) examinations on computer at more than 250 sites in North America and 116 sites internationally. This article highlights the steps HRCI followed in ensuring a successful transition of its certification examinations to computer-based testing (CBT).

Feasibility Study

In June 2000, PES completed a study for HRCI, evaluating the feasibility of moving its two certification examinations to computer. Cornelia Springer, HRCI's Executive Director, comments, "For us, a feasibility study was the best way to validate that moving to CBT was the way to go. It confirmed that our candidate population was ready for a move to computer, and it helped us in the transition process by making sure that we had thought of everything we needed to do."

The study showed that two aspects of computer-based testing (CBT) were particularly attractive to candidates. First was the greater flexibility in examination scheduling offered by CBT, although candidates wanted to maintain the relationship between test preparation courses and test dates. HRCI therefore decided to offer two computer testing windows annually, each for a period of two months centered around existing test preparation courses. Second, candidates wanted faster score reporting. With CBT, HRCI has the ability to provide preliminary score reports at the test center, and will continue to provide official score reports 2 to 3 weeks later.

Item Bank Preparation

According to Springer, "In 2000 we thought we would move to CBT right away, but the feasibility study showed that we did not have the depth in our item bank that we needed." She adds, "It was a huge lesson for us: it's one thing if your candidates are asking for CBT, but you as the organization have to be ready to make that move." So, in 2000, HRCI began a push to prepare its item bank for CBT.

HRCI needed 50 percent more examination forms annually to support linear CBT in two administration windows a year. In 2001, HRCI and PES embarked on a two-year effort to expand HRCI's item pools to support the construction of additional test forms. HRCI also reorganized its banks and made changes to its item development and review procedures to improve efficiency. In addition, HRCI began pretesting an increased number of examination items and began calibrating all new and existing items based on item response theory (IRT). Springer notes, "The result of this two-year push was the development of approximately 1600 new items, which have all been pretested and calibrated to IRT, ready for CBT."

Selecting a Delivery Vendor

Selecting a delivery vendor is a key part of the transition process. With input from PES, HRCI developed a request for proposal (RFP) that was sent to a number of delivery vendors in October 2002. HRCI evaluated the submissions by drawing up a matrix of the pros and cons of each proposal, and based on this analysis, three vendors were invited to make a presentation to HRCI. A member of the PES staff also attended the presentations to give input on each vendor's proposed services. In November 2002, Prometric was selected as the delivery vendor, and HRCI, PES, and Prometric had their first kick-off meeting in April 2003. Under CBT, Prometric provides test administration services to HRCI, while PES continues to provide examination development, application processing, and scoring and score-reporting services.

"Highlighting the benefits of CBT helped to offset the negative impact of a 30 percent increase in candidate fees."

Educating Stakeholders

HRCI partnered with the professional association, the Society for Human Resource Management (SHRM), to conduct a comprehensive communication plan, as Springer notes, "so that stakeholders would know well in advance and have a chance to get used to the idea of CBT." HRCI's communication strategy targeted all stakeholder groups and focused on the benefits of CBT, including the number of

testing locations, the flexibility of dates and times, and immediate preliminary score reporting. Springer emphasizes, "Highlighting the benefits of CBT helped to offset the negative impact of a 30 percent increase in candidate fees."

HRCI conducted an intensive media relations effort through a series of press releases, numerous articles and advertisements in the professional press, and information posted on its and the SHRM websites, which featured hotlinks to the delivery vendor's site. HRCI also set up a demonstration booth at professional meetings to provide stakeholders with an opportunity to try out CBT. In addition, HRCI developed various printed materials, including a new candidate handbook. Finally, HRCI created customer service scripts to enable staff to respond to phone inquiries from candidates and other stakeholders.

"Make sure that your candidate population is ready to accept computer-based testing; some professions may be better suited to paper-and-pencil testing."

Project Management

HRCI hired a project management consultant to coordinate and manage the transition to CBT. The consultant was dedicated to the transition process and remained with HRCI through the end of the first CBT testing window in June 2004. Her role was to ensure that HRCI, PES and Prometric stayed on track with a comprehensive transition plan,

and to follow up on items, as deadlines approached or slipped. According to Springer, "No one on staff would have had the time to focus on making sure everything was covered: it's been great to have someone dedicated solely to this project, who can concentrate on all the details involved in a transition to CBT."

Pilot Testing

A month before CBT went live, some HRCI Board members conducted a BETA test to check the operation of the computerized testing process. The examinations were rolled out at specific test centers, and Board members acted as candidates and went through the testing process. The pilot study examined such elements as transfer of candidate eligibility data, candidate registration, examination delivery, conditions at the test center, scoring and reporting, and security procedures. According to Springer, "A BETA test is a good exercise in making sure there are no glitches, prior to the launch of CBT."

Advice to Others

Asked what advice she would give to others considering a move to CBT, Springer says, "Make sure your program can support CBT from a psychometric point of view; the item bank especially is a key area." She goes on, "Make sure that your candidate population is ready to accept computer-based testing; some professions may be better suited to paper-and-pencil testing. This is a very important issue to address." Springer also notes, "It's been helpful to have someone who can dedicate time to focus on staying with the transition plan and timeline; as a result, things have gone very smoothly for us." □

Assessing the Feasibility of CBT

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Advice to Others

Asked about the benefits of conducting a feasibility study, Fandel says, "There is an increased comfort level, a feeling that you've asked all the right questions and are making a decision based on objective information and the input of an independent third party." On the negative side, Fandel points out that such studies do take time, and they require staff and financial resources. However, she says, "It's better to measure twice and cut once. It's important to have all stakeholders in agreement before moving forward, and to build a plan for transitioning to CBT." In giving advice to others considering a move to CBT, Fandel suggests, "Talk to people who have walked the road and know where the potholes are, gather as many perspectives as you can, and look at both the successes and the failures." □

The Impact of Computer-Based Testing

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business, testing, and stakeholder relationship point of view." Grace also points out that CBT involves a different set of administration issues: "Don't expect test administration concerns to go away. Some, like name changes, will stay the same. However, you will trade some paper-and-pencil administration problems for different CBT administration problems: you may see computer crashes, monitor glare, or issues about ergonomics. Candidates may also have anxiety about whether they were given the full testing time, or their answers were properly recorded." □

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