

Applying Lessons Learned in Educational Score Reporting to Credentialing

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Abstract

Score reporting is among the most challenging aspects of test development. Recent work in test score reporting has primarily focused on educational score reports. Although credentialing agencies have also invested in improving their score reporting efforts, the quality of reports remains inconsistent. Advances achieved in reporting student performance related to performance levels have great relevance to reporting pass-fail decisions in credentialing. Similarly, the growing reliance in education on domain scores and diagnostic feedback corresponds to the needs of failing credentialing candidates to identify skill improvement areas prior to subsequent test administrations. This paper synthesizes recent findings in educational score reporting to identify emerging best practices applicable to credentialing (i.e., certification and licensure).

Introduction

The validity of score interpretations is a central and guiding tenet in test development. Validity is currently formally conceptualized as “the degree to which accumulated evidence and theory support specific interpretations of test scores entailed by proposed uses of a test” (AERA, APA, & NCME, 1999, p. 184). Throughout the test development process, the test developer must be mindful of the resulting validity of score interpretations based on the work being conducted (e.g., test development efforts, score report development/design, or examining the domain of interest). For example, as the domain is analyzed, it is critical to ensure that the entire and appropriate domain is being represented by the subject matter experts contributing to the process. If test scores are not supported with appropriate evidence to establish the validity of the proposed interpretations of the scores, then the scores literally have no meaning.

Score reporting is one of the most challenging aspects of test development that testing agencies face today; score reporting is where the “rubber meets the road” in relation to score interpretation and use. The process of reporting results to stakeholders is the final step in the testing process. If the scores are not provided in a manner illustrating their appropriateness, then the entire test development effort may be perceived as subpar, irrelevant, and/or inconsequential. In many ways, it is no longer enough to have a psychometrically sound instrument that provides a valid and reliable measure of examinee proficiency; summarily labeling test performance with a single scale score is not satisfactory either. As noted by Hambleton and Zenisky (2013):

Communicating test score information matters. Stakeholders want to know what scores are and what they mean. This places a significant responsibility on the shoulders of testing agencies to prioritize reporting on par with other test development activities, which in most cases may be a departure from practice, requiring a shift in how agencies view their relationship with examinees and score users. (p. 14)

Stakeholders, including the examinees themselves, want context for the scores received and increasingly seek information that connects the results to the purpose of the test and what the test purports to measure (Ryan, 2006).

As reporting scores and information about testing programs has gained importance with the increasing significance attached in many cases to test results, test development agencies must invest time and resources to create clear, user-friendly, descriptive, and accurate documents. Test development agencies must also create systems for providing this information to stakeholders that lead users to the proper interpretation of the test results. In educational contexts, audiences often consist of

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the examinees, their parents, educators, policymakers, and the public; for professional credentialing applications, stakeholders may include examinees, professional preparation programs, employers, the public, and the professional organizations themselves. At this time, it is important to note that the communications encompassed within the term “score reports” often refer to both a test performance record given to an individual and larger summaries of performance for groups of examinees (e.g., a class, a school, a state or jurisdiction, or a nation). In many cases—although not always—it should likewise be acknowledged that testing programs may be required to prepare multiple types of reports.

Communicating outcomes related to proficiency should be viewed as an interdisciplinary process requiring creativity and leadership, stakeholder involvement, rigorous methodological approaches, and ongoing evaluation of impact and use. Hambleton and Zenisky (2013) broadly advocate this strategy, which applies equally to reporting efforts for individuals and groups, through contexts and populations, and across dissemination methods from static report documents to powerful dynamic and analytic online tools.

Recent work in the area of test score reporting has primarily involved issues and concerns associated with educational score reports. The headlines-grabbing accountability mandates that accompanied the No Child Left Behind Act of 2001 place a premium on questions of K-12 student competence and the communication processes around disseminating information in that specific testing context. In credentialing, while several individual agencies have substantially invested in improving their score report documents (among them the American Institute of Certified Public Accountants, the National Board of Medical Examiners, and the Chartered Alternative Analyst Association), reporting documents in the credentialing industry as a whole remain a mixed bag of quality (from the perspectives of both information quality and utility).

The goal of this paper is to synthesize recent trends in research and practice in educational score reporting to identify the emerging best practices for individual score reports and how these advances apply to the realm of credentialing assessment. The explicitly stated purpose of credentialing examinations is to make pass-fail decisions regarding candidates. These decisions are aligned with the guiding purpose of the credentialing organization/agency in helping to ensure that individuals with the credential possess a specified level of proficiency in the given domain. Candidates with sufficient knowledge/skill within the domain will pass the exam and earn the credential (or complete that phase of the credentialing process). Candidates lacking sufficient knowledge/skill within the domain will fail the exam and not earn the related credential. Many credentialing agencies face a growing desire/requirement to provide feedback to failing candidates regarding where/how their skills were lacking. Current test development practices in credentialing are not typically aligned with this additional level of reporting; thus the validity of those additional scores (beyond global pass-fail decisions) can be questioned given the lack of support throughout the development process. Advances in reporting student performance on the basis of performance levels has great relevance to reporting pass-fail decisions in credentialing; the growing reliance in education on domain scores and diagnostic feedback corresponds to the needs of failing credentialing candidates to identify ways to target improvement of their skills for subsequent test administrations through descriptive score reporting.

Guiding Standards

Professional standards *should* guide all assessment activities within education, certification, licensure, and all assessment arenas. The *Standards for Educational and Psychological Testing* (AERA, APA, & NCME, 1999) are commonly used within education and psychology but are equally applicable to credentialing assessments. Additional standards familiar to testing agencies focused on educational assessment include the *Code of Professional Responsibilities in Educational Measurement* (NCME, 1995), and the *Code of Fair Testing Practices in Education* (*Code of Fair Testing Practices in Education*, 2004). Some organizations have developed their own standards and hold their testing programs accountable to these standards, such as the *ETS Standards for Quality and Fairness* (Educational Testing Service, 2002).

Credentialing agencies frequently reference and rely on additional professional standards that incorporate standards related to assessments. These additional standards include ISO 17024 (American National Standards Institute, 2003), the *Guidance on Psychometric Requirements for ANSI* (American National Standards Institute, 2004), and the *Standards for the Accreditation of Certification Programs* (National Commission for Certifying Agencies, 2004). Clearly credentialing agencies must weigh a great number of professional expectations to which they may be held accountable by candidates, employers, accrediting organizations, and the legal system. Ensuring compliance with all of these standards can be a daunting task for agencies.

A brief review of the overarching principles that guide reporting efforts independent of context, specifically the aforementioned professional standards, frames the current discussion. Numerous standards are relevant to reporting practices that agencies should integrate into their reporting processes. Given that not all agencies are aware of the scope and breadth of coverage, relevant standards are included in Appendix A and referenced throughout this paper. However, it should be noted that this listing is not exhaustive.

Literature Review, Best Practices, and Emerging Research

Beyond such standards, which clearly offer a perspective on establishing a conceptual framework for reporting, the development of score reports should begin with a consideration of the intended use of the scores (focusing on validity) and then from a practical perspective, a consideration of the kind of information to be included. As noted in Goodman and Hambleton (2004), individual score reports may include a range of elements such as overall measure of performance on the assessment, the type of information that is reported (e.g., scale score, percentiles and/or percentile rank, raw score, performance levels and descriptors, and subdomain scores), numerical and/or graphical representations of performance, information about score precision (e.g., standard error), and additional information to give context to scores (as in text-based descriptions, explanations of performance relative to defined and relevant comparison groups, information about the skills, knowledge, and abilities tested, and narrative summaries of performance).

In recent years, a significant outgrowth has occurred in actual reporting efforts as well as agencies' thinking about issues and trends in reporting, both in terms of practice and research. Below we summarize emerging research in the key areas where trends in educational reporting research and practice may have especial application in credentialing.

One critical aspect of these recent initiatives in reporting in education with application in credentialing is *context*. Context can mean many things, depending on the purpose of the test and the intended users of the data, but includes (and is not limited to) comparison to/between reference groups, diagnostic (educational context) or descriptive (credentialing context) performance data at the

subdomain or perhaps even item level, narrative descriptions of strengths and weaknesses, and/or performance level descriptions that elaborate on what examinees at different proficiency levels know and can do.

The reporting of performance levels and pass-fail decisions is among the information most critical to reporting in credentialing. Reporting of such decisions begins with the soundness of the performance classifications themselves. The focus here is most typically on a single pass-fail cut score, but some programs employ the use of multiple cut scores (e.g., the Certified Rehabilitation Counselor examination sponsored by the Commission on Rehabilitation Counselor Certification)¹. Within credentialing, multiple cut scores are most typically related to conjunctive scoring where a candidate must achieve a passing score on multiple components of the assessment to pass. In the field of educational assessments, multiple cut scores are most typically related to descriptions of various different performance levels (below standard, at standard, exceeds standard). Within all contexts, these multiple cuts are subject to the same scrutiny as a single pass-fail cut score.

While there are reporting issues unique to educational score reporting (e.g., informing parents or guardians of results), there are still many areas where the reports created within credentialing could benefit greatly from research involving educational score reporting practices. Based on the multiple sources of standards referenced in Appendix A, there are three main areas of focus for score reporting where emerging research in educational reports could transfer to credentialing: 1) report design processes, 2) report design (layout) and contents, and 3) report delivery. Clearly, all areas overlap to some degree with one another because the contents of the report are clearly intertwined with the design of the report. However, the discussion here attempts to take each element in turn to provide the reader with appropriate source material for each element. The remainder of this section begins with a review of the Hambleton and Zenisky report development model (within the Report Design Process), to set the context for these three report areas, and discusses each of these three areas in turn.

Report Design Processes

The first area in which recent research on score reporting in educational contexts may have relevance to credentialing is in the area of report design processes. Historically, reporting has been an under-resourced element of test development efforts across testing contexts (Hambleton & Zenisky, 2008), although this is changing. As greater weight is given to test results (whether those stakes be educational accountability, graduation, placement, or professional certifications), communication strategies around scores and other relevant data has likewise gained more attention. For test results to be used, they must be understood. Agencies are increasingly performing the work needed to create reports that are valued by and useful to stakeholders.

Clear and purposeful report development processes are likewise necessitated by professional standards, including AERA, APA, and NCME (1999), ANSI (2003), ANSI (2004), and NCCA (2004). These documents note that reports need to be appropriate for the recipient, provide appropriate interpretations, and provide an indication of the amount of error in reported scores. Of course, these design and development concerns must be balanced with operational realities, including cost/benefit considerations that are quite reasonable in testing applications (including credentialing).

Research that impacts score report development processes primarily concerns the area of how reports are conceptualized and constructed, from the outset. Rather than agencies making assumptions

¹ http://www.crc certification.com/pages/crc_exam_overview/120.php

about users, their levels of data and assessment literacy, and their data needs, report development activities are increasingly integrating opportunities for user input into report design.

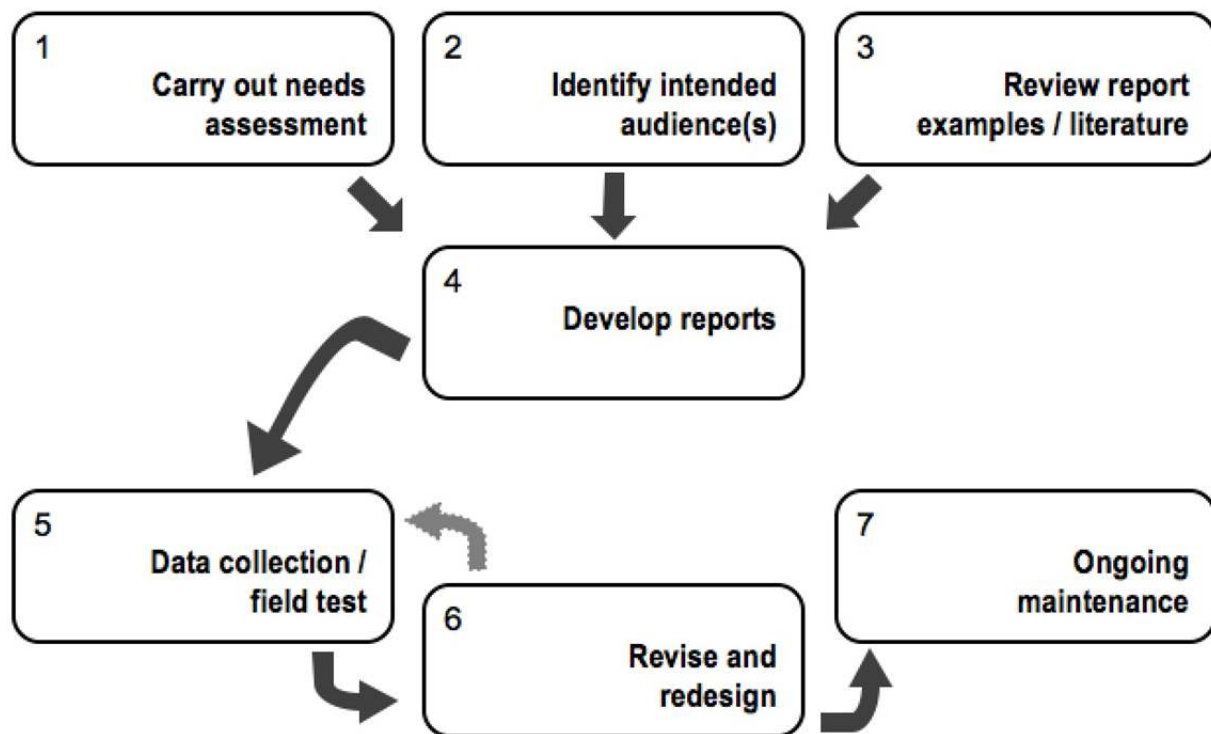
Turning to issues in reporting processes that are present in the credentialing context, Jaeger (2003) notes that, “Valid use of any assessment demands effective communication of its results and accurate interpretation of its findings” (p.37). Score reports are the medium for communicating assessment results. Effective communication of assessment results is the goal of every assessing agency. Yet, within credentialing, the score report typically receives very little consideration. The main goal of the score report is to simply communicate whether the candidate passed or failed the assessment, an indication of earning the credential (or successfully completing another step in the credentialing process) or not. Yet, based on the current variety of quality in existing score reports, it is clear that there needs to be more attention to score reporting in order to ensure that the work to provide evidence of validity throughout the rest of the test development process extends to reporting the scores.

Jaeger (2003) proposes a framework for determining “what to report, how to report it, and how to disseminate what is reported” (p.37), with a focus on considerations of the audience digesting the report and information. Within credentialing there are three primary audiences for test results: sponsoring agency, credential candidate, and employer of credentialed individuals. Although the specific information relevant to each group varies somewhat, the vast majority of score reports are aimed at providing information only to the candidate. Sponsoring agencies gather information through summary results of testing programs for specific exams, and employers access credential management systems, or rely on candidates to provide evidence of credentials.

Recent research on report development processes has suggested that it is necessary to separate out user groups and consider the needs of highly disparate groups separately; the underlying assumptions and prospective use cases vary considerably (Hambleton & Zenisky, 2013). This necessitates considering reports for individuals as a separate element of reporting from reports for groups of test-takers, and explicitly bringing in perspectives of users of each type of report at multiple points in report development processes, where applicable.

Hambleton and Zenisky (2012) propose a general approach to report development across testing contexts. This model was conceptualized as a flexible series of steps for agencies to consider in a deliberate process of developing test score reports. The model is rooted in the perspective that report development is a highly collaborative process, both in terms of a) soliciting input from stakeholders at multiple parts in the report development effort and b) integrating expertise from not just psychometricians, but also subject-matter experts, graphic designers, and information technology/systems personnel. A schematic representation of the model is given in Figure 1.

Figure 1. The Hambleton & Zenisky Model for Score Report Development (2012)



Briefly, this model begins with three steps that are largely focused on gathering data and information prior to any report development work. The background information is aimed at helping agencies develop an understanding of the context in which the reports will be used, and by whom. To this end, Hambleton and Zenisky advocate outreach with stakeholders to identify reporting needs, as well as consideration of reporting examples from relevant testing contexts.

With this data in hand, report development takes place. Again, Hambleton and Zenisky (2012) view this as a highly collaborative process, where individuals with different types of expertise have input in all aspects of report design.

The next phase of report development need not be extensive or involve a formal experimental design, but it can be valuable for agencies to obtain feedback on proposed reports from prospective users; this is the key point recommended by Hambleton and Zenisky. Obtaining feedback is also viewed as a continuous loop, where report development is iterative and observations are fed into the design process. The final step in this process is the idea of maintenance, concerned with how reports are received once released to the public and used over time. Zenisky (2013) reported on how to perform such research on reporting, in the context of an educational accountability test. However, the principles carry over across contexts.

The Hambleton and Zenisky (2012) model presented here is designed to elicit stakeholder feedback at multiple points in the development process; in that way, the model may be viewed as excessive or excessively rigid given the compressed timelines that are frequently present in credentialing applications. However, the model itself is not intended to be overly formal; rather, it proposes a broad framework for agencies to adapt and follow in a practical and usable sense. Hence the details matter less than the idea of instituting a process for gathering input. The underlying goal of

Hambleton and Zenisky (2012) is advancing validity, through enhancing the extent to which intended users understand test results and appropriate uses of test scores. The way to enhance such understanding is by soliciting user input.

In practice, the agency preparing for the development of score reports in a credentialing context may wish to allocate some time to a structured report development process, in which the relevant stakeholder groups are consulted to identify the types of score information sought as well as preferred strategies for report dissemination (i.e., paper versus online). This can occur alongside review of other reports (possibly publicly available or shared across agencies) across and within testing contexts. When moving on to report development, agencies may find it beneficial to bring in a range of expertise for actual report development, drawing on interdisciplinary knowledge to raise, discuss, and synthesize psychometric, aesthetic, and technical considerations. Then, the relevant stakeholder groups should be involved in some way, even in a small-scale feedback study, to identify potential interpretation and use issues. Once a satisfactory report is in hand, the reports can be released for operational use. After some period of time, feedback on the reports can be sought from users.

Zenisky (2013) documents the results of a survey specifically addressing the usefulness of score reports that were considered and designed within an iterative context. The reports were designed and modified based on feedback from users, and will continue to be modified over time based on feedback from users. The contents of the report are only useful if the report users understand the information being presented and are able to use that information appropriately.

Report Layout and Contents

For the purposes of this paper, report “design” involves the physical appearance and layout of the informational elements on the page—whether physical or increasingly virtual. Considerations of report contents include the informational elements that are contained on a report such as performance data (e.g., text, numerical, and graphical displays), test information (e.g., purpose, content), and personal demographic and background data. All of the professional guidelines noted in Appendix A include guidance to report developers indicating that substantial test-related information must be conveyed to test users and/or test takers. However, it is not always clear exactly *what* information should be provided, at what *level* the information is required/appropriate, or where/how such information must be provided (on the report or via a link to information on a website). This has been a sincere struggle within the credentialing arena. The resources available to the different credentialing agencies vary widely, including access to resources like psychometricians during the design of score reports.

The design and layout of score reports within educational contexts was the focus of the research by Goodman and Hambleton (2004). They noted that there were numerous designs and layouts in use and that most seemed to meet the intent of professional standards. However, they indicated five general areas of weakness:

1. *Information provided (both excessive and lacking)*: This area is an important topic in score reporting in the credentialing realm because the reports typically used in certification and licensure are focused on the primacy of the pass-fail determination. Report contents may reflect that aim to the near exclusion of other score data. However, report users, primarily individuals who do not pass, may have additional information needs and preferences that could be integrated into reports, depending on the program and the sufficiency of data to support such information. Hattie (2009) warns against providing too much information because providing information does not necessarily mean that users will interpret and use it correctly; that is an

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assumption. (Appendix B includes the different amounts and type of information provided across perfect score, pass, and fail reports for CompTIA, Inc. exams.)

2. *Lack of information about precision of scores (measurement error)*: The presence of error in test scores and the issues involved in reporting these errors is a topic that takes on added importance in credentialing because of the significance of the pass-fail determination. Recent work by Zwick, Zapata-Rivera, and Hegarty (2012) has looked into comparing graphical and verbal representations of error in test scores; these kinds of studies have natural relevance for reporting in the context of credentialing. Zwick, Zapata-Rivera, and Hegarty (2012) illustrate that the key is determining where and how to provide candidates and score users with the information regarding the degree of error, or lack of precision within the scores that are reported.
3. *Presence of unnecessary psychometric, statistical, or technical jargon*: When psychometricians are the report developers, the language used in the reports tends to be more technical than the intended user's level of understanding. In credentialing, while the intended audiences for reports are highly knowledgeable about the content, report developers should be mindful of the potential for over-reliance on psychometric terms and consider more neutral and/or accessible language.
4. *Lack of definition or interpretative materials for key terms*: Increasingly, in K-12 testing contexts, individual score reports are viewed as opportunities to establish and promote a dialogue with families and students. Part of this involves the inclusion of resources aimed at helping these users understand elements of reports. These resources include glossaries and links to curriculum materials. While the audience differs somewhat in credentialing, reports remain a key opportunity to connect with candidates and provide context and support for scores and score interpretations.
5. *Cluttered reports due to a lack of space and a large amount of presented information*: The physical arrangement of reporting elements on a page is a topic that has been somewhat under-researched in the area of reporting. Across reporting contexts there numerous examples of reports that are visually appealing and those that are not. This serves as a particularly useful example of a report design consideration that benefits from collaboration between psychometrics and graphic design.

Learning from these areas of weakness will help to ensure that credentialing bodies do not repeat the same errors.

In recent years, a significant amount of research has emerged related to the design and contents of score reports. While some of this work has primary application in K-12 testing, some work is also gaining more context within credentialing as more and more agencies seek accreditation by governing bodies. Below are a few topic areas within reporting of particular interest.

Historically, credentialing programs reported only global pass-fail decisions to candidates. Some credentialing agencies did not provide scores to candidates or other stakeholders, with the reports simply indicating Pass or Fail. As testing has evolved, credentialing agencies are under pressure to provide more information; as such, some agencies report raw scores, some report scale scores, and other agencies report percent correct scores. Frequently, the scores reported are not aided by interpretative information or guidance from a psychometrician.

There is also interest among stakeholders in credentialing to report subscores to candidates. Two main scoring models exist. In the conjunctive approach, each content element must be passed to earn an overall passing score. Second, in the compensatory model, the total overall score determines a

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candidate's pass-fail status. Compensatory models tend to be common in credentialing and allow candidates to compensate for weaker knowledge and skills in one aspect of content with strength in other areas. However, conjunctive models are appropriate when the profession (i.e., the credentialing agency, subject matter experts) has identified multiple elements that must be mastered for the credential to be earned. In these cases, there are additional considerations in the score reporting given the way that the subscores are used, and thus reported. Subscores are also desired as methods for providing additional feedback to candidates regarding relative strengths and weaknesses across areas of content to guide preparation for future exam attempts. Sometimes these subscores are viewed as diagnostic (although this designation is problematic without sufficient psychometric backing for the reliability and validity of the score); at other times, they are viewed simply as informative.

de la Torre and Douglas (2004) proposed higher-order latent trait modeling as a method for diagnostic subscore reporting indicating "these higher-order traits simultaneously afford a parsimonious model and express the concept of more general abilities affecting the acquisition of specific knowledge" (p.351). They further indicate "conjunctive models contrast with the formulation of most familiar models in item response theory and item factor analysis, in which compensatory models are most common" (p.351). This represents the struggles that the educational community has encountered in meaningful subscore reporting. The credentialing community needs to learn from these lessons regarding the use of conjunctive versus compensatory models and apply the knowledge prior to developing reported subscores within their assessments.

Haberman (2008) and Haberman and Sinharay (2010) examined the value and reporting of subscores. There is a large interest within credentialing to report subscores in order to provide candidates, especially those who fail the exam, with feedback regarding areas of strength and weakness. The NCCA (2004) standards (Standard 13 Essential Element C and Standard 14) require that candidates who fail the exam receive meaningful feedback regarding their performance and that reported scores are sufficiently reliable. Frequently, credentialing exams lack robustness within the items and the balance across forms at this level to meaningfully report scores at this level. Haberman (2008) provides empirical methodologies for determining the value of subscores relative to the total exam. These methodologies would be highly useful for credentialing agencies exploring the use of subscore reporting. Haberman and Sinharay (2010) applied multidimensional item response theory methods to operational data and found that subscores based on this methodology tended to be somewhat more accurate than scores obtained with classical test theory methods. It would be prudent to evaluate these methods with smaller samples, prior to application within credentialing, as Haberman and Sinharay (2010) included data from operational tests with between 2,154 and 31,001 examinees.

Report Delivery

For the purposes of this paper, report delivery concerns the mechanisms for reporting scores. Historically, report documents have been designed and conceptualized to be printed on 8.5" × 11" paper and mailed to candidates. Increasingly, reporting is occurring solely by means of secure online access. These are clearly two very different mediums of reporting, and reports need to be designed for presentation within their medium. If reports should be printable by any user, then reports geared towards that user must be able to be printed within the confines of standard paper sizes and with just black ink. If reports are designed to be interactive or only available online, then clearly color and size become different types of concerns. (The reports need to display properly across browsers, with varying size monitors and pixels, as well as varying color settings).

Given the emerging use (within educational contexts) of online score reporting, there is little research in this area. Zenisky and Hambleton (2013) present an overview of educational score reporting that is occurring via the Internet along with guidelines for assembling and maintaining online reporting resources. They follow the seven steps of the Hambleton and Zenisky method (Hambleton & Zenisky, 2013) with a specific focus on how online reporting enables the score user to be in charge of the types of information that they access, use, and interpret. Zenisky and Hambleton (2013) state that “Online reporting offers testing programs the opportunity to connect with stakeholders and communicate information in ways that more and more consumers of data have come to expect” (p.184).

In addition, many credentialing programs are interested in providing candidates information immediately after the test administration (i.e., at the testing center). This approach extends beyond much of what is occurring in education and requires additional considerations. Although scoring and evaluation of scores can be determined before test administration, the need to verify the proper interpretation of candidate performance may warrant further scrutiny after the administration. In such cases, programs may present these immediate score reports as “unofficial” or “preliminary” score reports to the candidates along with a timeframe by which the candidates’ scores will be reviewed and finalized internally.

Where Are We Now?

The current state of reporting within credentialing is varied. Some agencies provide top-notch reporting fully aligned with professional standards; other agencies are providing the bare minimum amount of information to candidates similar to the early days of simply communicating pass-fail determinations. There are agencies with sample reports available online, so that report users can access interpretative information easily. An example includes the National Council of Architectural Registration Boards (NCARB) Architect Registration Examination (ARE), available at http://ncarb.org/ARE/ARE-Portal/Score_Reports.aspx. NCARB provides interested parties with a PDF document “How to Read the New ARE Score Report”, along with information on the site regarding pass-fail status, how others (e.g., potential employers) would be able to access/verify a score, and information about the content areas included in the exam which corresponds with diagnostic information presented regarding failed areas. For users uninterested in exploring via a PDF document, there is still sufficient information on the site to explain the contents of the report and some basic interpretative information. The American Institute of CPAs (AICPA) provides a wealth of information regarding the psychometric underpinnings of the CPA exam along with how to read/interpret performance reports at:

<http://www.aicpa.org/BECOMEACPA/CPAEXAM/PSYCHOMETRICSANDSCORING/Pages/PsychometricsandScoring.aspx>. Explanatory material is contextualized with sample score reports and explanations provided at:

<http://www.aicpa.org/BECOMEACPA/CPAEXAM/PSYCHOMETRICSANDSCORING/Pages/PsychometricsandScoring.aspx>.

However, there are other agencies providing little or no interpretative information to score users and providing the most basic score information. An example is an agency that provides a report including the following pieces of information:

- Date report was posted/accessed
- Description of report (result for exam XXX)
- Testing center ID
- Exam series number
- Exam name

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- Exam date (date candidate took the exam)
- Grade (Pass or Fail)
- Mastery/Passing score (minimum score required to pass, cut score)
- Score (candidate's earned score)
- Exam history events (access of report and score information)

Note that only the final four bullet points are data that is test-related in nature, and the only context candidates receive from this report is the passing score against which their observed score is judged. With such little information provided to a candidate or score user in the way of context or feedback, the results are largely decontextualized. In this example, nothing on the reports offers candidates guidance about how (or where) to get more information or how to interpret the results beyond the immediate pass-fail determination. Clearly, a score report of this type would need significant work to become useful, meaningful, and aligned to professional standards. There are several possible approaches, but using the Hambleton and Zenisky (2013) method would provide an optimal starting place. With that model framing the discussion, a first step would be to define what would be useful and meaningful information for the different stakeholders and score users. The score report might be able to remain unchanged if additional supporting materials were developed, with materials aimed at the different score users (i.e., candidates, sponsoring agency, and employer).

Appendix B provides examples of three reports: Perfect (score), Pass, and Fail. These reports are available from CompTIA, Inc. and are generally aligned with professional standards. These reports provide information that would be useful across different score users. One element of additional information required by the standards would be inclusion or reference to information regarding psychometric characteristics of the reports (e.g., the error of measurement). This information could be easily added as a link to the appropriate website providing information for each exam. Table 1 provides a summary of the information that is contained on the reports. An "X" indicates that the information is not available on that particular report, while a checkmark indicates that the information is available. The information is also delineated as being related to the exam, the candidate, or general in nature. Some of the exemplary information contained would not be considered as important within educational reporting such as the inclusion of the candidate's picture (enabling score users to confirm that the individual presenting the report is the person named by the report). One element of information that is not directly referenced is more specific psychometric characteristics of the exam. However, this would be a relatively easy/minor addition with a link (the same manner that the exam blueprint is referenced).

Table 1. Information provided by report type

Information	Type	Perfect	Pass	Fail
Exam	Header with Exam Name Exam and Number	✓	✓	✓
	Name	✓	✓	✓
	Passing/Cut Score	✓	✓	✓
	Scaled Score Range	✓	✓	✓
	Location of Exam Objectives	X	✓	✓
Candidate	Photo	✓	✓	✓
	Name	✓	✓	✓
	ID Number	✓	✓	✓
	Registration Number	✓	✓	✓
	Date of Administration	✓	✓	✓
	Administration Site Number	✓	✓	✓
	Scaled Score	✓	✓	✓
	Pass/Fail Indication	✓	✓	✓
	Objectives with incorrect responses	X	✓	✓
General	Location of personal exam history/progress	✓	✓	✓
	Support	✓	✓	✓
	Retake policy	✓	✓	✓
	Paper certificates	✓	✓	X
	Viewing/Printing certificate online	✓	✓	X
	Pearson VUE™ information	✓	✓	✓
	Authentication information	✓	✓	✓

Conclusions

Reporting scores and other information about test performance to intended users is the end result of the test development process. Although scores are generated and reported after nearly all other development activities occur, the topic should not be de-prioritized (or worse, non-prioritized) by testing agencies, in any assessment context. The validity of the score interpretations must be the primary focus of any test development effort. As such, the scores and score reports must be considered throughout the development process. Score reporting therefore is where the rubber meets the road; if the score interpretations were not mindfully considered throughout development, the score reports will not be able to convey the intended meaning. Quality score reporting is based on making appropriate and mindful decisions early in the process to ensure that scores reflect the intended use or uses. In fact, communicating results to users should be viewed as an opportunity to connect with stakeholders and provide them with usable test score information. This information should highlight the quality and reliability of the test and reduce or avoid unintended or inappropriate interpretations of the results. To create well-designed, instructive reports, agencies must enter into a deliberate process that helps ensure validity and reflects the steps taken to create the assessments themselves.

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Appendix A: Guiding Standards

A brief review of the overarching principles that guide reporting efforts independent of context, specifically the professional standards, frames the current discussion. There are numerous standards relevant to reporting practices that agencies should integrate into their reporting processes. Given that not all agencies are aware of the scope and breadth of coverage, relevant standards are included here. This listing is not exhaustive.

Standards for Educational and Psychological Testing (AERA, APA, & NCME, 1999)

Deng and Yoo (2009) provide a comprehensive review of resources related to score interpretation, score reporting, test interpretation, and use of test scores. Given the current focus we limit our review to those standards specifically related to score reporting. Standards highlighted within the *Standards for Educational and Psychological Testing* (AERA, APA, & NCME, 1999) as reported by Deng and Yoo (2009) include:

- 5.11 / 6.12 / 12.15: Give more information for computer-generated interpretation
Standard 5.11: When computer-prepared interpretations of test response protocols are reported, the sources, rationale, and empirical basis for these interpretations should be available, and their limitations should be described. (p.65)
Standard 6.12: Publishers and scoring services that offer computer-generated interpretations of test scores should provide a summary of the evidence supporting the interpretations given. (p.70)
Standard 12.15: Those who use computer-generated interpretations of test data should evaluate the quality of the interpretations and, when possible, the relevance and appropriateness of the norms upon which the interpretations are based. (p.134)
- 7.5 / 11.20 / 12.19 / 13.7: Need of description and analysis of alternate explanations
Standard 7.5: In testing applications involving individualized interpretations of test scores other than selection, a test taker's score should not be accepted as a reflection of standing on the characteristic being assessed without consideration of alternate explanations for the test taker's performance on that test at that time. (p.82)
Standard 11.20: In educational, clinical, and counseling settings, a test taker's score should not be interpreted in isolation; collateral information that may lead to alternative explanations for the examinee's test performance should be considered. (p.117)
Standard 12.19: The interpretation of test scores or patterns of test battery results should take cognizance of the many factors that may influence a particular testing outcome. Where appropriate, a description and analysis of the alternative hypotheses or explanations that may have contributed to the pattern of results should be included in the report. (p.134)
Standard 13.7: In educational settings, a decision or characterization that will have major impact on a student should not be made on the basis of a single test score. Other relevant information should be taken into account if it will enhance the overall validity of the decision. (p.146)
- 7.2 / 7.8 / 13.19: For subgroups (gender, age, ethnicity, sample size & distribution)
Standard 7.2: When credible research reports differences in the effects of construct-irrelevant variance across subgroups of test takers on performance on some part of the test, the test should be used if at all only for those subgroups for which evidence indicates that valid inferences can be drawn from test scores. (p.81)

Standard 7.8: When scores are disaggregated and publicly reported for groups identified by characteristics such as gender, ethnicity, age, language proficiency, or disability, cautionary statements should be included whenever credible research reports that test scores may not have comparable meaning across these different groups. (p.83)

Standard 13.19: In educational settings, when average or summary scores for groups of students are reported, they should be supplemented with additional information about the sample size and shape or dispersion of score distributions. (p.149)

- 8.8: Categorical decisions to assign individuals

Standard 8.8: When score reporting includes assigning individuals to categories, the categories should be chosen carefully and described precisely. The least stigmatizing labels consistent with accurate representation should always be assigned. (p.88)

- 8.9: Confidentiality to report scores

Standard 8.9: When test scores are used to make decisions about a test takers or to make recommendations to a test taker or a third party, the test takers or the legal representative is entitled to obtain a copy of any report of test scores or test interpretation, unless that right has been waived or is prohibited by law or court order. (p.88)

- 9.5 / 10.11: Do not report flagged scores

Standards 9.5 and 10.11²: When there is credible evidence of score comparability across regular and modified tests or administrations, no flag should be attached to a score. When such evidence is lacking, specific information about the nature of the modification should be provided, if permitted by law, to assist test users properly to interpret and act on test scores. (p.98 and 108)

- 11.6 / 12.9 / 12.20 / 13.14 / 15.11: Format appropriate for recipient

Standard 11.6: Unless the circumstances clearly require that the test results be withheld, the test user is obligated to provide a timely report of the results that is understandable to the test taker and others entitled to receive this information. (p.114)

Standard 12.9: Professionals responsible for supervising group testing programs should ensure that the individuals who interpret the test scores are properly instructed in the appropriate methods for interpreting them. (p.132)

Standard 12.20: Except for some judicial or governmental referrals, or in some employment testing situations when the client is the employer, professionals should share test results and interpretations with the test taker. Such information should be expressed in language that the test taker, or when appropriate the test taker's legal representative, can understand. (p.135)

Standard 13.14: In educational settings, score reports should be accompanied by a clear statement of the degree of measurement error associated with each score or classification level and information on how to interpret the scores. (p.148)

Standard 15.11: When test results are released to the public or to policymakers, those responsible for the release should provide and explain any supplemental information that will minimize possible misinterpretations of the data. (p.169)

² Both standards have identical language. Standard 9.5 is contained in a chapter focused on testing individuals of diverse linguistic backgrounds, whereas Standard 10.11 is contained in a chapter focused on testing individuals with disabilities.

- 13.16: Date of test administration and the age of any norms to interpret report
Standard 13.16: In educational settings, whenever a test score is reported, the date of test administration should be reported. This information and the age of any norms used for interpretation should be considered by test users in making inferences. (p.149)
- 13.17 / 15.3 / 15.4: Definition of score & technical support need to use of gained score
Standard 13.17: When change or gain scores are used, such scores should be defined and their technical qualities should be reported. (p.149)
Standard 15.3: When change or gain scores are used, the definition of such scores should be made explicit, and their technical qualities should be reported. (p.167)
Standard 15.4: In program evaluation or policy studies, investigators should complement test results with information from other sources to generate defensible conclusions based on the interpretation of test results. (p.167)

Additionally, Standards 1.10 and 5.10 from AERA, APA, and NCME (1999) are presented below. Although the context is framed as educational testing, the underlying guidance across assessment is universal:

Standard 1.10: When interpretation of performance on specific items, or small subsets of items, is suggested, the rationale and relevant evidence to support such interpretations should be provided. (p.19)

Standard 5.10: When test score information is released to students, parents, legal representatives, teachers, clients, or the media, those responsible for testing programs should provide appropriate interpretations. The interpretations should describe in simple language what the test covers, what scores mean, the precision of the scores, common misinterpretations of test scores, and how scores will be used. (p.65)

Code of Professional Responsibilities in Educational Measurement (NCME, 1995)

Standards for test developers and related to informing test takers highlighted within the *Code of Professional Responsibilities in Educational Measurement (NCME, 1995)* as reported by Deng and Yoo (2009) include:

- 6.1 Conduct these activities in an informed, objective, and fair manner within the context of the assessment's limitations and with an understanding of the potential consequences of use.
- 6.2 Provide to those who receive assessment results information about the assessment, its purposes, its limitations, and its uses necessary for the proper interpretation of results.
- 6.3 Provide to those who receive score reports an understandable written description of all reported scores, including proper interpretations and likely misinterpretations.
- 6.4 Communicate to appropriate audiences the results of the assessment in an understandable and timely manner, including proper interpretations and likely misinterpretations.
- 6.5 Evaluate and communicate the adequacy and appropriateness of any norms or standards used in the interpretation of assessment results.
- 6.6 Inform parties involved in the assessment process how assessment results may affect them.
- 6.7 Use multiple sources and types of relevant information about persons or program whenever possible in making educational decisions.

6.8 Avoid making, and actively discourage others from making, inaccurate reports, unsubstantiated claims, inappropriate interpretations, or otherwise false and misleading statements about assessment results.

6.9 Disclose to examinees and other whether and how long the results of the assessment will be kept on file, procedures for appeal and rescoring, rights examinees and others have to the assessment information, and how those rights may be exercised.

6.10 Report any apparent misuses of assessment information to those responsible for the assessment process.

6.11 Protect the rights to privacy of individuals and institutions involved in the assessment process.

Code of Fair Testing Practices in Education (Code of Fair Testing Practices in Education, 2004)

Standards for test developers and related to informing test takers highlighted within the *Code of Fair Testing Practices in Education (Code of Fair Testing Practices in Education, 2004)* as reported by Deng and Yoo (2009) include:

For test developers: test developers should report test results accurately, and provide information to help test users interpret test results correctly.

C-1. Provide information to support recommended interpretations of the results, including the nature of the content, norms or comparison groups, and other technical evidence. Advise test users of the benefits and limitations of test results and their interpretation. Warn against assigning greater precision than is warranted.

C-2. Provide guidance regarding interpretations of results for test administered with modifications. Inform test users of potential problems in interpreting test results when test or test administration procedures are modified.

C-3. Specify appropriate uses of test results and warn test users of potential misuses.

C-4. When test developers set standards, provide the rationale, procedures, and evidence for setting performance standards or passing scores. Avoid using stigmatizing labels.

C-5. Encourage test users to base decisions about test takers on multiple sources of appropriate information, not on a single test score.

C-6. Provide information to enable test users to accurately interpret and report test results for groups of test takers, including information about who were and who were not included in the difference groups being compared, and information about factors that might influence the interpretation of results.

C-7. Provide test results in a timely fashion and in a manner that is understood by the test taker.

C-8. Provide guidance to test users about how to monitor the extent to which the test is fulfilling its intended purposes.

For test takers: test developers or test users should inform test takers about the nature of the test, test takers rights and responsibilities, the appropriate use of scores, and procedures for resolving challenges to scores.

D-1. Inform test takers in advance of the test administration about the coverage of the test, the types of question formats, the directions, and appropriate test-taking strategies. Make such information available to all test takers.

D-2. When a test is optional, provide test takers or their parents/guardians with information to help them judge whether a test should be taken—including indications of any consequences that may result from not taking the test (e.g., not being eligible to compete for a particular scholarship)—and whether there is an available alternative to the test.

D-3. Provide test takers or their parents/guardians with information about rights test takers may have to obtain copies of tests and completed answer sheets, to retake tests, to have tests rescored, or to have scores declared invalid.

D-4. Provide test takers or their parents/guardians with information about responsibilities test takers have, such as being aware of the intended purpose and uses of the test, performing at capacity, following directions, and not disclosing test items or interfering with other test takers.

D-5. Inform test takers or their parents/guardians how long scores will be kept on file and indicate to whom, under what circumstances, and in what manner test scores and related information will or will not be released. Protect test scores from unauthorized release and access.

D-6. Describe procedures for investigating and resolving circumstances that might result in canceling or withholding scores, such as failure to adhere to specified testing procedures.

D-7. Describe procedures that test takers, parents/guardians, and other interested parties may use to obtain more information about the test, register complaints, and have problems resolved.

ISO 17024 (American National Standards Institute, 2003)

ISO 17024 provides guidance specific to score reporting within Standard 6.2.4: The certification body shall adopt reporting procedures that ensure the performance and results of the evaluation are documented in an appropriate and comprehensive manner, including the performance and results of examinations.

Guidance on Psychometric Requirements for ANSI (American National Standards Institute, 2004)

The *Guidance on Psychometric Requirements for ANSI* indicates in 5.1

Level of Detail: Guidance: Each score reported that is associated with a pass-fail standard should be based on a sufficient number of items to attain a high level of reliability (internal consistency and decision-related) and validity. Sub-scores or partial scores should be linked to the test content outline or other document that provides the content structure for the test. If scaled scores are reported, candidates should have access to an interpretative explanation.

Implications: Adequate reliability and content validity are essential to ensure that results can be interpreted as intended, and that interpretations are appropriate to the structure of the test content and professional practice or job.

Standards for the Accreditation of Certification Programs (National Commission for Certifying Agencies, 2004)

The NCCA includes specific standards that require defensible and sound processes for score reporting.

Standard 12 states: The certification program must set the cut score consistent with the purpose of the credential and the established standard of competence for the profession, occupation, role, or skill.

Standard 13 states: The certification program must document the psychometric procedures used to score, interpret, and report assessment results.

Essential Element C states: Candidates must be provided meaningful information on their performance on assessment instruments. Such information must enable failing candidates to benefit from the information and, if psychometrically defensible, understand their strengths and weaknesses as measured by the assessment instruments.

Commentary B further indicates: The certification program should publish an explanation of the appropriate uses and misuses of reported score information.

Standard 14 states: The certification program must ensure that reported scores are sufficiently reliable for the intended purposes of the assessment instruments.

Within Essential Element A stating: Certification programs must provide information to indicate whether scores (including any subscores) are sufficiently reliable for their intended uses, including estimates of errors of measurement for the reported scores. Information must be provided about reliability or consistency of pass/fail decisions. When appropriate, information should be provided about the standard error of measurement or similar coefficients around the cut score.

Commentary B further indicates: The certification program should publish an explanation of the appropriate uses and misuses of reported score information.

Appendix B: Example Reports

The reports on the following pages were provided as examples by CompTIA, Inc. and included with their permission. These reports meet the essence of the professional standards. While it would not be expected to find examples of perfect score reports, these reports provide appropriate models for review.

The first report illustrated is an example of the report provided to candidates with a perfect score on the exam. The second report illustrates a passing, but not perfect score. The third illustrates a failing score. The information contained on these reports was summarized in Table 1.

Report for a Perfect Score



CompTIA A+ Certification Exam Score Report 000-000

CANDIDATE: Candidate Name
CANDIDATE ID: XXXX
REGISTRATION NUMBER: XXXXXXXX
EXAM: CompTIA A+ Certification Exam
DATE: 10/29/13
SITE NUMBER: XXXXXX
PASSING SCORE: 675
CANDIDATE SCORE: 900
PASS/FAIL: Pass

The CompTIA A+ Certification Exam has a scaled score between 100 and 900.

Requesting a Paper Certificate:

You can request your certificate only after you have passed BOTH required A+ exams. Carefully review the following steps to ensure proper delivery of your paper certificate.

1. Please allow **5 business days** after you've taken your CompTIA A+ Certification Exam, then login at www.certmetrics.com/comptia/login.aspx using your CompTIA user name and password (you will be prompted to create this on your first login).
2. Locate your exam record, and carefully review your first and last name and all of your demographic information for accuracy:
 - a. If all the information is correct, please move on to Step 3.

- b. If your name is NOT correct, DO NOT CLICK ON THE SUBMIT BUTTON. Instead, please click "SUPPORT" located on the top right corner of your screen and you will be linked to the CompTIA Customer Support Center. Click on "SUBMIT A TICKET", then select the ticket type "NAME CORRECTIONS/CHANGES" and provide the required corrections / legal documentation.
 - c. If any of your other demographics are incorrect, please make the correction to your record and move on to Step 3.
 3. Once all information is correct, press the submit button. By clicking on the submit button, you are confirming that all of your demographic information is correct and authorizing CompTIA to print and ship your paper certificate. Once CompTIA has received your authorization, CompTIA will generate your certificate, which should be delivered to you via mail within eight weeks after completing this process online.

Track your Exam History/Current Progress Online:

To access your exam history, update your demographics or verify certificate status, login at: www.certmetrics.com/comptia/login.aspx. Please allow five business days for your CompTIA web record to be updated with exam results.

View/Print Your Certificate Online:

To download a PDF of your CompTIA certificate:

1. Login at www.certmetrics.com/comptia/login.aspx
2. Click on "CERTIFICATIONS" tab.
3. On the far right, under the "DOWNLOADS" column, there is a PDF link for each earned certificate.
4. Click on a link to begin a download of the PDF file.

Support

If you have questions regarding this score report or your certificate, login at www.certmetrics.com/comptia/login.aspx, and click on "SUPPORT."

CompTIA Retake Policy

In the event you have passed the CompTIA A+ Certification Exam, you shall be required to wait for a period of twelve (12) calendar months before retaking the CompTIA A+ Certification Exam, unless CompTIA has changed the test objectives for the exam.

In the event you have failed the CompTIA A+ Certification Exam, CompTIA does not require any waiting period between the first (1st) and second (2nd) attempt to pass such examination. However, before your third (3rd) attempt or any subsequent attempt to pass such examination, you shall be required to wait for a period of at least fourteen (14) calendar days from the date of your last attempt to pass such exam. CompTIA beta Certification exams may only be taken one (1) time by each candidate.

If it is determined that you have violated CompTIA's retake policy, you may not be eligible to register and/or schedule any CompTIA certification examination for a minimum period of twelve (12) calendar months from the date of such determination, if determined necessary or appropriate by CompTIA.

DO NOT LOSE THIS REPORT

Thank you for choosing Pearson VUE!™

This examination was delivered at a Pearson VUE Authorized Center. For all your CompTIA testing needs, please contact your local Pearson VUE Authorized Center or visit our World Wide Web site at

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Or call...

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877-551-7587

Canada

877-551-7587

United Kingdom

0800-731-9905

For phone numbers not listed, visit the above web site.

You Can Authenticate This Score Report Using Pearson VUE's Digital Embosser!

Registration Number: XXXXXXXX

Validation: XXXXXXXX

To maintain the integrity of this testing program and the value of your certification, Pearson VUE introduces Digital Embossing! Digital Embossing eliminates the possibility of unauthorised embossing of counterfeit score reports. To authenticate this score report, go to www.pearsonvue.com/authenticate.

Report for a Passing Score



CompTIA A+ Certification Exam Score Report 000-000

CANDIDATE:	Candidate Name
CANDIDATE ID:	XXXXX
REGISTRATION NUMBER:	XXXXXXXXXX
EXAM:	CompTIA A+ Certification Exam
DATE:	10/29/13
SITE NUMBER:	XXXXXX
PASSING SCORE:	675
CANDIDATE SCORE:	822
PASS/FAIL:	Pass

The CompTIA A+ Certification Exam has a scaled score between 100 and 900.

You incorrectly answered one or more questions in the following objective areas:

- 1.2 Differentiate between motherboard components, their purposes, and properties.
- 1.9 Evaluate and select appropriate components for a custom configuration, to meet customer specifications or needs.
- 2.6 Install, configure, and deploy a SOHO wireless/wired router using appropriate settings.

For a complete listing of CompTIA A+ Certification Exam objectives, please visit certification.comptia.org.

Requesting a Paper Certificate:

You can request your certificate only after you have passed BOTH required A+ exams. Carefully review the following steps to ensure proper delivery of your paper certificate.

1. Please allow 5 business days after you've taken your CompTIA A+ Certification Exam, then login at www.certmetrics.com/comptia/login.aspx using your CompTIA user name and password (you will be prompted to create this on your first login).

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2. Locate your exam record, and carefully review your first and last name and all of your demographic information for accuracy:
 - a. If all the information is correct, please move on to Step 3.
 - b. If your name is NOT correct, DO NOT CLICK ON THE SUBMIT BUTTON. Instead, please click "SUPPORT" located on the top right corner of your screen and you will be linked to the CompTIA Customer Support Center. Click on "SUBMIT A TICKET", then select the ticket type "NAME CORRECTIONS/CHANGES" and provide the required corrections / legal documentation.
 - c. If any of your other demographics are incorrect, please make the correction to your record and move on to Step 3.
3. Once all information is correct, press the submit button. By clicking on the submit button, you are confirming that all of your demographic information is correct and authorizing CompTIA to print and ship your paper certificate. Once CompTIA has received your authorization, CompTIA will generate your certificate, which should be delivered to you via mail within eight weeks after completing this process online.

Track your Exam History/Current Progress Online:

To access your exam history, update your demographics or verify certificate status, login at: www.certmetrics.com/comptia/login.aspx. Please allow five business days for your CompTIA web record to be updated with exam results.

View/Print Your Certificate Online:

To download a PDF of your CompTIA certificate:

1. Login at www.certmetrics.com/comptia/login.aspx
2. Click on "CERTIFICATIONS" tab.
3. On the far right, under the "DOWNLOADS" column, there is a PDF link for each earned certificate.
4. Click on a link to begin a download of the PDF file.

Support

If you have questions regarding this score report or your certificate, login at www.certmetrics.com/comptia/login.aspx, and click on "SUPPORT."

CompTIA Retake Policy

In the event you have passed the CompTIA A+ Certification Exam, you shall be required to wait for a period of twelve (12) calendar months before retaking the CompTIA A+ Certification Exam, unless CompTIA has changed the test objectives for the exam.

In the event you have failed the CompTIA A+ Certification Exam, CompTIA does not require any waiting period between the first (1st) and second (2nd) attempt to pass such examination. However, before your third (3rd) attempt or any subsequent attempt to pass such examination, you shall be required to wait for a period of at least fourteen (14) calendar days from the date of your last attempt to pass such exam. CompTIA beta Certification exams may only be taken one (1) time by each candidate.

If it is determined that you have violated CompTIA's retake policy, you may not be eligible to register and/or schedule any CompTIA certification examination for a minimum period of twelve (12) calendar months from the date of such determination, if determined necessary or appropriate by CompTIA.

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Or call...

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877-551-7587

Canada

877-551-7587

United Kingdom

0800-731-9905

For phone numbers not listed, visit the above web site.

You Can Authenticate This Score Report Using Pearson VUE's Digital Embosser!

Registration Number: XXXXXXXXXX

Validation: XXXXXXXXXX

To maintain the integrity of this testing program and the value of your certification, Pearson VUE introduces Digital Embossing! Digital Embossing eliminates the possibility of unauthorised embossing of counterfeit score reports.

To authenticate this score report, go to www.pearsonvue.com/authenticate.

Report for a Failing Score



CompTIA A+ Certification Exam Score Report 000-000

CANDIDATE: Candidate Name
CANDIDATE ID: XXXXX
REGISTRATION NUMBER: XXXXX
EXAM: CompTIA A+ Certification Exam
DATE: 10/29/13
SITE NUMBER: XXXXXXX
PASSING SCORE: 675
CANDIDATE SCORE: 100
PASS/FAIL: Fail

Before attempting to retake the CompTIA A+ Certification Exam, please review the CompTIA Retake Policy below.

The CompTIA A+ Certification Exam has a scaled score between 100 and 900.

You incorrectly answered one or more questions in the following objective areas:

- 1.1 Configure and apply BIOS settings.
- 1.10 Given a scenario, evaluate types and features of display devices.
- 1.11 Identify connector types and associated cables.
- 1.12 Install and configure various peripheral devices.
- 1.2 Differentiate between motherboard components, their purposes, and properties.
- 1.3 Compare and contrast RAM types and features.
- 1.4 Install and configure expansion cards.
- 1.5 Install and configure storage devices and use appropriate media.
- 1.6 Differentiate among various CPU types and features and select the appropriate cooling method.
- 1.7 Compare and contrast various connection interfaces and explain their purpose.
- 1.8 Install an appropriate power supply based on a given scenario.

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- 1.9 Evaluate and select appropriate components for a custom configuration, to meet customer specifications or needs.
- 2.1 Identify types of network cables and connectors.
- 2.10 Given a scenario, use appropriate networking tools.
- 2.2 Categorize characteristics of connectors and cabling.
- 2.3 Explain properties and characteristics of TCP/IP.
- 2.4 Explain common TCP and UDP ports, protocols, and their purpose.
- 2.5 Compare and contrast wireless networking standards and encryption types.
- 2.6 Install, configure, and deploy a SOHO wireless/wired router using appropriate settings.
- 2.7 Compare and contrast Internet connection types and features.
- 2.8 Identify various types of networks.
- 2.9 Compare and contrast network devices, their functions, and features.
- 3.1 Install and configure laptop hardware and components.
- 3.2 Compare and contrast the components within the display of a laptop.
- 3.3 Compare and contrast laptop features.
- 4.1 Explain the differences between the various printer types and summarize the associated imaging process.
- 4.2 Given a scenario, install and configure printers.
- 4.3 Given a scenario, perform printer maintenance.
- 5.1 Given a scenario, use appropriate safety procedures.
- 5.2 Explain environmental impacts and the purpose of environmental controls.
- 5.3 Given a scenario, demonstrate proper communication and professionalism.
- 5.4 Explain the fundamentals of dealing with prohibited content/activity.

For a complete listing of CompTIA A+ Certification Exam objectives, please visit certification.comptia.org.

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