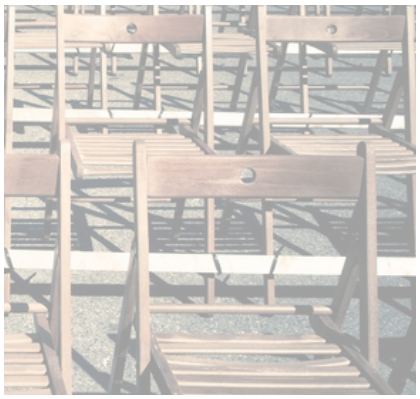
National Council on Teacher Quality

WHAT TEACHER PREPARATION PROGRAMS TEACH ABOUT K-12 ASSESSMENT: A review

May 2012







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Preface

This report provides information on the preparation provided to teacher candidates from teacher training programs so that they can fully use assessment data to improve classroom instruction. It follows a similar shorter report we released in March 2012.[1] In this newest report, we have significantly expanded our initial sampling to encompass 180 undergraduate and graduate programs housed in 98 institutions in 30 states.[2]

In early 2013, with U.S. News & World Report as the publisher, we will release a comprehensive review of all teacher preparation programs in the United States. That review will also include further analysis of teachers' preparation in use of assessment for instructional improvement.

Our purpose with both preliminary reports is to encourage teacher preparation programs, along with the federal and state agencies supporting and overseeing these programs, to focus more on the importance of future teachers' knowledge and skills in the increasingly critical area of assessment.

1 http://www.nctq.org/p/edschools/docs/assessment_publication.pdf

2 Institutions included in the sample are listed in Appendix 1. Of the 180 programs, 87 (48 percent) are elementary (84 percent undergraduate and 16 percent graduate) and 93 (52 percent) are secondary (74 percent undergraduate and 26 percent graduate).

Introduction

Why teacher knowledge of assessment is critical

Judging from some of the debates on the use of data in schools, one might think that the only reason for prospective teachers to learn how to interpret student performance data is to interpret the standardized tests that are mandated by states and the federal government.[3] The imperative for teachers to be able to use data should not, however, be limited to such tests. Data from assessments of all kinds have always been central to good instructional practice. Effective instruction requires that teachers have a well grounded sense of student proficiency in order to make a daunting number of instructional decisions, such as making snap judgments in the midst of interactions with students, and planning lessons, be they for the next day, the next unit or the entire school year. Setting aside many of the 1,200 or so instructional decisions teachers make on average each day ("Has this student sufficiently mastered the material so that he can work independently until recess?" "What question can I pose that will get the guys in the back row to perk up?"), the number of instructionally *significant* decisions made daily is about 60 ("Which topics should I include on the unit test?").[4]

Teachers have always needed a firm grasp of their students' understanding to make appropriate instructional decisions. Many of the first signals attuned teachers pick up on are not the result of any assessment. A teacher needs to be alert to the less tangible indications that students are not grasping new material, from a furrowed brow to "acting out." That knowledge must be combined with more tangible information gleaned from assessments in the form of spontaneous questioning, homework assignments, quizzes, tests or state-mandated assessments. From informal oral checks to computer-administered tests, assessment provides the basis for instructional decisions, making it critical even in

3 This report does not touch on the need for teachers to understand the use of student performance data in evaluating their own performance, but that understanding is also critical.

4 Hosp, J. L (December 2010). *Linking assessment and instruction: Teacher preparation and professional development. A TQ connection issue paper on improving student outcomes in general and special education.* Washington, DC: National Comprehensive Center for Teacher Quality. (Access at: http://www.tqsource.org/pdfs/TQ_IssuePaper_AssessInstruct.pdf)

the absence of "high stakes" standardized tests.[5] Further, the use of frequent assessments is a hallmark of the teaching profession in countries whose students outperform our own.[6] For example, Finland — cited often for a variety of educational features, among them a dearth of standardized testing — trains teachers to use classroom assessment with a high level of sophistication.[7] Moreover, several recent studies suggest that assessment itself appears to enhance learning through strengthened memory representation.[8]

The new focus on "*data driven instruction*"

"Data driven instruction" represents a more organized and collaborative commitment to use data from a variety of assessments and other sources in order to develop or adjust instruction.

While any teacher who casually peruses quiz results and then decides to re-teach a concept could be described as "using data to drive instruction," that phrase has taken on new meaning in this era of increased school accountability. "Data driven instruction" represents a more organized and collaborative commitment to use data from a variety of assessments — as well as information on student attendance, student engagement, demographics, attendance and school climate — in order to develop or adjust instruction.

Districts may vary in their organizational commitment to data driven instruction, but it is clear that teachers increasingly find themselves not just working in isolation to divine the instructional implications of assessment results, but also working collaboratively with colleagues to use results to improve the performance of individuals, classes, grades or the entire school. For instance, the state of Delaware recently threatened to withhold $2.5 million from a school district because the district had not properly implemented a 90-minute common planning time in which teachers "take time to strategize and learn to use the voluminous data produced by the state's new computer assessments to help students in areas where they are struggling most."[9]

5 The stakes of high stakes assessment were recently raised by research connecting high standardized tests scores with a wide variety of measurable positive outcomes in adult life: Chetty, R., Friedman, J. N., & Rockoff, J. E. (2011). The long-term impacts of teachers: Teacher value-added and student outcomes in adulthood (Working Paper 17699). Cambridge, MA: National Bureau of Economic Research. (Access at: http://www.nber.org/papers/w17699)

6 Tucker, M. S. (May 24, 2011). *Standing on the shoulders of giants: An American agenda for education reform.* Washington, DC: National Center on Education and the Economy. (Access at: http://www.ncee.org/wp-content/uploads/2011/05/Standing-on-the-Shoulders-of-Giants-An-American-Agenda-for-Education-Reform.pdf)

7 Sahlberg, P. (2011). *Finnish lessons: What can the world learn from educational change in Finland?* New York: Teachers College Press. See p. 66 for a discussion of assessment.

8 Chang, C.-Y., Yeh, T-K., & Barufaldi, J. P. (2010). The positive and negative effects of science concept tests on student conceptual understanding. *International Journal of Science Education*, 32(2), 265-282; Karpicke, J. D., & Blunt, J. R. (2011). Retrieval practice produces more learning than elaborative studying with concept mapping. Science, 331, 772-775; McDaniel, M. A., Agarwal, P. K., Huelser, B. J., McDermott, K. B., & Rodeiger III, H. L. (2011). Test-enhanced learning in a middle school science classroom: The effects of quiz frequency and placement. *Journal of Educational Psychology*, 103(2), 399-414; Rohrer, D., & Pashler, H. (2010). Recent research on human learning challenges conventional instructional strategies. *Education Researcher*, 39(5), 406-412; Rohrer, D., Taylor, K., & Sholar, B. (2010). *Journal of Experimental Psychology, Learning, Memory, and Cognition*, 36(1), 233-239.

9 Dobo, N. (December 16, 2011). *Delaware tells Brandywine schools to make time for teachers to plan.* Delawareonline.com (Access at: http://www.delawareonline.com/article/20111216/NEWS/112160335/Delaware-tells-Brandywine-schools-make-time-teachers-plan)

The school districts in the nation that do best in the face of the challenge of educating disadvantaged students have become obsessive about using data to drive instruction. Two of the last three winners of the highly coveted Broad Prize for Urban Education, an award to honor "urban school districts that demonstrate the greatest overall performance and improvement in student achievement while reducing achievement gaps among low-income and minority students," each demonstrated a relentless focus on data.[10]

The 2011 Broad Prize winner, **Charlotte-Mecklenburg Schools (CMS)** in North Carolina, narrowed achievement gaps between African-American and white students in reading and math at all school levels. The district's intense approach to data-based decision making is one factor in this success: All educators in CMS are trained in Data Wise, a structured system to improve instructional and organizational practices based on data, and every school has a data team. Teachers, administrators and coaches can access a wide variety of learning data on the district's online portal, which gives them the capacity to meaningfully track student performance and adapt quickly to learning difficulties.

Aldine Independent School District (Texas) won the Broad Prize in 2009, with a strong record of academic success for its students and a student performance data initiative that parallels CMS's. The district developed its own online curriculum and assessment database (in part fed by data from frequent common student assessments), which provides teachers, instructional leaders and district staff with valuable same-day, aggregated and disaggregated student achievement information. This data empowers them to monitor and modify instruction until students demonstrate that they have mastered a subject. District staff can use the data to identify students who need special help, such as students with disabilities or English language learners, and can then use this information to implement targeted staff development in schools where problems are detected. Individual professional development plans are also shaped by test data.

It is fair to say that the school districts in the nation that do best in the face of the challenge of educating disadvantaged students have become obsessive about using data to drive instruction.

Ideally, the training that every aspiring teacher receives would fully prepare them for the growing demands of data driven instruction, employing all potential sources of data that could bear on the academic performance considered, including attendance records, school climate issues such as suspension rates, the nature of needs posed by a variety of English language learners and so on. This report, however, focuses more narrowly on the training teacher candidates receive only in using data derived from *student assessments* — ranging from classwork practice to state tests — to improve instruction. All references to "data" refer to data from such assessments. References to coursework that addresses assessment and assessment data will be referred to as "assessment coursework."

10 http://www.broadprize.org/past_winners/2011.html

Previous research

There has been little research on the efficacy of teacher training in assessment. A search of peer-reviewed journals over the last decade produced 26 studies, the vast majority of which do not meet common standards for research. These studies generally have a very small number of subjects (often the researcher's own students) and make no attempt to examine the effects of any "treatment" on teacher effectiveness. The core finding of these weak studies is that teachers have difficulty analyzing data from classroom assessments and are therefore unable to use the data to guide instruction. The small number that consider the effects of assessment coursework on teacher effectiveness attempt to do so without using data from externally validated data sources. (A list and categorization of these studies is found in Appendix 3.)

The evidence for the connection between using data to drive instruction and student performance is emerging, just as the practice of using data is emerging.

The evidence for the connection between using data to drive instruction and student performance (sometimes called "an inquiry cycle") is emerging, just as the practice of using data is emerging.[11] At this early stage, however, and using strict definitions of adequate research, an Institute on Education Sciences (IES) report found "no research that assessed the impact on student achievement of using an inquiry cycle, or individual steps within that cycle, as a framework for data analysis… The panel determined that the level of evidence to support [the recommendation for its use] is *low*." Notwithstanding this conclusion, however, IES did publish a lengthy "practice guide" on the topic, implicitly recommending that educators implement well-designed inquiry cycles.[12]

Since publication of the IES overview, one study has found that a data driven reform initiative in 500 schools located in seven states led to district-wide improvements in student mathematics achievement, but no such improvements in reading achievement.[13]

11 Black and Wiliam reviewed 250 studies of formative assessment and claim that it has a large potential impact, to arrive at this conclusion, but since these studies are older (they were conducted between 1988 and 1998) when most education research had weaker designs than they do today, an untold number may be suspect. Only the fact that there was a consistent finding for such a very large number of studies lends credence to this conclusion. Black, P., & Wiliam, D. (1998). Assessment and classroom learning. *Assessment in Education*, 5, 7-74.

12 National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences. (September 2009). *IES practice guide: Using student achievement data to support Instructional Decision Making*. Washington, DC: U.S. Department of Education. (Access at: http://ies.ed.gov/ncee/wwc/pdf/practice_guides/dddm_pg_092909.pdf)

13 Carlson, D., Borman, G., & Robinson, M. (2012). A multistate district-level cluster randomized trial of the impact of data-driven reform on reading and mathematics achievement. *Educational Evaluation and Policy Analysis*, 33(3), 378-398. A soon-to-be-released study by the Council of the Great City Schools found modest improvements in middle school mathematics and elementary reading.

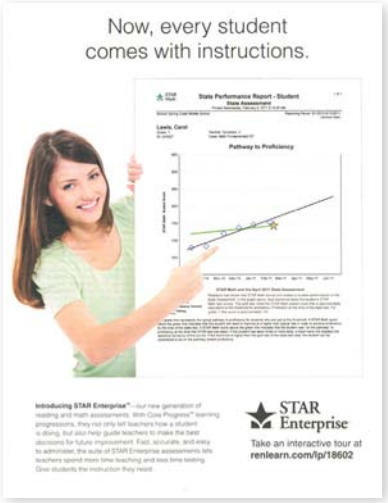
A professional imperative from "day one"

U.S. Secretary of Education Arne Duncan made data-driven decision making a national priority, requiring states to improve their data systems and create high-quality assessments to be eligible for a Race to the Top grant. Federal and state governments have devoted increasingly significant resources to the data-driven decision making reform effort. Since 2005, over $500 million of federal funding has been spent through the Statewide Longitudinal Data System (SLDS) program for development of states' technology infrastructures.[14]

Fortunately, progress has been made. The Data Quality Campaign (DQC) released a report in December 2011 indicating that every state now has the ability to match individual students' test records from year to year in order to measure academic growth.[15]

Districts, too, have been making significant investments. For example, Aldine Independent School District, the 2009 Broad Prize winner, invested $930,000 over a six-year period in its online curriculum and assessment database — a significant sum given that the district has only 64,000 students.[16]

While the data produced by district and state systems may have value in terms of accountability, the full educational potential of these systems can only be realized if teachers have the capacity and motivation to use the data they make available. Yet anecdotal reports indicate that teachers are not taking full advantage of the data that assessments yield.[17] Even among teachers that consider themselves heavy users of student performance data, less than half see data that originate *outside* of their own classroom (such as data from district or state-required tests) as very important. Among teachers who report being light users of data, the proportion of those who see such external data as important is fewer than one in four.[18]



A November 2011 advertisement in Education Week. *The tools for monitoring and reporting on student performance are an increasingly important feature of K-12 education.*

14 National Center for Education Statistics. (2010). *Statewide longitudinal data systems grant program*. (Access at: http://nces.ed.gov/programs/slds/)

15 Sparks, S. (2011, December 7). Survey Shows Nearly All States Can Track Data on Students. *Education Week*. While we agree that much progress has been made by states, our 2011 *State Teacher Policy Yearbook* (http://www.nctq.org/stpy11/reports/stpy11_california_report.pdf) discusses deficiencies in California's capacities.

16 According to Ben Wilson, Aldine's Assistant Superintendent of Community and Governmental Relations, approximately 70 percent of these expenditures were funded by the district, with the remaining 30 percent funded by grants.

17 Of course, the responsibility for poor use of data and data systems is shared between teachers and their districts when the district's system is poorly designed. For example, New York City spent more than $80 million on data system design and development, but an audit revealed that less than half of educators accessed the system in spring 2011. (Access at: http://www.comptroller.nyc.gov/bureaus/audit/audits_2012/1-23-12_7I11-118A.shtm) An online blog reports that New York City teachers complain that the system offers them too little information, and parents say it's hard to access. The fact that some teachers and administrators do want data is revealed by the fact that enterprising teachers and schools have created alternative systems for their own use that they are also selling to other public schools. (Access at: http://gothamschools.org/2010/09/15/frustrated-with-citys-data-system-teachers-build-their-own)

18 Primary Sources: America's Teachers on America's Schools: A Project of *Scholastic* and The Bill and Melinda Gates Foundation (2010). (Access at: http://www.scholastic.com/primarysources/pdfs/Scholastic_Gates_0310.pdf) The most recent report in this series issued in 2012 does not change these conclusions. (Access at http://www.scholastic.com/primarysources/pdfs/Gates2012_full.pdf)

Ironically, many teachers seem to see little use for external assessments even considering the purposes for which they are clearly designed: determining whether students have a deep understanding of content and deciding whether to move them to the next grade. In a recent survey, no more than three in 10 teachers ranked these tests as valuable for such purposes.[19]

The Washington Post recently printed some reactions by teachers to a column discussing the growing paperwork burden placed on public school teachers. These responses revealed both the ubiquity of "data crunching" and the overwhelmingly negative sentiments about it:

- *It's all about data these days, and our professional development days are all about crunching numbers, looking at data and sifting through scores. NEVER is there any talk about how to create engaging and effective and interesting lessons.*
- *Lost in all of this insanity of being driven by the data is the teacher's cry in the wilderness: Where is the responsibility for the student to learn?*
- *I would argue that in order to improve student achievement, teachers need time to actually instruct children. Instead, too much time has been spent this last quarter on … assessing students.*[20]

School district personnel do report that these attitudes can shift with evidence of the positive impact on student learning of data driven instruction.

"In my experience, when teachers are able to see first-hand how the use of data can impact the achievement of *their* students they can be convinced of the value of data driven instruction."

— Abbey Goldstein
Manager, Strategic Initiatives
District of Columbia
Public Schools

Identifying a core for assessment knowledge

School districts, states and teacher preparation training programs have yet to establish what knowledge a new teacher should have in order to enter a classroom with some facility for applying data to improve classroom instruction. In fact, the field has struggled to incorporate data-driven decision making into its program sequences. As researchers Ellen Mandinach and Edith Gummer wrote:

> *The field of data-driven decision making falls between the cracks of traditional courses. It is not introductory statistics or measurement; it is not instruction, pedagogy, or methods. Data-driven decision making lies at the intersection of those courses.*
>
> — *The Complexities of Integrating Data-Driven Decision Making into Professional Preparation in Schools of Education: It's Harder Than You Think*[21]

In 2010, NCATE, the largest accreditor of teacher preparation programs, published a report on assessment in teacher preparation[22] with the general recommendation that "candidates

19 Survey results can be accessed at http://www.nwea.org/every-child-multiple-measures

20 What's lost in the paperwork. (2011, November 21). *The Washington Post*, p. B2.

21 Mandinach, E. B., & Gummer, E. S. (2011, May 12). *The complexities of integrating data-driven decision making into professional preparation in schools of education: It's harder than you think.* Report from an Invitational Meeting Presented to the Spencer Foundation. (Access at: http://educationnorthwest.org/webfm_send/1133)

22 *Assessment as a critical element in clinical experiences for teacher preparation.* (Access at: http://www.ncate.org/LinkClick.aspx?fileticket=oo50CSYDEFM%3D&tabid=715)

be presented with multiple and rich course material in their preparation that will enable them to become *assessment-literate* and *data-wise*." It did not however, provide specific suggestions as to how such material could be integrated into existing coursework or provided through new coursework.[23]

After a review of the literature and the opinions of experts in the field,[24] we delineated the following three domains of knowledge needed by teacher candidates in the area of assessment preparation:

1. How to measure student performance using assessments: "**Assessment Literacy**"
2. How to analyze student performance data from such assessments: "**Analytical Skills**"
3. How to use student performance data from assessments to plan instruction: "**Instructional Decision Making**"

These three domains of knowledge formed the basis of our examination of institutional practice in assessment. As we sifted through the syllabi for professional coursework that 180 programs require of their teacher candidates, we classified a course as relevant if it provided content associated with one or more of the three domains. We then proceeded to rate the comprehensiveness of a program's coverage.

A full discussion of each domain, the rubrics used for evaluation in each of the three domains, and descriptions of the relevant features of sample programs under each rating category are found in Appendix 2.

The three domains of assessment knowledge needed by teacher candidates:

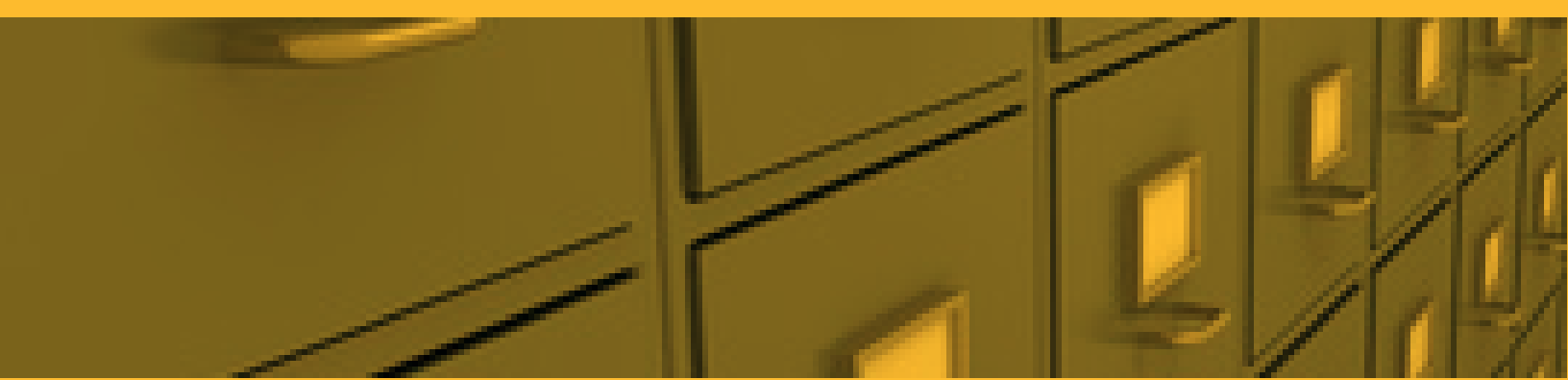
1. Assessment Literacy

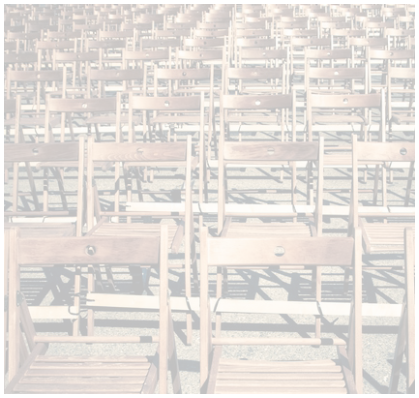
2. Analytical Skills

3. Instructional Decision Making

23 Appendix 4 contains a full review of state regulations, institution accreditation standards and professional standards, examining the degree to which they have articulated the requisite teacher knowledge and performance.

24 Notably Dr. John Hosp, Associate Professor, Department of Teaching and Learning, University of Iowa; Dr. Barry Kaufman, President, BK Education Consulting Services; and Dr. Ellen Mandinach, Senior Research Scientist, WestEd.





Methodology

The study sample

The sample for this preliminary report is 180 teacher preparation programs for both elementary and secondary teacher candidates, housed in 98 institutions of higher education (IHE) in 30 states. These institutions were selected for the sample because they were in the first states responding to open records requests from NCTQ to provide syllabi associated with required professional coursework toward initial certification, an aspect of our *National Review of Teacher Preparation Programs*.[25]

The graphics that follow illustrate the characteristics of the sample relative to the total population of institutions offering teacher preparation programs, as well as illustrating the distribution of the sample relative to institutional selectivity in admissions as measured by average SAT scores of all students.

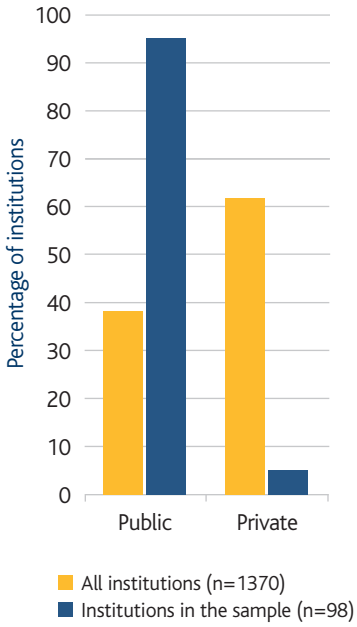
While the sample is overwhelmingly composed of public institutions, we have no reason to believe that this biases results. The results from our analysis of assessment coursework in Illinois[26] suggest that there is little difference in the practices of public and private institutions.[27]

25 http://www.nctq.org/p/edschools/home.jsp

26 Greenberg, J., & Walsh, K. (2010). *Ed school essentials: A review of Illinois teacher preparation*. Washington, DC: National Council on Teacher Quality. (Access at: http://www.nctq.org/edschoolreports/Illinois)

27 While the rating process in Illinois was not exactly the same as used here or as will be used in the *National Review*, programs in private institutions in Illinois had average ratings of 3.0 on a 4-point scale, whereas ratings of public institutions averaged 2.8.

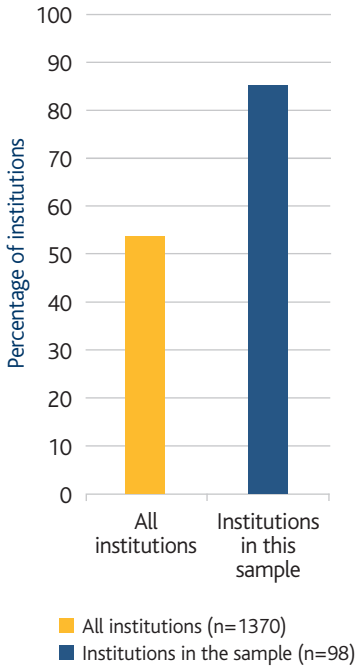
Public and private institutions*



*Data from Title II reports

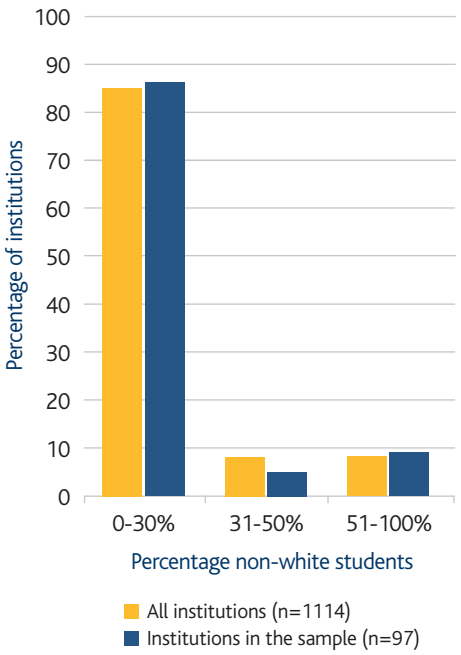
Data were obtained mostly through open records requests to which only public institutions must respond. As a result, while just over one-third of the IHE's offering teacher preparation are public institutions, about 95 percent of the IHEs in the sample are public.

National accreditation of institutions



Because many states require that IHEs offering teacher preparation seek accreditation, a disproportionate number of accredited IHEs are public. This may explain why the proportion of accredited IHEs in the sample is much larger than in the proportion of accredited IHEs overall.

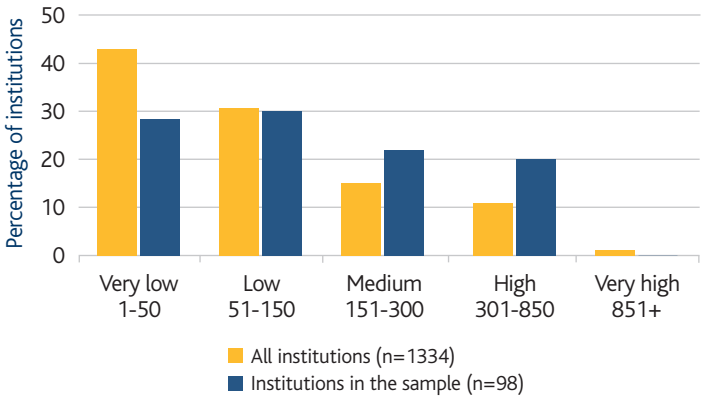
Diversity of institutions*



*Data from Title II reports

In terms of minority enrollment, the sample is representative of the population of IHEs offering teacher preparation.

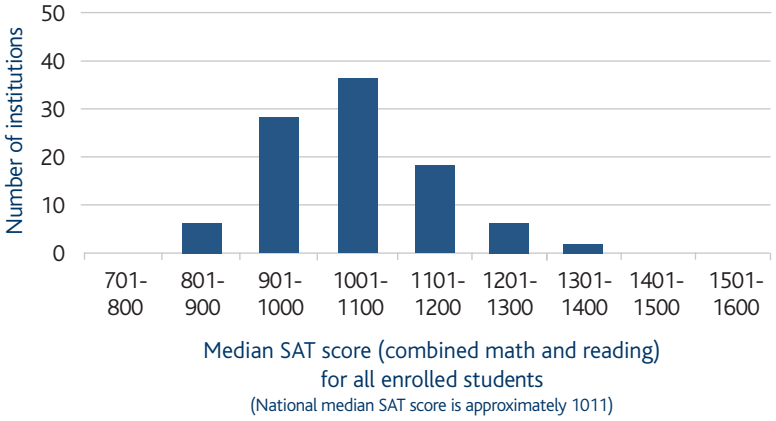
Number of teachers produced annually by institutions*



*Data from Title II reports

The distribution of IHEs offering teacher preparation is dominated by institutions producing 50 or fewer graduates annually in all programs, many of them private. The fact that the sample contains a disproportionate share of public IHEs may explain why the sample has a more even distribution across four of five categories of production.

Admissions selectivity of institutions in the sample*



* Data obtained from IPEDS for all but four IHEs for which scores were obtained from Cappex.

Selectivity information based on average student SAT scores is not available for a large number of IHEs. This only illustrates the distribution of SAT scores for the sample.

The methodology for selection of coursework

Any required course was considered relevant for further analysis if the title of the course or its description in the IHE's catalog indicated that the topic of assessment might be a significant feature of instruction and/or practice.[28] The syllabi for all such courses were reviewed.

Some courses were not classified as relevant to the aims of this study even though their title and/or description referenced the topic of assessment. These include courses in educational psychology that are taught in a psychology department (rather than an education department) and that are not designed for teacher audiences. These courses' treatment of assessment would not be sufficiently contextualized to K-12 schooling to include in this study. Courses in which literacy was the main topic were also excluded.[29]

For the purpose of evaluating programs preparing elementary and secondary teachers, all professional courses referencing assessment in the title or course description (with the exceptions noted above in educational psychology and literacy) were evaluated. For the purpose of evaluating programs preparing secondary teachers, one of four pathways for secondary certification was randomly selected (English, mathematics, science or social studies) and the methods course for the path chosen was also evaluated, regardless of whether assessment was mentioned in its title or description.[30]

After deciding which courses appeared to be relevant, programs were evaluated on the basis of the following information:

- The course syllabi stating the course objectives, lectures, assignments, textbooks and required readings;[31]
- Information provided by publishers' descriptions of the content of required textbooks; and
- Requirements for capstone projects (often called "teacher work samples" or "portfolios").[32]

28 We had anticipated that institutions would assist in the identification of assessment coursework through a voluntary curriculum mapping process, but the lack of cooperation from institutions in the *National Review* sample made this impossible. Institutions' requests for excessive payments for data also made it impossible to obtain all professional coursework syllabi for all schools to examine them for coverage of assessment. It is possible that courses treat assessment but the title or course description did not so indicate. To ascertain the potential for the coverage of assessment that is not revealed by title or course description, we conducted an analysis of coursework in 18 programs in the sample for which we had all syllabi available for evaluation. Our analysis indicates that titles and descriptions of many methods courses do not mention assessment, even though assessment is the topic of one or two lectures. However, with the exception of one course in one program, there were no practice assignments on assessment other than in the course of writing lesson plans, and there was no instruction or practice that would be evaluated in the second and third assessment domains that will shortly be described. Both because the program in which non-lesson planning-related practice was found already had adequate practice and because instruction and practice was related only to the first domain, had this instruction and practice been included in our evaluation, none of the additional coverage of assessment in these courses in the 18 programs would have changed the overall rating of any of the programs in which it was found.

29 Assessment in literacy instruction (ranging from typical progress monitoring to the assessment that is integral to systematic programs such as "Response to Intervention") requires a more specialized evaluation than provided here. Our evaluation of literacy coursework against our early reading standard addresses assessment and assessment strategies. For example, we evaluate whether instruction on assessment strategies focuses on systematic skill building as opposed to approaches such as running records.

30 It is reasonable to assume that assessment-informed planning would be addressed in the separate subject-specific methods course for each pathway to certification. In other words, it is valid to evaluate only a sample of methods courses in a program in order to produce a general evaluation of methods coursework because it parallels the experiences of teacher candidates.

31 Several researchers evaluating teacher preparation in literacy assessment-evaluated programs have used this same source of data: McCombes-Tolis, J., & Spear-Swerling, L. (2011). The preparation of pre-service elementary educators in understanding and applying the terms, concepts, and practices associated with response to intervention in early reading contexts. *Journal of School Leadership*, 21(3), 360-389.

32 Teacher Performance Assessments (TPAs) were also evaluated as capstone projects. For all projects, we accounted for any assessment-related project assignments, including whether these projects required that candidates submit artifacts from earlier coursework that reflected assessment assignments or entailed new assessment assignments.

On this basis, a total of 455 courses were evaluated, anywhere from one to six relevant courses for each program. The average number of courses in each program that reference assessment is 2.5.

The validity of using syllabi

Analyses of syllabi have long been an accepted part of the evaluation of teacher preparation by state agencies, accrediting organizations and multiple research studies. The NCTQ methodology mirrors this approach, looking only for topics that are considered so essential that an instructor would not have failed to mention them on the syllabus if she or he intended to teach the topics at all.[33] Even in cases when syllabi are cryptic, careful examination yields valuable information about what teacher candidates are expected to learn and practice. For example, if a syllabus was unclear whether an assignment for an "assessment analysis" included analysis of both classroom and standardized assessments, it was assumed that both were addressed, provided that a lecture delivered before rather than after the assignment was due dealt with standardized tests. In the absence of clear lecture topics or practice assignments, course objectives were used to assess course content.[34]

A total of 455 courses in 180 programs were evaluated for their coverage of assessment.

33 Teacher educators often object to the use of syllabi to assess the core of instruction. Most objections seem to be based on the proposition that the most important concepts in a course can be so deeply embedded that they are invisible. In the words of one education school dean, if something is a "natural part" of a course it "need not be explicitly identified." In fact, it is exactly the "natural part" of a course that is routinely expected by students, instructors, college administrators, trustees and accreditors to be described by syllabi that are the topics salient to this analysis.

34 See "Sample program earning a '4'" on p. 37 for an example of coursework evaluated in the absence of clear lecture topics.

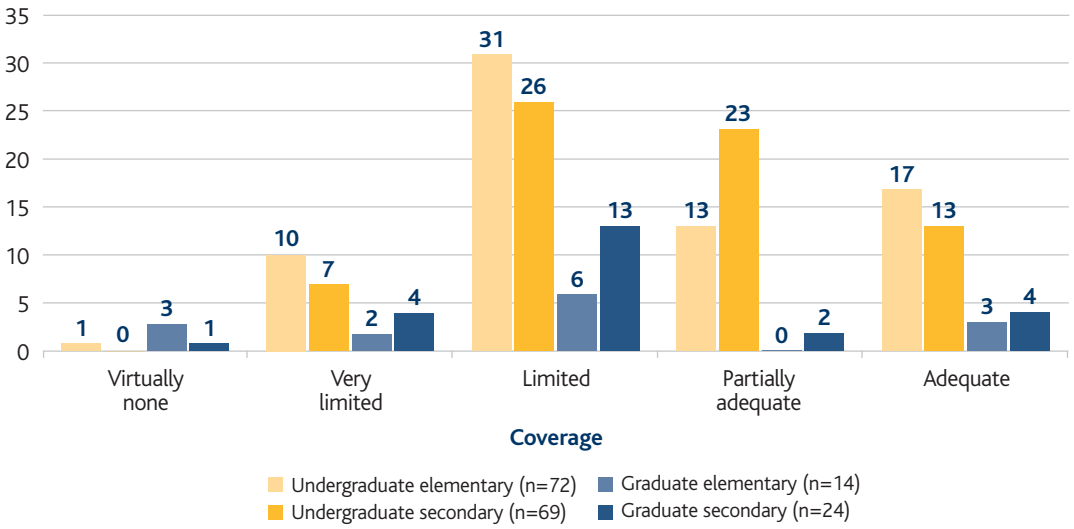
Findings

How adequately does teacher preparation program coursework address Domain #1, *Assessment Literacy*?

Assessment Literacy

An understanding of the taxonomy of assessment and a familiarity with the different types of classrooms and standardized assessment. For example, teacher candidates should understand the distinction between formative and summative assessment and have developed several types of each form of assessment. Appendix 2 contains a more detailed description of this domain, the rubric used for evaluating programs in this domain area, and descriptions of the relevant features of sample programs in each of the rubric's rating categories.

How adequately does coursework address "Assessment Literacy"?



Only 21 percent of the programs in the sample cover literacy topics adequately, with an additional 21 percent doing so with partial adequacy. More than half of all programs have no, very limited or limited coverage.

In the first domain, only five programs (3 percent) in our sample earned the lowest rating, and one in five programs (21 percent) earned the highest. Findings in this domain are clearly more positive than findings in the two other domains.

Programs that earned the highest score provided:

1. Comprehensive coverage of both classroom and standardized assessment (including key concepts such as validity and reliability), and
2. Practice on developing and scoring assessments.

Most of the remaining programs provide teacher candidates with at least basic exposure to both formative and summative assessment.[35] Moreover, in about two-thirds of the programs (67 percent), the coursework contained at least some reference — albeit, in most cases, fairly minor references — to standardized testing. We also noted little explicit skepticism about state assessments and accountability systems, finding it in only six programs (3 percent). Given that a recent survey of teacher educators found that only 24 percent of teacher educators believe it "absolutely essential" to produce "teachers who understand how to work with the state's standards, tests and accountability systems,"[36] this absence of explicit skepticism is commendable.

How adequately does teacher preparation program coursework address Domain #2, *Analytical Skills*?

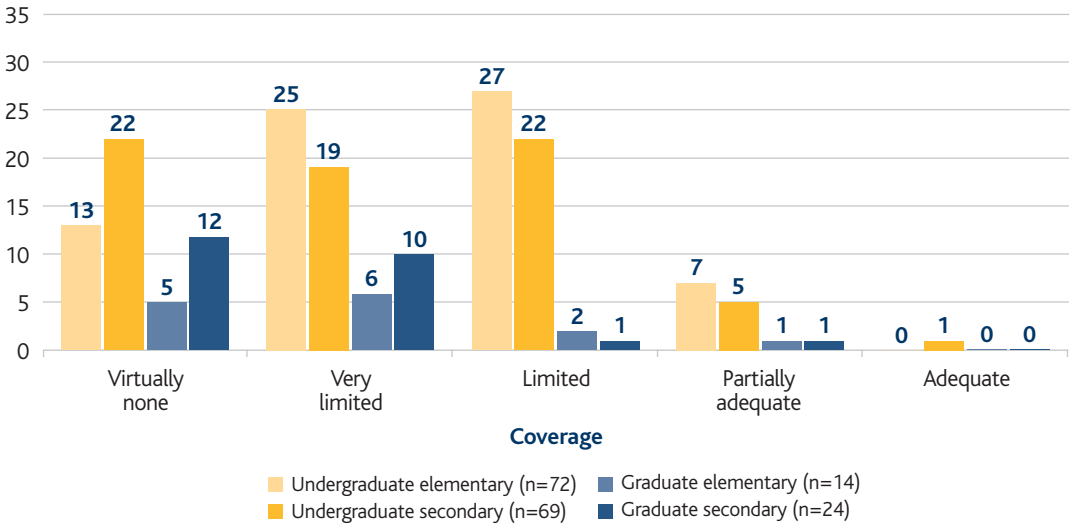
Analytical Skills

Understanding how to dissect, describe and display the data that emerges from assessments. For example, teacher candidates might learn how to disaggregate class results on a series of assessments in a unit to review and present differential subgroup performance in a table or chart. Appendix 2 contains a more detailed description of this domain, the rubric used for evaluating programs in this domain area, and descriptions of the relevant features of sample programs in each of the rubric's rating categories.

35 Our findings run contrary to the results of a recent ETS study that found formative assessment mentioned explicitly in only three of the 22 programs (14 percent) that ETS examined. (Access at: http://blogs.edweek.org/edweek/teacherbeat/2011/12/how_do_we_train_teachers_to_us.html) In an examination of the first 27 institutions (48 programs) evaluated, (approximately one-quarter of the total programs evaluated), we found explicit references in roughly half of the programs (14/27 or 52 percent). We found implicit references to assessment (e.g., a lecture on "how to determine what students know") and/or capstone projects that required teachers to design formative assessments in all but one of the remaining 13 programs.

36 *Cracks in the ivory tower?: The views of education professors circa 2010.* (Access at: http://educationnext.org/cracks-in-the-ivory-tower-the-views-of-education-professors-circa-2010/)

How adequately does program coursework address "Analytical Skills"?



Less than 1 percent of the programs in the sample cover Analytical Skills adequately, with an additional 8 percent doing so with partial adequacy. The vast majority of programs (92 percent) have no, very limited or limited coverage.

The ratings are considerably poorer in this second domain. Over one-quarter of all of the programs (29 percent) and almost half of the graduate programs (45 percent) were completely deficient, and only one program was found adequate.

The program deemed "adequate" provided:

1. Instruction on analysis of data from both classroom and standardized assessments, and
2. Practice that includes both field-based practice in teams and presentation of results in both quantitative and graphic displays.

In general, coursework appears to provide only the most basic tools for analysis of assessment data and then primarily from classroom assessment. Only 71 programs (39 percent) address standardized testing in the context of data analysis, and fewer — 22 programs (12 percent) — have classwork or homework practice that exposes teacher candidates to the process of analyzing data from standardized assessment. In 72 programs (40 percent), teacher candidates have to demonstrate analytical proficiency through independent "capstone projects" in which they analyze classroom assessment data, but this exercise appears to be candidates' only practice in 43 programs (60 percent of those programs with such projects). We found evidence of *collaborative* analysis in in-class or capstone project assignments in a very small fraction (4 percent) of the programs.

How adequately does teacher preparation program coursework address Domain #3, *Instructional Decision Making*?

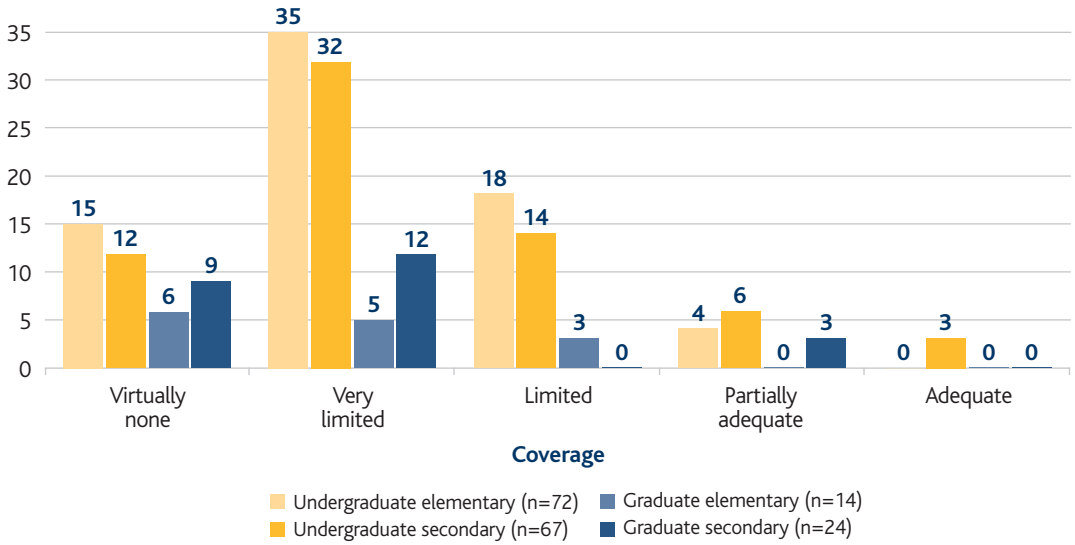
Instructional Decision Making

An understanding of how to derive instructional guidance from assessment data. For example, a teacher candidate preparing to teach secondary mathematics might examine a variety of test results obtained in field work to determine the reasons students have performed poorly on a math problem on the subject of rates. The teacher candidate will need to determine if students lacked a basic understanding of rates themselves or if they were confused about the mixed-number multiplication necessary to compute the rate.* The next steps would depend on the outcome of this examination. They might lead to formative assessment to "zero in" on students' understanding either of rates or mixed-number multiplication (or both), appropriately focused instruction, and a summative assessment for final student evaluation.

Appendix 2 contains a more detailed description of this domain, the rubric used for evaluating programs in this domain area and descriptions of the relevant features of sample programs in each of the rubric's rating categories.

* See *Driven by Data: A Practical Guide to Improve Instruction* by Paul Bambrick-Santoyo (John Wiley & Sons, Inc., 2010) for more examples of the triangulation approach to Instructional Decision Making.

How adequately does coursework address "Instructional Decision Making"?



Fewer than 2 percent of programs in the sample cover Instructional Decision Making adequately, with 7 percent doing so with partial adequacy. The vast majority of programs (91 percent) have no, very limited or limited coverage.

In this third domain of Instructional Decision Making, findings remain almost as troubling as in the second domain. Only three programs (all undergraduate secondary) earned the highest score. In only a slight improvement over results in the second domain, almost one-quarter (23 percent) of all programs and over one-third (39 percent) of graduate programs were completely deficient.

Programs found adequate provided instruction and practice on using assessment data to drive instruction that is extensive and includes coursework that is subject-specific.[37]

Many programs do provide at least cursory exposure to the concept of "formative assessment," which constitutes a toehold on how to use assessment data for planning.[38] Programs generally, however, do not appear to use their methods courses as the vehicles for more nuanced, subject-specific practice. In 42 elementary programs (48 percent of such programs), using assessment to drive instruction appeared to be virtually absent from methods courses, meaning that no expert taught teachers how to examine assessment data with the benefit of subject matter-specific insight.[39] For example, a science methods course and a mathematics methods course could provide different but equally valuable insights into subtle misconceptions and misinterpretations that might underlie incorrect answers, or how assessment results might suggest necessary instructional scaffolding.

In 54 secondary programs (58 percent of such programs), there was either no subject-specific methods course, or there was a subject-specific methods course that did not address assessment. Again, this finding means that a teacher candidate in a social studies certification route, for example, may not have the advantage of an instructor with content expertise as she tries to evaluate the content validity of a test she has developed with original multiple choice questions. Even in programs in which assessment was a topic of methods coursework, it was generally a very minor topic at best. For example, only one lecture might address assessment in the subject at hand; teacher candidates might be required to complete an assignment entailing only one assessment, with no explicit connection to how its use might inform instruction.

The bar to earn a passing rating in this study was set low.

Lastly, we found evidence of *collaborative* Instructional Decision Making practice in in-class or capstone project assignments in a very small fraction (8 percent) of the programs.

How adequately does teacher preparation coursework address all three domains of assessment?

Before discussing the overall performance of programs, it is important to note that the bar to earn a passing rating in this study was set low.

Just how low? *One* relevant objective or lecture was sufficient to categorize a program as addressing standardized assessment. Several assignments were sufficient to categorize a program as having "adequate practice" in a particular area. Some might reasonably suggest that teachers, especially in this era of accountability and assessment, need far more exposure and practice than this standard suggests—a fair criticism in our judgment.

37 This standard pertains to secondary programs. The analogous standard for elementary programs requires that instruction and practice are evident in all four core elementary subjects: language arts, mathematics, science and social studies.

38 See Appendix 5 for a tutorial on assessment taxonomy.

39 As mentioned earlier, we assume that virtually all methods courses address assessment to the minimal extent of requiring that lesson plans include at least summative assessments.

Why do we set such a low bar? We do so to give institutions the benefit of the doubt. Though our examination of course materials is comprehensive, our low bar compensates for our inability to audit the actual course and the risk we face that a course might actually cover material that was not spelled out in the syllabus. This approach means that some programs earn higher marks than perhaps they should have. But it also means that our margin of error is so substantial that there should be little doubt that a program designated as inadequate is in fact inadequate.

Our overall conclusion is that while assessment is addressed to some extent in all but five of the 180 programs we examined, only six programs (3 percent) provide preparation that can be deemed adequate: four elementary programs and two secondary programs.

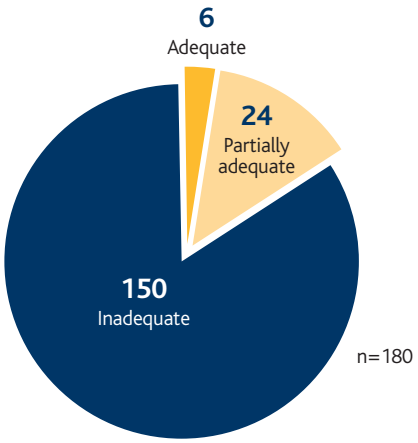
Only six programs (3 percent) provide preparation that can be deemed adequate.

When it comes to assessment, what is an "adequate" program?

1) The program provides a foundation in Assessment Literacy, with attention to the instructional role of standardized tests, particularly the program state's standardized tests;
2) The program requires teacher candidates to prepare formative and summative classroom assessments; and
3) The program builds a relatively strong foundation for interpreting and applying data, *both individually and in teams*, from standardized and classroom assessments in order to inform and adjust instruction.

These three parts are based roughly on the three domains, but combining them into an overall metric moves us away from a simple aggregation of ratings in each domain. Frankly, this allows us to note a program as "adequate" that may not have received the highest rating on any of the domains but still provides a "*relatively* strong" foundation in all.

How adequate overall is teacher preparation program coverage of assessment?



Only 3 percent of programs in the sample cover assessment adequately, with 13 percent doing so with partial adequacy. Over three-quarters of programs (83 percent) have inadequate coverage.

The most common weaknesses:

- As noted, programs were rated much more poorly on the second (Analytical Skills) and third (Instructional Decision Making) domains than on the first (Assessment Literacy). Even among the programs earning the highest rating on the first domain, few were adequate on the domains of Analytical Skills and Instructional Decision Making.
- While about two-thirds of programs address standardized assessments, coverage is found largely in the first domain of Assessment Literacy. Even programs that address standardized assessments rarely discuss data from standardized tests in the context of Analytical Skills or Instructional Decision Making, or have relevant practice.
- Programs rarely mention the use of data by teachers for *school* improvement purposes, (as opposed to improvement of the performance of their own students).
- There is little evidence of collaborative practice being modelled or promoted.

We found that programs in the same institution may be internally *inconsistent*: In only one of the three institutions in which we evaluated all four program types were all the programs rated the same —in this case, unfortunately, as "inadequate."

Even among the programs earning the highest rating on the first domain, few rated well on the domains of Analytical Skills and Instructional Decision Making.

The impact of state regulation.

In many areas of teacher preparation, NCTQ has found that state regulations governing the content of teacher preparation have little impact in actual practice.[40] In the policy brief we released earlier this year, our analysis of a smaller sample of programs suggested that state regulation on preparation for assessment might be an exception to this general rule. With the full sample in hand, however, we can once again confirm that state regulations do not affect what teachers learn in their preparation programs.[41] As noted in our recommendations, this is likely due to the fact that states do not require candidates to pass tests in this subject to become licensed.

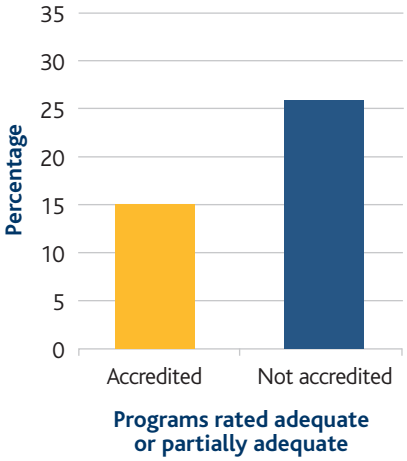
40 See Appendix 4 for a discussion of relevant state regulations.

41 The 180 programs evaluated to date are found in 30 states, 18 of which have regulations that at least address to some extent the responsibility of teacher preparation programs to address assessment. (See graphic in Appendix 4.) In all states, whether regulations are relatively strong or weak, ratings on programs within the state are mixed in states for which more than one program was evaluated. However, only a slightly higher proportion of programs are "adequate" or "partially adequate" (18 percent) in states that are relatively stronger on regulation than in states that are not (15 percent).

The impact of accreditation.

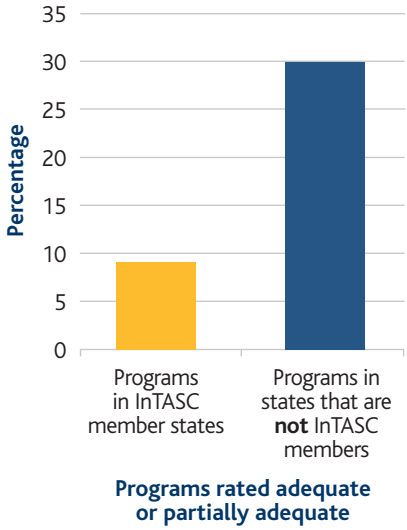
In previous analyses of various areas of teacher preparation we have not found a significant difference between accredited and non-accredited institutions. In this area, we have, and the difference points to a negative impact of accreditation for the 157 programs that are accredited by either NCATE or TEAC out of this sample of 180 programs.[42]

Does accreditation make a difference?



Twenty-six percent of the programs in non-accredited institutions are rated as "adequate" or "partially adequate," whereas only 15 percent of the programs in institutions accredited by NCATE or TEAC fall into either of these two rating categories.

Does a state's adoption of InTASC professional standards make a difference?



Only 9 percent of the programs in states that are members of InTASC are rated "adequate" or "partially adequate." A much higher proportion (30 percent) of programs in states that are not members fall into either of these two rating categories.

The impact of professional standards

As with accreditation, if there is a difference, it appears to indicate a *negative* impact of professional standards for the 109 programs in the 21 states in the sample which are members of InTASC and subscribe to its professional standards.[43]

42 See Appendix 4 for a discussion of relevant accreditation standards.
43 See Appendix 4 for a discussion of relevant professional standards.

Recommendations

We fully recognize that assessment and use of assessment data is such a large and important topic for teacher candidates that no matter how adequate a program may be in laying a foundation, continued training will be necessary to build and hone knowledge and skills during induction and throughout classroom teaching. But the need for in-service training does not negate the need for foundational knowledge to be also laid during pre-service. Numerous levers are available to provide both increased pressure on and increased support for teacher preparation programs to lay a better foundation for continuing professional development in the area of assessment.

Federal Government

Provide more legislative guidance

The federal government should encourage better teacher candidate preparation in data driven instruction through:

1. Amending Title II of the Higher Education Act (HEA), providing suitable incentives for teacher preparation programs to prepare teacher candidates to understand and use assessments and assessment data;
2. Requiring that a portion of State Longitudinal Data System (SLDS) funds be used for training on assessment and data skills; and
3. Allocating a percentage of funds under Title II of the Elementary and Secondary Education Act (ESEA) for training.

Amendments to HEA and ESEA, respectively, could also

1. Provide states with incentives to ensure that their program approval authority reinforces the importance of teacher data skills; and
2. Encourage innovative state and local practices in data driven instruction.

Invest in research

There are a number of issues related to data driven instruction that warrant exploration. Federal policy should support research into its effects on student achievement, the knowledge and skills teachers need to become expert, the conditions within schools necessary for it to have maximum impact, the collection and dissemination of best practices related to pre-service and in-service training, and the compilation and meta-analysis of existing research on assessment, data driven instruction and related topics.

We present two different and potentially complementary approaches that might increase the accountability of preparation programs, one for states and one for school districts:

States

Increase accountability of preparation programs

Teacher licensing tests are perhaps the most effective and efficient means available to drive significant change in teacher preparation programs. One possible reason that assessment is addressed so poorly in teacher preparation programs is that it is not covered at any depth in the licensing tests required by most states. As a first step to remedying this situation, the ***Council of Chief State School Officers (CCSSO)*** could evaluate the scope of topics addressed in those licensing tests that do include assessment to make recommendations to states about how licensing tests might be improved in this area. If warranted, CCSSO could sponsor a consortium of states who wish to aggressively promote licensing test enhancements.

Now — of necessity — districts must hire new teachers who no sooner arrive at their new schools than they need professional development on a variety of assessment tools and tasks necessary for school improvement.

School Districts

Ensure a better applicant pool for hiring

Of all the stakeholders in the country's educational system, ***school districts*** have the greatest vested interest in hiring teachers with a solid foundation in assessment. Now – of necessity – districts must hire new teachers who no sooner arrive at their new schools than they need immediate professional development on a variety of assessment tools and tasks necessary for school improvement. Districts hiring a large share of graduates from any given teacher preparation program might use their bargaining power to bring the program to the table to ensure that its teacher candidates arrive with a better foundation in all assessment domains.

Absent a state effort to focus pedagogical licensing tests on the topic of assessment knowledge that teachers need, we recommend that districts administer their own test, one that applicants must take as a condition of hiring. Such a test might be designed under the supervision of, for example, the ***Council of the Great City Schools***. It may be the most efficient step toward persuading states that assessment knowledge needs to be an integral part of any licensing test.

Foundations

Develop instructional data sets and model curricula

A variety of graduate programs for teachers and administrators offer coursework in the data driven instruction model that can be taken in degree programs or as stand-alone in-service training.[44] Participants must bring to these programs their own district's student performance data inventory. Course assignments have participants working directly with their own data. Teacher educators in *initial* certification programs seeking to improve their courses, however,

44 As mentioned earlier, all teachers in the Charlotte-Mecklenburg school district – a Broad Prize winner – have taken one of the most well-known courses, Harvard's "Data Wise" course.

would have a hard time replicating these inventories. Neither the instructor nor enrolled teacher candidates has access to the appropriate data, and fabricating data is not easy.[45]

Innovation-minded teacher educators would welcome synthetic but realistic elementary and secondary school data sets that contain student performance data from a typical range of classroom, district and state assessments. These data sets could form the basis of a very rich collection of simulations and exercises designed to develop expertise in Assessment Literacy, Analytical Skills and Instructional Decision Making in existing coursework or in model course curricula developed by foundations and their partners.[46]

School data sets that contain student performance data from a typical range of classroom, district and state assessments could form the basis of simulations and exercises in teacher preparation coursework.

How might student performance data be used in instruction?

Consider as a hypothetical a case example in an Institute for Education Sciences practice guide on "Using State Achievement Data to Support Instructional Decision Making."* The case example describes how a group of elementary teachers might analyze data on student performance in mathematics: The teachers find that students are weakest on state tests in geometry skills related to shapes and measurements, but data on district interim assessments do not reveal the source of the problem. It is only when student workbooks are consulted that the teachers surmise that the students' difficulties relate to the need to combine shapes for some calculations. This leads the teachers to generate some relevant classroom lessons. The next interim district test shows improvement on the type of problems that the teachers had analyzed collaboratively.

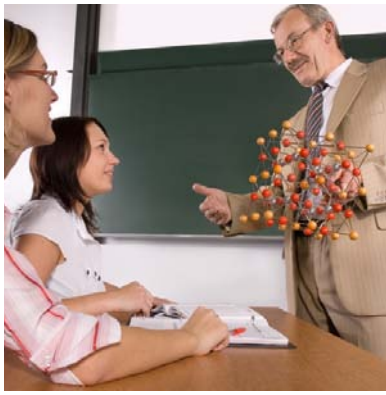
Teams of teacher candidates could simulate this same exercise in coursework. They could be provided a data set containing 1) fabricated but realistic 4th grade student test scores on the mathematics section of a state test and interim district assessments taken throughout the year, 2) appropriate statistical descriptions and graphic displays, and 3) examples of student work designed to illuminate possible student failings and misconceptions. Working together, the teacher candidates could develop appropriate lesson and assessment plans, just as they might soon be doing with colleagues when they begin teaching.

Developing data sets for the core subjects at both the elementary and secondary levels could provide ample practice for teacher preparation coursework to be used ideally in courses in which faculty with assessment expertise and faculty with pedagogical expertise could coordinate instruction or team-teach.

* National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences. (September 2009). *IES practice guide: Using student achievement data to support Instructional Decision Making* (p. 17). Washington, DC: U.S. Department of Education.

45 Several instructors of graduate level assessment coursework informed us that they have attempted to develop such a data inventory for course participants who had no access to data and that they had not found the results satisfactory because the task of replicating the massive amount of data now available to many school administrators and teachers is so difficult.

46 The DQC reports that discussions are underway between the New Hampshire Department of Education and teacher preparation programs in the state to develop a college course around effective use of data to plan instruction. (Access at: http://www.dataqualitycampaign.org/resources/field_profiles/NH.A9)



Conclusion

We find evidence of a serious misalignment between what school districts seek in the skills of their teacher corps and the training provided by teacher preparation programs. It is noteworthy that only two of the 455 assessment courses we identified appear to exploit local school district expertise, in this case by having a representative from a local district lecture, presumably on student performance data in the district context.

In too many programs, assessment coursework centers only on the tests that teachers have always administered, preparing teacher candidates to develop and use assessment data to improve their students' performance in an insular environment. As important as this type of preparation continues to be, it shortchanges teacher candidates because it does not represent the environment of schools in this century. New teachers undoubtedly find themselves confronting data presentations using unfamiliar terms and concepts. The flow of data they currently have to deal with will only grow larger in 2014, as new assessments tied to the Common Core state standards are first administered. Today's schools demand teachers who can comfortably understand and utilize — both individually and collaboratively — a full range of classroom and standardized data, whether the data relate to their own students or to all the students in their school. Preparing them for anything less is unfair to teacher candidates, as well as to the many students they plan to teach.

This report is available online at
www.nctq.org/p/publications/docs/assessment_report.pdf

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Appendices

Appendix 1: Institutions included in the sample

Institution	State	Undergraduate Elementary	Undergraduate Secondary	Graduate Elementary	Graduate Secondary
Adams State College	CO	X	X		
Alcorn State University	MS	X	X		
Alice Lloyd College	KY		X		
Appalachian State University	NC	X	X		
Ball State University	IN				
Binghamton University, State University of New York	NY			X	X
Bloomsburg University of Pennsylvania	PA		X		
Blue Mountain College	MS	X	X		
Boise State University	ID	X	X		
Catawba College	NC	X	X		
Central Michigan University	MI	X	X		
Central Washington University	WA	X	X		
Chadron State College	NE	X	X		
Chipola College	FL	X	X		
Clayton State University	GA		X		
Colorado Mesa University	CO	X	X		
Colorado State University-Pueblo	CO	X	X		
Dalton State College	GA	X			
Daytona State College	FL	X	X		
Dickinson State University	ND		X		
East Carolina University	NC	X	X		
Eastern Kentucky University	KY	X	X		
Elizabeth City State University	NC		X		
Elon University	NC	X	X		
Emporia State University	KS	X	X		X
Florida A&M University	FL	X	X		
Florida State University	FL	X	X	X	X
Fort Hays University	KS		X		
Great Basin College	NV	X	X		
Harris Stowe State University	MO	X			
High Point University	NC	X	X		
Hunter College - CUNY	NY			X	X
Indian River State College	FL		X		
Indiana State University	IN	X	X		
Indiana University - Purdue University Indianapolis	IN	X	X		
Indiana University Bloomington	IN	X	X		
Indiana University East	IN	X	X		
Indiana University Kokomo	IN	X	X		
Indiana University Northwest	IN	X	X		
Indiana University South Bend	IN	X	X		

Institution	State	Undergraduate Elementary	Undergraduate Secondary	Graduate Elementary	Graduate Secondary
Indiana University Southeast	IN	X	X		
Kentucky State University	KY	X	X		
Lake Superior State University	MI	X			
Lehman College - CUNY	NY			X	X
Lewis-Clark State College	ID	X	X		
Mayville State University	ND	X	X		
Miami-Dade College	FL		X		
Michigan State University	MI		X		
Michigan Tech University	MI		X		
Minot State University	ND	X	X		
Mississippi University for Women	MS	X			X
Morehead State University	KY	X	X		
Murray State University	KY	X	X		
North Carolina A&T State University	NC	X			
North Carolina State University	NC	X		X	
Northeastern State University	OK	X	X		
Northern Kentucky University	KY	X	X		X
Northern State University	SD	X			
Northwest Florida State University	FL	X			
Northwestern Oklahoma State University	OK	X	X		
Oklahoma Baptist University	OK	X	X		
Penn State	PA	X			X
Penn State Harrisburg	PA	X			
Peru State College	NE	X	X		
Pittsburg State University	KS	X	X		X
Plymouth State University	NH	X			X
Potsdam, The State University of New York	NY	X	X	X	X
Rutgers University - Camden	NJ	X	X		
Saginaw Valley State University	MI	X	X		
St. Mary's College of Maryland	MD			X	X
St. Cloud State University	MN	X	X		X
St. Petersburg College	FL			X	
SUNY Oneonta	NY		X		
The University of Southern Mississippi	MS	X	X		
The University of Tennessee Knoxville	TN			X	X
The University of Utah	UT	X			
University of Alaska Fairbanks	AK	X			
University of Colorado Denver	CO	X	X	X	X
University of Central Oklahoma	OK		X		
University of Cincinnati	OH	X			
University of Colorado at Colorado Springs	CO	X	X		
University of Colorado Boulder	CO	X	X		

Institution	State	Undergraduate Elementary	Undergraduate Secondary	Graduate Elementary	Graduate Secondary
University of Kentucky	KY	X	X		X
University of Louisville	KY	X	X	X	
University of New Hampshire	NH			X	X
University of North Carolina - Charlotte	NC			X	X
University of South Dakota	SD	X			
University of Virginia	VA			X	X
Vicennes University	IN	X			
Wayne State College	NE	X	X		
West Virginia University at Parkersburg	WV	X			
Western Carolina University	NC				X
Western Kentucky University	KY	X	X		X
Western Michigan University	MI	X	X	X	
Western Washington University	WA	X			
Winthrop University	SC				X
York University - CUNY	NY	X	X	X	
Youngstown State University	OH		X	X	
Totals		73	69	14	24

Appendix 2: Evaluating for the three assessment domains

For each program, we rated coursework on the degree to which it delivered instruction in the three domains of Assessment Literacy, Analytical Skills and Instructional Decision Making. Using the rubrics below, we assigned a rating between "0" and "4" to each program.[47]

Note that in the first two rubrics, a determination that a program delivered instruction with a "comprehensive scope" means that instruction covered both classroom assessments and standardized assessments, including district, state and national tests. A program with at least two practice assignments was deemed to have "adequate practice."

Evaluating for Assessment Literacy

More about Assessment Literacy

Understanding the many different categories and forms of assessment is fundamental to the capacity to generate or select appropriate classroom assessments and to understand the rationales for the many different types of district, state and national assessments. The teacher candidate should 1) understand the taxonomy of assessment; 2) review a variety of classroom assessments, and district and state standardized tests; and 3) practice developing a variety of classroom assessments. Teacher candidates should also gain an understanding of assessment "bias" and what "validity" and "reliability" mean with respect to assessment items.

The taxonomy of assessment in and of itself is a challenging topic, but is also absolutely essential. A typical course might organize assessments in a simple list (e.g., norm-referenced, criterion-referenced, formal, informal, formative, summative, diagnostic, performance, selected response, open response and portfolio), but teacher candidates need to be able to organize these assessments along dimensions such as purpose (formative vs. summative), approach (authentic vs. traditional), and scoring (norm-referenced vs. criterion-referenced). They also need to understand how validity and reliability issues connect to these categorizations. Without this grounding, a teacher candidate cannot understand why one state assessment might assert that results cannot be used to determine instructional objectives for a 3rd grade class, while a district assessment's results might be intended for that very purpose. An assessment taxonomy tutorial found in Appendix 5 illustrates the assessment topics that teacher preparation coursework should address and may also inform the reader about types of assessment.

Rubric for evaluating Assessment Literacy (elementary and secondary programs)

Instructional material considered for rating on this rubric: course objectives, textbooks and required readings, lectures, practice, and practice aligned with field work, including capstone projects.

47 A rating of "Could not be determined" (CBD) was given if the nature of instruction and/or practice could not be ascertained using syllabus material. The program was removed from the sample if CBD ratings in one or more domains precluded development of an overall rating.

0	1	2	3	4
There is no or almost no instruction or practice on the various types of assessment.	Instruction on the various types of assessment is very limited and there is no or almost no practice.	**Case 1:** The scope of Instruction on the various types of assessment is not comprehensive and practice is very limited to adequate. **OR** **Case 2:** The scope of instruction on the various types of assessment is comprehensive, but practice is very limited or limited.	The scope of instruction on various types of assessment is comprehensive and there is adequate practice.	The scope of instruction on the various types of assessment is comprehensive, including concepts such as "validity" and "reliability," and there is adequate practice.

Examples of evaluations in Assessment Literacy at each rating level

Note: Each example is provided for illustrative purposes only and represents only one of many ways by which coursework could earn a particular rating.

Sample program earning a "0": *There is no or almost no instruction or practice on the various types of assessment.*

- The focus is on classroom assessment only.
- Only one assessment-relevant course is in the program; no objectives in this course's syllabus mention assessment.
- "Assessment in the Classroom" is the topic of the one lecture on assessment.
- The text on educational psychology is presumed to cover assessment, but only very generally.
- There are no practice assignments related to assessment and no required capstone project.

Sample program earning a "1": *Instruction on the various types of assessment is very limited, and there is no or almost no practice.*

- The focus is on classroom assessment only.
- Only one assessment-relevant course is in the program; of six objectives, only one explicitly pertains to assessment: *Candidates will be able to develop, implement, and utilize curriculum that encompass a variety of assessment methods.*
- Assessment is the topic of one lecture.
- There are no required textbooks or readings that address any aspect of assessment.
- One practice assignment relates to assessment: *Teacher candidates develop a curriculum unit with a pre- and post-test as a component of their field work.*

Sample program earning a "2" (case 1): *The scope of instruction on the various types of assessment is not comprehensive and practice is very limited to adequate.*

- The focus is on classroom assessment only.
- Two courses are assessment-relevant, each with one explicit measurement-related objective.
- There is one lecture entitled "How do I know what my students know?"
- There are no required textbooks or readings that address any aspect of assessment.
- Practice assignments involving developing assessments take place in field work associated with coursework, student teaching and a capstone project.

Sample program earning a "2" (case 2): *The scope of instruction on the various types of assessment is comprehensive, but practice is very limited or limited.*

- Both classroom and standardized assessment are addressed.
- Three courses are assessment-relevant, and two of these have five measurement-related objectives.
- Among the three courses, there are seven lectures on assessment topics, including "Large Scale Standardized Tests and the Classroom" and "Formative Assessment: Ongoing Assessment to Promote Student Success."
- A required textbook addresses assessment.
- Practice assignments involve evaluation of a standardized test and an "integrated instructional plan," including a strategy for assessing state/district standards, but there are no assessment assignments associated with field work (considering both student teaching and work associated with a capstone project).

Sample program earning a "3": *The scope of Instruction on the various types of assessment is comprehensive, and there is adequate practice.*

- Both classroom and standardized assessment are addressed.
- Five courses are assessment-relevant, and three of these have six explicit measurement-related objectives.
- Among the five courses, there are five lectures on assessment topics, including "Standardized Testing and Tests" and "Formative/Informative and Summative Assessment."
- Two required textbooks address classroom assessment, with other required readings possibly addressing assessment more broadly.
- Coursework includes practice on curriculum-based assessment, and a capstone project completed in student teaching requires teacher candidates to create a plan for evaluation of student learning that includes pre-assessment, formative assessments and summative assessments.

Sample program earning a "4": *The scope of instruction on the various types of assessment is comprehensive, including concepts such as "validity" and "reliability, and there is adequate practice.*

- Both classroom and standardized assessment are addressed.
- While only one course is assessment-relevant, six of its objectives relate to measurement.
- The syllabus indicates that the course will cover "local, state and national assessment requirements," a scope of coverage that is underscored by the objectives that address a comprehensive range of types of assessments (including NAEP), and include mention of reliability and validity.
- Two required textbooks address assessment.
- A "work sample" of assessments includes an example of each of six types of formats, and an assessment project conducted during student teaching includes development of a variety of assessments.

Evaluating for analytic skills

More about Analytical Skills

The teacher candidate should understand how to dissect, describe and display the data that emerge from assessments.[48] For classroom assessment, the tools may be fairly simple. The descriptive statistics may involve no more than a discussion of means, medians or modes, and the graphic displays can be simple. A teacher candidate might develop a line graph that demonstrates whether an achievement gap between the lowest and highest achieving groups of students in a class has been reduced over the course of a cycle of formative assessment, instruction, re-teaching and remediation, and final summative assessment.

To understand district and state assessments, the teacher candidate should understand the concepts of sampling error and measurement error, different types of scores (raw scores, percentiles, cut-scores, performance levels, grade equivalent scores, developmental scale scores), how scores are used to determine student growth or student "value-added" growth, and how data from various types of assessments can be used in conjunction to triangulate on causes for poor student performance.

Rubric for evaluating Analytical Skills (elementary and secondary programs)

Instructional material considered for rating on this rubric: course objectives, textbooks and required readings, lectures, practice, and practice aligned with field work (including capstone projects), with consideration of the extent of collaborative practice.

0	1	2	3	4
There is no or almost no practice or instruction preparing teachers to analyze data from assessments.	Instruction for preparing teachers to analyze data from assessments is very limited, and there is almost no or very limited practice.	**Case 1:** The scope of instruction on analyzing data from assessments is not comprehensive, there is limited to adequate practice that includes at least one of the following features: field-based practice, presentation of results in quantitative and graphic displays and/or analysis and presentation in teams. **OR** **Case 2:** The scope of instruction on analyzing data from assessments is comprehensive, but practice is very limited or limited.	The scope of instruction to prepare teachers to analyze data from assessments is comprehensive, and there is adequate practice that includes at least one of the following features: field-based practice, presentation of results in quantitative and graphic displays and/or analysis and presentation in teams.	The scope of Instruction on analyzing data from assessments is comprehensive, and there is adequate practice that includes both of the following features: 1) field-based practice in teams and 2) presentation of results in quantitative and graphic displays.

48 As mentioned earlier, when teachers actually work with data at the school level, student data include both performance data and student record data (such as attendance information) that are relevant to performance.

Examples of evaluations in Analytical Skills at each rating level

Note: Each example is provided for illustrative purposes only and represents only one of many ways by which coursework could earn a particular rating.

Sample program earning a "0": *There is no or almost no practice or instruction preparing teachers to analyze data from assessments.*

- The focus is on classroom assessment only.
- While there are two assessment-relevant courses, there is only one objective on the topic of analysis of assessment data.
- There are no lectures on analysis of assessment data.
- There are no required textbooks or readings addressing assessment or assessment data.
- The only practice is practice aligned with field work, which requires only that the teacher candidate teach a lesson and "assess change in understanding and submit a report detailing your experience and reflections." There is no collaborative practice.

Sample program earning a "1": *Instruction on analyzing data from assessments is very limited, and there is almost no or very limited practice.*

- The focus is on classroom assessment only.
- There are three assessment-relevant courses that together have three objectives on the topic of analysis of assessment data.
- There is one lecture on "assessment analysis."
- There are no required textbooks, but there is one required reading on "making sense of assessment."
- The only practice is practice aligned with field work, which requires candidates to analyze an assessment. There is no collaborative practice.

Sample program earning a "2" (case 1): *The scope of instruction on analyzing data from assessments is not comprehensive, but there is limited to adequate practice that includes at least one feature: field-based practice, presentation of results in quantitative and graphic displays and/or analysis and presentation in teams.*

- The focus is on classroom assessment only.
- There are two assessment-relevant courses that together have only one objective on the topic of analysis of assessment data.
- Course topics include "communicating assessment result."
- There is a required textbook that addresses assessment types comprehensively, but it does not appear to address analysis of assessment data.
- Practice involves both individual analysis ("After teaching your lesson in the field setting, you will submit a reflective paper that analyzes the effectiveness of the lesson in terms of student learning") and collaborative group analysis ("You will be presented with the results of student performance on an exam and be required to analyze the data…This will be a group project completed in class").

Sample program earning a "2" (case 2): *The scope of instruction on analyzing data from assessments is comprehensive, but practice is very limited or limited.*

- Both classroom and standardized assessment are addressed.
- There is one assessment-relevant course that has one objective on the topic of analysis of assessment data.
- The course addresses "summarizing and communicating assessment data."
- There is a required textbook, but it does not appear to focus on analysis of assessment data.
- The only practice is two assignments during field work: 1) an assignment to "document a selected student's performance using existing classroom assessments, school-based state assessment data (CATS), school-based national standardized assessment (CTBS) and other assessment sources and to communicate the student's progress in a form that is clear to a parent, team teacher, and counselor or principal;" and 2) an analysis of assessment data completed during student teaching. There is no collaborative practice.

Sample program earning a "3": *The scope of instruction to prepare teachers to analyze data from assessments is comprehensive, and there is adequate practice that includes at least one of the following features: field-based practice, presentation of results in quantitative and graphic displays, and/or analysis and presentation in teams.*

- Both classroom and standardized assessment are addressed.
- There is one assessment-relevant course that has two objectives on the topic of analysis of assessment data, one of which is unusually technical: "Interpret standardized test scores (i.e., percentile, raw score, scaled score, grade equivalent score, stanine)."
- One lecture focuses on interpreting assessment results.
- The required textbook addresses assessment types comprehensively, but it does not appear to focus on data analysis.
- Practice includes two assignments aligned with field work: 1) "Using the summative assessment data from the unit you taught, you will present the data as a whole-class graph, and also as a 'gap-group' graph, accompanied by descriptive statistics and a paragraph explaining the data and possible interpretations regarding student learning"; and 2) As part of a comprehensive unit plan, the instructor will grade "how you will communicate your students' progress to the students and their parents." There is no collaborative practice.

Sample program earning a "4": *The scope of Instruction on analyzing data from assessments is comprehensive, and there is adequate practice that includes both of the following features: 1) field-based practice in teams and 2) presentation of results in quantitative and graphic displays.*

- Both classroom and standardized assessment are addressed.
- There is one assessment-relevant course that has three objectives on the topic of analysis of assessment data, one of which indicates that the teacher "should be skilled in administering, scoring and interpreting results of both externally-produced and teacher-produced assessment methods."
- One lecture focuses on analysis of student learning.
- Two required textbooks focus on assessment data and communicating assessment results.
- There is collaborative practice to "prep" for separate individual analysis of student learning and a strong assignment on analysis of data in a capstone project that must be accompanied by a discussion of how colleagues provided aid in analyzing and interpreting individual student work products and group growth.

Evaluating for Instructional Decision Making

More about Instructional Decision Making

The teacher candidate needs to begin to practice how to derive instructional guidance from assessment data. Because the purpose of formative assessment is to modify teaching and learning activities as necessary to improve student performance, practice using formative assessment is by definition practice in this area.[49] Programs teaching processes such as "Understanding by Design" or "Curriculum-Based Evaluation" are attempting to develop this "backwards" thinking approach to instruction. That approach encourages teachers to develop instruction based on clear indications of what students already know and what they still need to master.

While it is possible to deal with the fundamentals of assessment-informed planning in the abstract through exposure to and practice with formative assessments, more sophisticated instruction should be provided by subject-matter experts who teach methods courses. Because there can be a variety of reasons why a student gives an incorrect answer to an assessment question, learning how to discern the instructional implications from assessment data goes well beyond using a formative assessment. Purposeful and directed examination of a variety of classroom assessment data and standardized data is sometimes necessary to identify the source of misunderstandings by students.

Rubric for evaluating Instructional Decision Making (elementary programs only)

Instructional material considered for rating on this rubric: The range of subjects addressed in methods coursework, course objectives, lectures, textbooks and required readings, practice, and practice aligned with field work (including capstone projects), with consideration of the extent of collaborative practice.

0	1	2	3	4
There is no or very limited instruction or practice that prepares teachers to use assessment data to drive instruction in specific elementary subject areas.*	There is limited instruction or practice that prepares teachers to use assessment data to drive instruction in specific elementary subject areas.*	Instruction and practice on using assessment data to drive instruction is evident but only in one or two elementary subject areas.*	Instruction and practice on using assessment data to drive instruction is evident but not in all four core elementary subject areas.*	Instruction and practice on using assessment data to drive instruction is evident in all four core elementary subject areas.*

* For purposes of this analysis, the four core elementary subject areas are the language arts, mathematics, science and social studies.

Rubric for evaluating assessment-informed planning (secondary programs only)

Instructional material considered for rating on this rubric: assessment coursework and secondary methods coursework in one selected pathway, course objectives, lectures, textbooks and required readings, practice and practice aligned with field work (including capstone projects), with consideration of the extent of collaborative practice.

0	1	2	3	4
There is no or almost no instruction or practice that prepares teachers to use assessment data to drive secondary instruction.	There is very limited instruction or practice that prepares teachers to use assessment data to drive secondary instruction.	Instruction and practice on using assessment data to drive instruction is limited but includes coursework that is subject-specific.	Instruction and practice on using assessment data to drive instruction is evident and includes coursework that is subject-specific.	Instruction and practice on using assessment data to drive instruction is extensive and includes coursework that is subject-specific.

49 For purposes of our analysis, we counted instruction and practice on "pre-assessment" as instruction and practice on formative assessment, even though pre-assessment is only one of many forms of formative assessment.

Examples of evaluations in Instructional Decision Making at each rating level

Note: Each example is provided for illustrative purposes only and represents only one of many ways by which coursework could earn a particular rating.

Elementary programs

Sample elementary program earning a "0": *There is no or almost no instruction or practice that prepares teachers to use assessment data to drive instruction in specific elementary subject areas.*

- Assessment is such a small feature of a course taken in conjunction with student teaching that there is only one general assessment-related objective and no objective related to assessment-informed planning.
- Lectures on the topic are limited, if provided at all.
- There is no required textbook addressing assessment in general or using assessment to inform planning.
- There is no practice (thus no practice aligned with field work or collaborative practice) on using assessment data to plan instruction.

Sample elementary program earning a "1": *There is very limited instruction or practice that prepares teachers to use assessment data to drive instruction in specific elementary subject areas.*

- While a non-methods course in this program has four objectives on using assessment data for planning, it does not appear to have any related instruction on using assessment data to plan instruction.
- There is one lecture on "Formative Assessment: Ongoing Assessment to Promote Student Success."
- Two methods courses are assessment-relevant, but neither has any coursework features that suggest instruction in this assessment domain.
- There is no practice (thus no practice aligned with field work), nor is there collaborative practice on using assessment data to plan instruction.

Sample elementary program earning a "2": *Instruction and practice on using assessment data to drive instruction is evident but only in one or two elementary subject areas.*

- The two assessment-relevant courses in this program include one focused on assessment only and a "curriculum and instruction" course that also touches on the topic; between the two courses, there are two objectives relevant to using assessment data to plan instruction.
- There are no lectures on using assessment data to plan instruction.
- A required textbook addresses the "use of assessment to support student learning."
- There is one practice assignment, and it is aligned with field work: "How did the data collected from the pre-assessment guide lesson development and instruction? Based on your experience teaching the lesson and analyzing assessment data, what changes would you make in the lesson?" There is no collaborative practice.

Sample elementary program earning a "3": *Instruction and practice on using assessment data to drive instruction is evident but not in all four core elementary subject areas.*

- While a total of five courses in this program were deemed assessment relevant (including a social studies course, a math methods course and an elementary curriculum course), only one course has one objective related to using assessment data for planning instruction.
- One-half of one lecture is devoted to "Formative/Informative" assessment.
- Two required textbooks address assessment, and one of these focuses on "backwards design."
- While there is no practice in this program other than in a capstone project, the practice required in the project is strong. It requires the teacher candidate to discuss "the ways in which formative and summative data informed instructional decisions…[with]implications for remediation and revision of instruction" and to "propose a remediation plan for those students who did not make growth."

Sample elementary program earning a "4": *No elementary program earned a "4" in this domain.*

Secondary programs

Sample secondary program earning a "0": *There is no or almost no instruction or practice that prepares teachers to use assessment data to drive secondary instruction.*

- Neither of the two assessment-relevant courses (a general methods course and a methods course in English, the randomly selected pathway) has an objective related to using assessment data to plan instruction.
- There is one lecture on "Lesson Planning – Backwards Design."
- There are no required textbooks or readings that address any aspect of assessment.
- There is no practice (thus no practice aligned with field work), nor is there collaborative practice on using assessment data to plan instruction.

Sample secondary program earning a "1": *There is very limited instruction or practice that prepares teachers to use assessment data to drive secondary instruction.*

- Neither of the two assessment-relevant courses (a general methods course and a methods course in social studies, the randomly selected pathway) has an objective related to using assessment data to plan instruction.
- There are no lectures on using assessment data to plan instruction.
- There are no required textbooks or readings that address any aspect of assessment.
- The only practice is aligned with field work and requires preparation of formative assessments. There is no collaborative practice.

Sample secondary program earning a "2": *Instruction and practice on using assessment data to drive instruction is limited but includes coursework that is subject-specific.*

- Of the two assessment-relevant courses (one focused on assessment and a methods course in science, the randomly selected pathway), the assessment-focused course has the one objective related to using assessment data to plan instruction.
- There is one lecture on formative assessment and one lecture on integrating standards with the "understanding by design" approach to instructional planning.
- A required textbook addresses "understanding by design."
- The only practice is the development of a teaching unit using an "understanding by design" template. (This may be done in groups of three.)

Sample secondary program earning a "3": *Instruction and practice on using assessment data to drive instruction is evident and includes coursework that is subject-specific.*

- The methods course in English, the randomly selected pathway, is the only assessment-relevant course.
- Lectures address "Backwards Design: how to use the standards and outcomes to direct your instruction," "Using Backwards Design" and analyzing student writing samples to "plan instruction based on this analysis."
- There are no required textbooks or readings that address any aspect of assessment.
- Practice includes a "Pre-Assessment Activity for Shakespeare," involving the use of formative assessments, and practice aligned with field work requiring teacher candidates to "understand the purposes of different assessments (including state mandated exams) and how to make instructional decisions that improve student performance." There is no collaborative practice.

Sample secondary program earning a "4": *Instruction and practice on using assessment data to drive instruction is extensive and includes coursework that is subject-specific.*

- Four courses (one on general methods and three on English/language arts methods) address assessment.
- Three lectures in an English methods course address use of assessment data for instructional planning.
- There are no required textbooks or readings that address any aspect of assessment.
- Practice includes a heavily weighted class assignment involving analyzing artifacts of student writing to "assess student learning, to assess your instructional practice, and to revise and plan for future writing instruction;" the assignment is presented to class "colleagues." A separate capstone project requires that teacher candidates supply artifacts that demonstrate that they align assessments with content goals and plan backwards from summative assessments, while using formative assessments to guide instruction.

Appendix 3: Research looking at how assessment is taught in teacher preparation programs and the impact on teachers

One of the only available sources of information about the nature of assessment coursework in initial certification programs is found in a cursory survey of 60 institutions conducted in 2010 by two graduate students at George Washington University.[50] Teacher educators were asked whether they teach students how to use data, and, if so, whether the coursework 1) entailed a stand-alone course or was a component of several courses and 2) was required. Of the 25 institutions that responded, almost all (23) indicated that they offered some assessment coursework, and 18 labeled the coursework as required. Respondents were about evenly split on the mode of delivery, with some relying on a single course and others relying on multiple courses.

A second source is a 2011 study conducted by the Educational Testing Service (ETS) on coverage of formative assessment by 22 teacher preparation programs in New Jersey. The study found only three programs in which formative assessment was specifically mentioned.[51]

The following table categorizes the 26 studies we have located that address the impact on teachers of assessment coursework.

"Studies with stronger design" use some sort of control or comparison group in an experiment, natural or otherwise, or use a multiple regression for correlation. These studies have a sample size of 100 or more.

"Studies with weaker design" have no comparison or control, are often simply case studies with potential selection bias, and rely on survey or otherwise qualitative data. These studies have a sample size of fewer than 100.

Total number of studies	Studies with stronger design		Studies with weaker design	
	No consideration of teacher effectiveness	Consideration of teacher effectiveness	No consideration of teacher effectiveness	Consideration of teacher effectiveness**
26	**2** (g),(x)	**0**	**16** (a),(b),(c),(d),(e),(f),(h),(j),(k),(l*),(o),(r),(s),(v),(w*),(y),(aa*)	**8** (i*),(m*),(n),(p*),(q),(t*),(u*),(z*)

* Research conducted on an in-service sample with applicability to pre-service preparation.

** This consideration of teacher effectiveness does not include use of data from standardized student assessments.

Citations for articles categorized in the table are listed below. These articles were located in the Education Research Complete and ERIC (Education Resource Information Center) databases from listings of reports on research conducted in the United States, Canada, England and Australia that were published between 2000 and 2011 in peer-reviewed journals.

50 Mann, B., & Simon, T. (July 2010). *Teaching teachers to use data*. Washington, DC: The George Washington University.

51 http://blogs.edweek.org/edweek/teacherbeat/2011/12/how_do_we_train_teachers_to_us.html

a) Bangert, A., & Kelting-Gibson, L. (2006). Teaching principles of Assessment Literacy through teacher work sample methodology. *Teacher Education and Practice*, *19*(3), 351-364.

b) Bellara, A. P., & Hibbard, S. T. (2010). Assessing learner needs through formative evaluations in a prescriptive course: Self-reflection of teaching practices through student onput. *International Journal of Learning*, *17*(7), 359-368.

c) Bennett, K., & Cunningham, A. C. (2009). Teaching formative assessment strategies to pre-service teachers: Exploring the use of handheld computing to facilitate the action research process. *Journal of Computing in Teacher Education*, *25*(3), 99-105.

d) Buck, G. A., Trauth-Nare, A., & Kaftan, J. (2010). Making formative assessment discernable to pre-service teachers of science. *Journal of Research In Science Teaching*, *47*(4), 402-421.

e) Campbell, C., & Collins, V. L. (2007). Identifying essential topics in general and special education introductory assessment textbooks. *Educational Measurement: Issues & Practice*, 26(1), 9-18.

f) Dass, Pradeep M. (2005). Using a science/technology/society approach to prepare reform-oriented science teachers: The case of a secondary science methods course. *Issues in Teacher Education*, *14*(1), 95-108.

g) DeLuca, C., & Klinger, D. A. (2010). Assessment Literacy development: Identifying gaps in teacher candidates' learning. *Assessment in Education: Principles, Policy & Practice*, *17*(4), 419-438.

h) Dorfman, A. B., Galluzzo, G. R., & Meisels, S. J. (2006). Learning to teach: Developing assessment skills when program and placement are aligned. *Journal of Early Childhood Teacher Education*, *27*(3), 231-247.

i) Fan, Y., Wang, T., & Wang, K. (2011). A web-based model for developing Assessment Literacy of secondary in-service teachers. *Computers & Education*, *57*(2), 1727-1740.

j) Forbush, D. E., Stenhoff, D. M., Vasquez III, E., Furzland, M., Alexander, M., & Stein, J. (2007). Evaluation of an online tool for assessing competence in achievement testing. *Teacher Education & Special Education*, *30*(3), 142-154.

k) Graham, P. P. (2005). Classroom-based assessment: Changing knowledge and practice through pre-service teacher education. *Teaching and Teacher Education: An International Journal of Research and Studies*, *21*(6), 607-621.

l) Huai, N., Braden, J. P., White, J. L., & Elliott, S. N. (2006). Effect of an internet-based professional development program on teachers' Assessment Literacy for all students. *Teacher Education and Special Education*, *29*(4), 36-52.

m) Hunsaker, S. L., Nielsen, A., & Bartlett, B. (2010). Correlates of teacher practices influencing student outcomes in reading instruction for advanced readers. *Gifted Child Quarterly*, *54*(4), 273-282.

n) Jie-Qi, C., & McNamee, G. (2006). Strengthening early childhood teacher preparation: Integrating assessment, curriculum development, and instructional practice in student teaching. *Journal of Early Childhood Teacher Education*, *27*(2), 109-128.

o) Mayor, S. (2005). Pre-service teachers' developing perspectives on assessment and remediation of struggling readers. *Reading Improvement*, *42*(3), 164.

p) Menzies, H. M., Mahdavi, J. N., & Lewis, J. L. (2008). Early intervention in reading: From research to practice. *Remedial and Special Education*, *29*(2), 67-77.

q) Moore, R. (2006). Taking action: Assessing the impact of pre-service teaching on learning. *Action in Teacher Education*, *28*(3), 53-60.

r) Morrison, J. A. (2005). Using science notebooks to promote pre-service teachers' understanding of formative assessment. *Issues in Teacher Education*, *14*(1), 5-21.

s) Morrison, J. A., McDuffie, A., & Akerson, V. L. (2005). Pre-service teachers' development and implementation of science performance assessment tasks. *International Journal of Science And Mathematics Education*, 3(3), 379-406.

t) Ruiz-Primo, M., & Furtak, E. (2006). Informal formative assessment and scientific inquiry: Exploring teachers' practices and student learning. *Educational Assessment*, *11*(3-4), 237-263.

u) Sato, M., Wei, R., & Darling-Hammond, L. (2008). Improving teachers' assessment practices through professional development: The case of national board certification. *American Educational Research Journal*, *45*(3), 669-700.

v) Siegel, M. A., & Wissehr, C. (2011). Preparing for the plunge: Pre-service teachers' Assessment Literacy. *Journal of Science Teacher Education*, *22*(4), 371-391.

w) Southerland, S. A., Sowell, S., & Enderle, P. (2011). Science teachers' pedagogical discontentment: Its sources and potential for change. *Journal of Science Teacher Education*, *22*(5), 437-457.

x) Stobaugh, R., Tassell, J., & Norman, A. D. (2010). Improving pre-service teacher preparation through the teacher work sample: Exploring assessment and analysis of student learning. *Action in Teacher Education*, *32*(1), 39-53.

y) Tomanek, D., Talanquer, V., & Novodvorsky, I. (2008). What do science teachers consider when selecting formative assessment tasks? *Journal of Research in Science Teaching*, *45*(10), 1113-1130.

z) Volante, L., & Beckett, D. (2011). Formative assessment and the contemporary classroom: Synergies and tensions between research and practice. *Canadian Journal of Education*, *34*(2), 239-255.

aa) Windschitl, M., Thompson, J., & Braaten, M. (2011). Ambitious pedagogy by novice teachers: Who benefits from tool-supported collaborative inquiry into practice and why? *Teachers College Record*, *113*(7), 1311-1360.

Do state regulations speak to teacher preparation in assessment?

State	
Alabama	☐
Alaska	■
Arizona	■
Arkansas	■
California	■
Colorado	■
Connecticut	■
Delaware	☐
District of Columbia	☐
Florida	■*
Georgia	■
Hawaii	■
Idaho	■
Illinois	■
Indiana	☐
Iowa	■
Kansas	■
Kentucky	☐
Louisiana	■
Maine	■
Maryland	☐
Massachusetts	■
Michigan	☐
Minnesota	■
Mississippi	☐
Missouri	■
Montana	☐
Nebraska	☐
Nevada	☐
New Hampshire	■**
New Jersey	■
New Mexico	☐
New York	☐
North Carolina	■
North Dakota	■
Ohio	■
Oklahoma	■
Oregon	☐
Pennsylvania	☐
Rhode Island	■
South Carolina	☐
South Dakota	■
Tennessee	■
Texas	☐
Utah	☐
Vermont	☐
Virginia	■
Washington	■
West Virginia	■
Wisconsin	☐
Wyoming	☐

* Only with regard to reading instruction

** Only with regard to elementary preparation programs

Appendix 4: State regulations, accreditation standards, professional standards

State regulations

All teacher preparation programs, whether housed in public or in private institutions, must be approved by the state. The table below summarizes the nature of state regulations with regard to whether states explicitly or implicitly require that programs prepare candidates in assessment.[52]

Even in states that have relevant regulations, those regulations can differ considerably in focus and scope. Some regulations are fairly brief and general. For example, New York's regulations[53] state, in part:

> *The program shall provide study that will permit candidates to obtain the following pedagogical knowledge, understanding, and skills:*
> *(vii) formal and informal methods of assessing student learning and the means of analyzing one's own teaching practice — and skill in using information gathered through assessment and analysis to plan or modify instruction, and skill in using various resources to enhance teaching.*

In contrast, Louisiana's regulations[54] are extensive and specific:

> ***Component III.D. The teacher demonstrates ability to assess and facilitate student academic growth***
> ***Attributes: III.D.1 Consistently monitors ongoing performance of students.***
> *The beginning teacher will 1) use a variety of assessment methods, including technology, that are appropriate for evaluating student achievement and instructional goals and objectives; 2) communicate assessment criteria and standards to students; 3) adjust instruction based on ongoing assessments of student understanding; and 4) analyze assessment results to help plan instruction for groups of students or individuals.*
> *III.D.2 Uses appropriate and effective assessment techniques.*
> > *The beginning teacher will 1) use curriculum-embedded and standardized assessment to assess progress; 2) design assessments, where appropriate, that reflect real-world applications of knowledge and understanding; 3) promote students' use of self- monitoring and self-assessment; and 4) use alternative instructional approaches and assessments to ensure that all students learn and succeed.*

52 States can implicitly require such preparation by specifying professional competencies for teachers that include knowledge of assessment.

53 Regulations of the Commissioner of Education 52.21. (Access at: http://www.highered.nysed.gov/ocue/52.21.htm)

54 Guidelines for the Submission and Review of Redesigned teacher Preparation Programs, "Components of Effective Teaching." (Access at: http://www.laregentsarchive.com/Academic/TE/redesign_guidelines.pdf)

III.D.3 Provides timely feedback to students regarding their progress.

The beginning teacher will 1) use appropriate language and formats to provide each student with timely feedback that is accurate, constructive, substantive, and specific; 2) promote students' ability to use feedback to guide and enhance their learning; and 3) base feedback on high expectations for student learning.

III.D.4 Produces evidence of student academic growth under his/her instruction.

The beginning teacher will 1) collect and maintain accurate records; 2) analyze and interpret assessment data; and 3) summarize assessment results to share with students, families, and school administrators.

Moreover, additional preparation requirements related to assessment may not be evident in regulations. For example, Oregon does not appear in our review of regulations to have any regulations that touch on the preparation of teachers in assessment, but candidates seeking initial licensure must submit to the state two "work samples" that include assessments,[55] analysis of assessment data and the use of assessment data in instructional plans.[56]

The difficulty of ascertaining the exact nature of requirements for teacher preparation (especially when survey questions concern both teacher preparation requirements and requirements for preparation of administrators) may explain inconsistent responses from state personnel in several surveys conducted by the DQC. In a broad survey about many aspects of state initiatives on use of data, the DQC asked state agency personnel about whether training on data driven instruction figured into their state's approval process for educator and/or leader preparation programs:

Does your state's program approval process require educator and/or leader preparation programs to demonstrate that they are adequately training their candidates to analyze, interpret, and use student- and aggregate-level data to adapt classroom, building, and district practices based on student need?

About two dozen states answered affirmatively in each of the two most recent surveys, but a large number of states answered inconsistently, with their answer in one survey not matching their answer in the second, including states whose affirmative answer in the earlier survey was not repeated in the subsequent survey.

Institutional accreditation standards

NCATE is the largest accreditor of teacher preparation programs, having accredited about half of the nation's 1,400 institutions offering such programs.

NCATE has a standard for what teacher candidates should learn about assessment.[57] Expectations are fairly low. Only candidates in advanced certification programs (not candidates in initial certification programs at the undergraduate or

55 It does require that administrators "demonstrate the ability to use aggregated and disaggregated student achievement data to develop effective instructional programs."

56 Oregon's requirements (Administrative Code 584-017-0185) can be accessed at http://arcweb.sos.state.or.us/pages/rules/oars_500/oar_584/584_017.html.

Other states requiring teacher work samples that address assessment explicitly include Washington (WAC 181-78A-255), Kansas (see the Department of Education's Kansas Performance Teaching Portfolio: Content Guidelines, 2011, at http://www.ksde.org/LinkClick.aspx?fileticket=_FxbAFAEop4%3D&tabid=3769&mid=11692) and Missouri (see the Department of Elementary and Secondary Education's Missouri Standards for Teacher Preparation Programs and Benchmarks for Preliminary Teacher Education Programs at http://www.dese.mo.gov/schoollaw/rulesregs/documents/MoSTEP_10-06.pdf

57 NCATE also published a report in 2010 on assessment in teacher preparation: Assessment as a Critical Element in Clinical Experience for Teacher Preparation, which can be accessed at http://www.ncate.org/LinkClick.aspx?fileticket=oo50CSYDEFM%3D&tabid=715

graduate level) are expected to have a "thorough knowledge" of assessment that includes making "data-driven decisions."[58]

> ***TARGET***
>
> *Teacher candidates focus on student learning and study the effects of their work. They assess and analyze student learning, make appropriate adjustments to instruction, monitor student learning, and have a positive effect on learning for all students. Candidates in advanced programs for teachers have a thorough understanding of assessment. They analyze student, classroom, and school performance data and make data-driven decisions about strategies for teaching and learning so that all students learn. They collaborate with other professionals to identify and design strategies and interventions that support student learning.*

Professional standards

Many states have professional standards for teachers that guide the nature of preparation provided to teacher candidates. These standards often articulate the professional competencies that coursework and clinical practice are designed to build. Thirty-six states[59] have adopted as their professional standards the model core teaching standards issued by the Interstate Teacher Assessment and Support Consortium (InTASC).[60] In 2011, InTASC issued a revised assessment standard:

> *The teacher understands and uses multiple methods of assessment to engage learners in their own growth, to monitor learner progress, and to guide the teacher's and learner's decision making.*
>
> *(The standard can be found in its entirety below.)*

The substantive differences between this new standard and the previous InTASC assessment standard are few: "Formative" and "summative" assessments are referenced in the new standard, whereas the old standard referenced "informal" and "formal" assessments used for the same instructional purposes; collaborative work to examine test and other performance data is included in the new standard, whereas only individual work was mentioned in the old.

Of some note is a new performance goal also added to the InTASC collaboration standard:

> *The teacher participates actively as part of an instructional team, giving and receiving feedback on practice, examining student work, analyzing data from multiple sources, and sharing responsibility for each student's learning.*

58 Access at: http://www.ncate.org/Standards/NCATEUnitStandards/UnitStandardsinEffect2008/tabid/476/Default.aspx#stnd1

59 Although the consortium has always emphasized that state professional standards should only use InTASC standards as a foundation, most states that are members use the standards verbatim.

60 Access at: http://www.ccsso.org/Documents/2011/InTASC_Model_Core_Teaching_Standards_2011.pdf

InTASC Standard #6 - *Assessment The teacher understands and uses multiple methods of assessment to engage learners in their own growth, to monitor learner progress and to guide the teacher's and the learner's decision making.*

Performances

6(a) The teacher balances the use of formative and summative assessment as appropriate to support, verify and document learning.

6(b) The teacher designs assessments that match learning objectives with assessment methods and minimizes sources of bias that can distort assessment results.

6(c) The teacher works independently and collaboratively to examine test and other performance data to understand each learner's progress and to guide planning.

6(d) The teacher engages learners in understanding and identifying quality work and provides them with effective descriptive feedback to guide their progress toward that work.

6(e) The teacher engages learners in multiple ways of demonstrating knowledge and skill as part of the assessment process.

6(f) The teacher models and structures processes that guide learners in examining their own thinking and learning as well as the performance of others.

6(g) The teacher effectively uses multiple and appropriate types of assessment data to identify each student's learning needs and to develop differentiated learning experiences.

6(h) The teacher prepares all learners for the demands of particular assessment formats and makes appropriate accommodations in assessments or testing conditions, especially for learners with disabilities and language learning needs.

6(i) The teacher continually seeks appropriate ways to employ technology to support assessment practice both to engage learners more fully and to assess and address learner needs. Critical

6(o) The teacher knows when and how to evaluate and report learner progress against standards.

6(p) The teacher understands how to prepare learners for assessments and how to make accommodations in assessments and testing conditions, especially for learners with disabilities and language learning needs.

Essential Knowledge

6(j) The teacher understands the differences between formative and summative applications of assessment and knows how and when to use each.

6(k) The teacher understands the range of types and multiple purposes of assessment and how to design, adapt or select appropriate assessments to address specific learning goals and individual differences and to minimize sources of bias.

6(l) The teacher knows how to analyze assessment data to understand patterns and gaps in learning, to guide planning and instruction and to provide meaningful feedback to all learners.

6(m) The teacher knows when and how to engage learners in analyzing their own assessment results and in helping to set goals for their own learning.

6(n) The teacher understands the positive impact of effective descriptive feedback for learners and knows a variety of strategies for communicating this feedback.

6(o) The teacher knows when and how to evaluate and report learner progress against standards.

6(p) The teacher understands how to prepare learners for assessments and how to make accommodations in assessments and testing conditions, especially for learners with disabilities and language learning needs.

Dispositions

6(q) The teacher is committed to engaging learners actively in assessment processes and to developing each learner's capacity to review and communicate about their own progress and learning.

6(r) The teacher takes responsibility for aligning instruction and assessment with learning goals.

6(s) The teacher is committed to providing timely and effective descriptive feedback to learners on their progress.

6(t) The teacher is committed to using multiple types of assessment processes to support, verify and document learning.

6(u) The teacher is committed to making accommodations in assessments and testing conditions, especially for learners with disabilities and language learning needs.

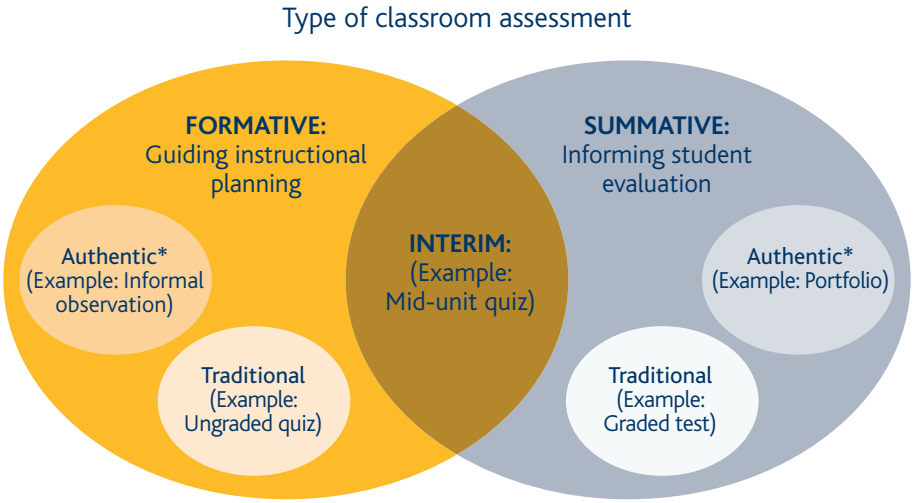
6(v) The teacher is committed to the ethical use of various assessments and assessment data to identify learner strengths and needs to promote learner growth.

Appendix 5: A short tutorial on the taxonomy of assessment

While "norm-referenced" student performance data (provided by tests such as the SATs) that compare a student's performance to the performance of peers nationwide are used by school districts, the classroom teacher is most concerned with data from "criterion-referenced" assessment designed to determine whether a student has sufficiently mastered specific academic content defined by the state's K-12 learning standards.[61]

In turn, criterion-based assessment falls into two broad categories: internally and externally validated assessments. Internally validated, or "classroom assessments," are possibly developed, but at least selected, by the classroom teacher or a team of teachers at a school. These assessments are administered on a schedule determined by the teachers and scored by a scale at the teachers' discretion. Externally validated assessments are interim or final "standardized" assessments whose content and scoring are uniform across a district or a state. These assessments are administered on a schedule determined by districts or state agencies.[62]

Classroom assessments can be further divided into categories based on type (alternative, authentic or performance, as opposed to traditional "pencil and paper") and purpose ("formative assessment" informs teacher instruction whereas "summative assessment" informs student evaluation).[63]



*Also known as "alternative" or "performance-based."

The categorization of student performance data is more fluid than this categorization suggests. For example, most standardized assessments are designed to serve as end-of-year assessments of mastery and are therefore summative, but they can also provide rich data for guiding instruction in the succeeding school year, thus taking on a formative purpose.

61 Another category of assessment is termed "ipsative" — comparing a student's current performance to past performance. If standardized assessments are vertically scaled, they can serve both a summative and an ipsative purpose.

62 It follows then that classroom assessment could also be broadly defined as "internal assessment" and standardized assessment broadly defined as "external assessment."

63 Even this categorization does not exhaust other possible ones. For example, assessment is either "objective" (a classroom or standardized assessment on which each question has only one correct answer) or "subjective" (an assessment on which each question can be correctly answered in more than one way). Also useful is the categorization of classroom or standardized assessment as "formal" (i.e., using a written document and producing a numeric score or "informal" (i.e., less structured in format and more casually scored).

This report is available online at
www.nctq.org/p/publications/docs/assessment_report.pdf

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