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.

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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.

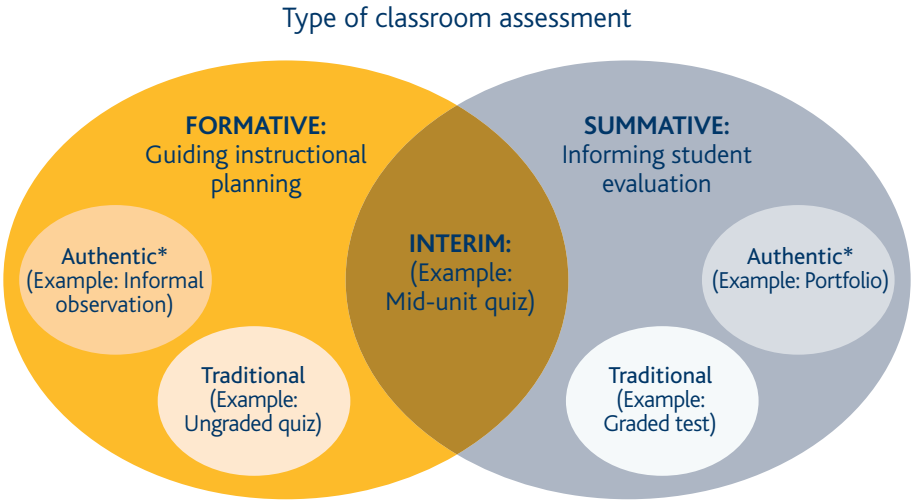
6(v) The teacher is committed to the ethical use of various assessments and assessment data to identify learner strengths and needs to promote learner growth.

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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