

Responding to *Gulino*: A psychometric practitioner perspective

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Abstract

The case of *Gulino v. Board of Education* challenged whether the content of an educator licensure exam represented appropriate expectations for all teachers. The resulting arguments raised questions about how a psychometric practitioner should engage in program design and test development, and how validity evidence to support the use of test scores for credentialing purposes should be collected and analyzed. Most, if not all, practitioners in the education and credentialing sectors rely primarily on the guidance provided by the *Test Standards* for directing the collection of validity evidence, evaluating the appropriateness of use of test scores, and supporting the inferences from those test scores.

The focal program described in this paper includes one required exam is analogous in many ways to the exam that was at the center of the *Gulino* case with respect to purpose, intended use, and design. Given these similarities, it seemed prudent to review the focal program and determine how it would stand up to a similar challenge. The response described in the paper represents a collaboration among a psychometrician working with the program, the program director, and the policymakers that are responsible for defining program characteristics. The result of this response was an update to the program's validation framework to ensure that the construction of the examination continues to meet the program's goals.

The evaluation described in this paper was conducted in two phases. In the first phase, the current program was evaluated for available validity evidence, identifying the strengths and areas for improvement. This review began with the historical foundations and rationale for the testing requirements, continued with a job task analysis with a focus on a content validation study to evaluate the content of the program, and then the evaluation of the test framework against a national database of related occupational expectations. The second phase was a program redesign activity where the findings from the first phase were used to evaluate the future directions for the program, what changes needed to be made to the current design (e.g., requirements, content, intended use of test scores), and how these changes will be implemented. The processes and outcomes of each phase provide guidance to practitioners on the design and execution of this type of process in the context of the court's ruling.

Responding to *Gulino*: A psychometric practitioner perspective

In large part, testing decisions are driven by psychometric best practices and professional standards. However, when legal challenges directly relate to the circumstances of a testing program, practice focus may shift to evaluate vulnerability in the focal areas. For almost 20 years, the case of *Gulino v. Board of Education of the City School District of the City of New York* (2015a; 2015b) held the attention of state-level teacher credentialing programs as it raised challenges about the requirements for teacher licensure.

The *Gulino* case was focused on the New York Liberal Arts and Science Test (LAST) which was a requirement for anyone in the state teaching an educator license. The LAST was a measure of general knowledge including:

- scientific, mathematical, and technological processes,
- historical and social scientific awareness,
- artistic expression and the humanities,
- communication and research skills, and
- written analysis and expression.

A group of plaintiffs – who were employed in temporary teacher positions – were unable to pass this test and thus either lost or were denied a permanent position. In 2012, the New York court found the department of education did not prove the job relatedness of the content in the LAST, and thus it was unlawful to require passing this exam as a requirement for teacher licensure due to the disparate impact that was found for the exam. Concurrently, the state of New York changed their requirements for teacher licensure and redeveloped the LAST into a new exam (the Academic Literacy Skills Test [ALST]) which is focused on reading instruction and writing ability.

Although the *Gulino* case was focused in New York state, the potential implications could be further reaching. Each state sets their own requirements for teacher licensure including what knowledge and skills must be demonstrated through a standardized assessment. Beyond assessments focused on subject matter knowledge (e.g., Physics, Psychology, Language) and pedagogy, many of these state-level programs include expectations regarding general knowledge (e.g., reading comprehension skills, application of math concepts, writing ability). The teacher licensure program in Oklahoma – this focus of this paper - is one such program.

Oklahoma Teacher Credentialing

The Oklahoma Office of Educational Quality and Accountability (OEQA) is responsible for overseeing the Certification Examinations for Oklahoma Educators (CEOE) program which includes over 50 exams:

- 1 measure of general knowledge: Oklahoma General Education Test (OGET)
- 2 measures of pedagogy [1 for elem/middle school, 1 for middle/high school]: Oklahoma Professional Teaching Exam (OPTE)

- 53 measures of subject area knowledge: Oklahoma Subject Area Test (OSAT)

Teacher candidates in the state must take and pass the OGET, the OPTE, and at least one OSAT to be eligible for the credential. The OGET is designed to measure candidates' knowledge of:

- reading comprehension
- communication skills
- critical thinking in mathematics
- mathematical computation skills
- knowledge in liberal studies (Science, Art and Literature, Social Sciences)
- writing ability

Given the similarities between the content of the LAST and the OGET, the OEQA identified the need to conduct their own evaluation of the OGET with a lens towards how this measure helped in making credentialing decisions about teachers now and in the future. This paper describes the resulting two-phase validity research project designed to evaluate the current and future status of the OGET. As noted in the *Standards for Educational and Psychological Testing* (AERA, APA, & NCME, 2014), "Validation of credentialing tests depends mainly on content-related evidence, often in the form of judgments that the test adequately represents the content domain associated with the occupation or specialty being considered" (p.175). Because scores from this component of the program are explicitly used to evaluate whether entry level educator candidates are at least minimally qualified, this project aligns with this professional expectation to gather and evaluate content-related evidence to build the validity foundation for the OGET. Because the courts in the *Gulino* case did not allow the defendants to rely solely on adherence to the *Standards*, a multi-faceted approach was taken to review the historical foundations of the exam, the current relevance of the expectations, and the most appropriate future for the

In the first phase of this project, the research focused on reviewing existing evidence to support the content framework of the OGET as part of the test documentation process. The second phase of this research was designed to take the output of the first phase, along with various external sources of information, to determine the future directions for this program including what will be included in the content framework. Each phase is described in detail within the subsequent sections.

Phase 1: Evaluation of Content Validity Evidence

One of the central challenges in the *Gulino* case was that the content of the exam was not job relevant for all entry-level educators. Therefore, the first focus of the evaluation conducted by the OEQA was identifying sources of validity evidence to support the constructs measured by the OGET. A generally accepted tenant in psychometrics is that validity is not an all or nothing condition but rather is an argument by which the use of test scores is supported by a collection of evidence (see Kane, Clouser, & Kane, 2017). The first source was the theoretical rationale to include a general education knowledge requirement as part of the construct for defining credentialing requirements for Oklahoma educators. The rationale is presented within this

report with evidence regarding the alignment of core elements of this mission statement to the requirements within the OGET. The second source of evidence was an independent analysis of the content validation survey data collected and evaluated during the creation of the content framework for the OGET. The empirical evidence from this study was reviewed to determine the perception of teachers and teacher educators about the proposed requirements for entry-level educators. Third, the requirements included within the OGET framework were compared to the job components of educators noted by O*NET, a national database of occupational tasks that may be used as a starting point for defining job related knowledge, skills, and abilities for a credential. Each source is described below along with the specific findings.

Validity Source #1: Construct Rationale

In 1994, the Oklahoma Commission for Teacher Preparation (OCTP, the Commission¹) published the *Report on Educator Preparation and Professional Development* (OCTP, 1994). This report documented the culmination of two years of work that followed the establishment of the Commission in 1992 after House Bill 2246 was passed the same year. The goal of the Commission was to develop “a new competency-based teacher preparation and professional development system” (p. 2). One specific decision of this group was to create a new teacher assessment system that would include general education, subject matter, and pedagogical components. When operationalized, these later became known as the Oklahoma General Education Test (OGET), the Oklahoma Subject Matter Test (OSAT), and the Oklahoma Professional Teaching Exam (OPTe). In regards to the inclusion of the OGET, the report notes that “All teacher candidates would undergo assessment of general education competencies. A state assessment component of general education would require candidates to demonstrate core competencies in critical thinking, communications, and computation” (p.123).

With this new requirement being formulated, the Commission further detailed the rationale for the requirement and expectations for general education for teacher preparation institutions. Specifically, the Commission noted as follows,

General education is based on the belief that neither liberal learning nor scientific knowledge should be confined to a cultural or technical elite. General education programs are appropriate to our college and university students because in a democracy all are asked to participate in political decisions. Equally important, general education courses provide students an introduction to the arts that makes possible a greater appreciation of history, culture, and artistic performance.

Moreover, general education has become an economic necessity. As our economy is increasingly global, Americans need to be able to communicate with people who do not speak English. They need a better sense of the world and their place in it. As the economy changes more rapidly in response to global economic threats, citizens need to have the skills that can be transferred from job to job and especially the ability to learn and grown in new jobs. And as the economy becomes more dependent on the

¹ The Commission was renamed the Office of Educational Quality and Accountability (OEQA) in 2014.

production and dissemination of information to all levels of an enterprise, every person needs to be able to think and communicate clearly.

Only teachers, who themselves have received the benefits of such a general education can hope to educate students in the skills and values that will in turn allow students to become well-educated citizens. Teachers with a rigorous general education will be able to impart to students the value of a life of continuous learning, productive activity, mutual understanding, and service to the public good. (p. 30-31)

Extending from their rationale to include this as part of the requirements for new educators, the Commission further detailed guidelines for teacher preparation programs to meet these new expectations. These guidelines were presented to teacher preparation programs in Oklahoma as foundational recommendations for changing their program to meet these new expectations. In turn, the assessments like the OGET were developed to assess the knowledge, skills, and abilities included within these guidelines. The content within the OGET was organized into a three-level structure of subareas (e.g., topics) and competencies (e.g., required knowledge, skills, and abilities) with descriptive statements to help candidates understand the expectations in the competencies.

As a part of this evaluation, the competencies from the OGET were aligned to the original guidelines recommended within the commission report (see Appendix A, Table A.1). The alignment in this Table shows the connection of the OGET competencies (i.e., knowledge, skills, and abilities) to the original recommendations from the Commission. Several recommendations for teacher preparation are not covered by the OGET (e.g., conversation skills, in-depth knowledge of another area of the world). These recommendations are likely be covered in other areas of the teacher preparation program.

Validity Source #2: Review of Content Validation Survey Evidence

Moving beyond the theoretical and foundational rationale to include the OGET as a component of entry level educator credentialing requirements, the second source of evidence investigated was the content validation survey conducted for the OGET test framework. The process of developing the content specification for a credentialing examination has implications for the defensibility of the ultimate test scores. In 1997, National Evaluation Systems (NES, now known as the Evaluation Systems Group of Pearson) conducted a content validation study of the Oklahoma General Education Test (OGET) for the OCTP. To evaluate the content validity of the new exam, NES developed a survey that contained 96 competencies and descriptive statements targeted to be measured on the OGET. The survey was distributed statewide to Oklahoma teachers and educator preparation faculty to gather their opinions on the importance of each competency and descriptive statement for an entry-level educator.

As part of this validity evidence evaluation, the responses from this survey were independently reanalyzed to determine if the connection between the findings of the original content validation survey and the requirements for entry-level educators can be confirmed. The findings from this review are summarized below.

NES sent out questionnaires to survey Oklahoma public schools and educator preparation institutions. From the historical information, it was unclear how many total surveys were sent to the public schools and higher education institutions and how many were distributed to individuals. In total, 763 survey responses were received and analyzed of which 628 were deemed qualified based on responses to screening questions. Note that although the absolute number of respondents may be robust, without information about the population at the time of the study (1997) and the distribution strategy, the actual response rate cannot be calculated. Of these qualified responses, 46% were educators and 54% were eligible college faculty. Because no information on the teacher or educator preparation faculty populations in the state of Oklahoma in 1997 was provided in the technical documentation for the study, we are unable to evaluate the representativeness of the respondent sample.

Respondents were asked whether they felt the specific content (competency, descriptive statement) was important to an entry-level educator (yes/no response), and how important it was (scale of 1=not important to 7=extremely important). Based on the analyses conducted (detailed in the full report) and using a minimum threshold for determination of inclusion, all 21 competencies and 75 descriptive statements included in the OGET framework were considered competencies that entry-level educators are expected to know. Similarly, all competencies and descriptive statements were rated as important. Figure 1 below shows a summary of the average importance ratings across all respondents. As shown in the figure, most descriptive statements and competencies were rated between ‘moderately important’ and ‘extremely important’. The results of this analysis support the outcomes of the original content validation survey and content defined in the OGET in 1997.



Figure 1. Average importance ratings for competencies and descriptive statements from the OGET content validation study.

Validity Source #3: Comparison to External Benchmarks

As a third source of evidence, the OGET competencies were linked to an external framework for expectations for educators. The Occupational Information Network (O*NET) is a database of information about a wide range of occupations that was developed through funding provided by the US Department of Labor/Employment and Training Administration. This database was developed for use by job seekers, employers, trainers, and others interested in learning more about standardized occupations. As it applies to the job analysis process, this resource can be used as a starting point when defining roles that may be licensed or certified.

Within the O*NET database, 19 occupations include the word “teacher”. For this comparison, we sampled four specific occupations that aligned with the targeted testing population for the OGET:

- Kindergarten Teacher (not special education)
- Elementary Teacher (not special education)
- Middle School Teacher, Except Special and Career
- Secondary School Teacher, Except Special and Career

Each of these frameworks is organized into several components:

- Tasks
- Tools
- Technology
- Knowledge
- Skills
- Abilities
- Work Activities
- Detailed Work Activities

Across the four reviewed frameworks, the specific expectations within each component were compared and aligned to identify which expectations were common across all grade levels. Several commonalities occurred across the four frameworks, but some expectations were unique to just one or two grade levels that reflected the difference in job requirements (see Appendix B for the full list and alignment). Within this larger set of expectations, specific components did reflect a requirement to have foundational background in general education. In Table 2, these requirements² are identified with the aligned OGET competencies. The results of this analysis show the connection between the requirements for general education knowledge and skills required by the OGET and some of the expectations for the teacher profession as reported by O*NET.

Summary of Phase 1 Validity Evidence

² Not all O*NET requirements are listed due to the extensive nature of the list. Many of the requirements focused on pedagogy related knowledge and skills that are explicitly considered separately within the credentialing program with specific tools and technologies. The full list is included in Appendix B.

This phase of the evaluation focused on reviewing and organizing the validity evidence in support of the existing content framework for the OGET that specifies the general knowledge required for all entry-level educators in the state of Oklahoma. The framework is organized into subareas, competencies, and descriptive statements. The focus of this evaluation was the competency level as this is the level at which items are aligned and test forms are constructed.

This review included three sources of validity evidence. The first source was the theoretical foundation for including general knowledge of a broad curriculum as a part of the requirements for entry-level educators. A review of these foundational requirements found close alignment with the competencies within the OGET framework.

The second source of evidence was an independent analysis of the survey responses from the initial content validation study of the OGET competencies descriptive statements. The results of this analysis suggested that all competencies and descriptive statements were judged to be important for entry-level educators at the time of the survey (1997). However, one limiting factor within this source of evidence was the lack of information about the number of surveys distributed to be able to evaluate response rate. Another limitation was the lack of demographic information about the teacher and educator preparation faculty populations in Oklahoma at the time to be able to evaluate representativeness of the responding sample. Both limitations are reasonable expectations when evaluating survey studies as part of content validation activities.

The third source of evidence was the results of a review of the O*NET database of occupational requirements as an external source of validation for those knowledge components included in the OGET framework. This comparison identified several areas where general knowledge and skills were part of the job requirements for multiple or all grade spans. However, this evidence only shows that the requirements within the OGET are part of the job requirements identified by O*NET, not that the OGET covers, or is intended to cover, all general knowledge or related tasks suggested by O*NET information.

In sum, the three sources of validity evidence suggested that at the outset of the development of the OGET, it had a compelling foundational justification that was directly linked to the content framework, the survey of practitioners in Oklahoma found sufficient support for the general education content included within the framework with the cautions noted above regarding interpretation, and the expectations for general knowledge can be reasonably linked to a national database of occupational knowledge expectations for these roles.

Phase 2: Designing the Future of the OGET

Beyond this historical support, it is important for programs to continue to evolve and evaluate the need for changes to adapt to new and emerging needs in their field. The original design for the general education test was conceptualized in 1994. Since that time there have been revisions to teacher education program accreditation requirements, teacher preparation programs, and student academic content and achievement standards. These changes warrant a structural and substantive evaluation of the existing program to maintain the intended

alignment among the interrelated components in the system. Therefore, the second phase of this evaluation project included a formal program design discussion with relevant stakeholders to evaluate the current and future needs of measurement of general education knowledge, skills, and abilities for entry-level educators.

The intent of these discussions was to gather opinions from those who were most knowledgeable about the expectations placed on entry-level educators. Therefore, three groups were convened: Educator Preparation Faculty, Educational Administrators, and Educators. Each panel included 6-7 professionals with varying levels of expertise. All members of the first group currently served in an educator preparation program within the state and all members of the second and third focus groups held current educator credentials within the state. During these focus groups, the panels were provided information on the background of the OGET, the current questions and considerations for the future of the exam, and the perspectives of other states on what was required for entry-level educators (with regards to general knowledge). Based on the background information, each panel was asked to brainstorm their ideas for what knowledge (beyond subject matter and pedagogy) were required for entry-level educators. After drafting this initial list of topic areas, each panel then closely reviewed the current OGET framework and suggested edits to the content, wording, and weighting. Each group was provided with discussions parameters including:

- The purpose of the OGET: measuring expectations of entry-level educators
- Topics already covered by the other parts of the CEOE (OPTE, OSAT)
- National trends in general knowledge and skill expectations for entry-level educators
- Expectations for professional standards in credentialing
 - Focused on entry-level skills
 - Required/fair for all professionals eligible for the credential
 - Link to job must be identifiable

The educator preparation faculty and administrations completed their review on the first day. The educators met on the second day to complete same task but also review/consider the input of the prior panels.

Results

Each focus group engaged in a rich discussion of the expectations for educators and several key themes emerged as consistent recommendations:

- All groups emphasized the need to incorporate an expanded view of literacy to better capture the broader topic of information literacy.
- All groups suggested that the Liberal Studies no longer be a separate subarea as many of these topics did not represent critical knowledge and skills for entry-level educators. However, the contexts covered in this subarea (e.g., science, art, politics, culture) should be represented in the other subareas assessing critical thinking skills in reading and math.
- All groups indicated that the writing assessment still represented important skills
- All groups indicated that the Reading subarea/s were the most important content areas covered on the exam.

Figure 2 below shows the high-level suggestions for revision of the framework which includes combining similarly focused sections of the exam, removing the content focused on liberal studies (science, art and literature, social studies), and creation of a section on information literacy and research. Each topic area is listed below under the current and suggested versions of the framework along with the recommended weighting.

Figure 2. Suggested Revision to the current OGET framework.

Current OGET Framework		Suggested OGET Framework
Critical Thinking Skills: Reading and Comprehension [20%]		Communication Skills [30%]
Communication Skills [12%]		
Critical Thinking Skills: Mathematics [12%]		Mathematics [25%]
Computation Skills [12%]		
Critical Thinking Skills: Writing [20%]		Writing Skills [25%]
Liberal Studies: Science, Art and Literature, Social Studies [24%]		
		Information Literacy and Research [20%]

There are also several recommendations from one or two groups (i.e., not all 3) that were submitted to OEQA for consideration. All suggestions were considered in the revision process, and OEQA worked with their test development vendor create a revised version of the framework. This revised framework will be formulated in a survey which will be sent out to a larger sample of Oklahoma educators to gather their opinions as to the importance of each part of the framework. The final revised framework will be based on responses from the survey.

Summary of Evaluation Process

Regular test maintenance activities (including evaluation) should be a part of the management of any test development processes. However, there are often situations that arise which prompt program leaders to engage in a specific evaluation or review. The *Gulino* case could have far-reaching implications as the focal program in that case is similar in structure and requirements to others across the country. As the oversight organization for one of those programs, the OEQA decided to conduct a preemptive evaluation project to organize the validity evidence available to support the intended use of these test scores.

The resulting evaluation was conducted in the two phases. In the first phase, the OEQA focused on the historical foundation of their general education measure. In addition to the historical review, this phase also linked the current expectations to those identified for the same

profession by a national external source. The summative results from this multi-faceted phase were used to create a single source of validation information on the current OGET measure. In the second phase, the future of the exam program was explored through an exploration of expectations for new teachers identified through research, focus groups, and a large sample survey.

When legal challenges to large-scale testing programs arise, there is no absolute way to predict how validity evidence will be reviewed and evaluated by the courts. In the *Gulino* case, there were specific claims that the program lacked evidence documenting the job relevance of particular expectations despite the fact that the testing program had followed generally accepted practices of identifying content for an exam. The process documented in this paper is the response designed and executed by one testing program who identified the potential relevance of the *Gulino* finding to their own programs. Although the process executed for this study may seem excessive and beyond what professional standards require, the implications of a challenge such as was in the *Gulino* case warrant the additional review. Other programs – either those that are similar to the one challenged in the *Gulino* case or facing a potential challenge – should consider the critical areas of validity evidence identified in this review and what evidence might need to be collected.

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Appendix A: Report on Analysis of Content Framework Survey

The table below shows the alignment of the OGET competencies to the Oklahoma General Education Guidelines.

Table A.1 - Alignment of OGET Competencies with original Oklahoma General Education Guidelines

Oklahoma General Education Guidelines³ <i>Preservice teacher preparation programs shall require that the teacher candidates...</i>	Aligned OGET Competencies⁴
demonstrate the ability to think critically	1. Identify a writer's point of view and intended meaning. 2. Analyze the relationship among ideas in written material. 3. Use critical reasoning skills to evaluate written material. 4. Recognize the roles of purpose and audience in written communication. 5. Recognize unity, focus, and development in writing.
write and speak clearly, correctly, and effectively	6. Recognize effective organization in writing. 7. Recognize sentences that effectively communicate intended messages. 8. Recognize standard conventions of formal written English usage in the United States. 21. Prepare an organized, developed composition in edited English in response to instructions regarding content, purpose, and audience.
analyze, discuss and use quantitative information, to develop a facility for mathematical problem solving and to understand connections between mathematics and other disciplines	9. Solve problems involving data interpretation and analysis. 10. Apply mathematical reasoning skills to analyze patterns and solve problems. 11. Solve applied problems using a combination of mathematical skills (including word problems involving one and two variables). 12. Solve word problems involving integers, fractions, decimals, and units of measurement. 13. Graph and solve algebraic equations with one and two variables. 14. Solve problems involving geometric figures.

³ Source: OCTP (1994), pages 34-37

⁴ Source: OGET Study Guide (http://www.ceoe.nesinc.com/PDFs/OGET_074_SG.pdf)

<p>Oklahoma General Education Guidelines³</p> <p><i>Preservice teacher preparation programs shall require that the teacher candidates...</i></p>	<p>Aligned OGET Competencies⁴</p>
<p>have a basic understanding of the natural world developed through a study of both the biological and physical sciences</p>	<p>15. Understand and analyze major scientific principles, concepts, and theories, and apply skills, principles, and procedures associated with scientific inquiry.</p> <p>16. Understand and analyze the historical development and cultural contexts of science and technology and the impact of science on society.</p>
<p>understand literature and the arts</p>	<p>17. Understand, interpret, and compare representations from the visual and performing arts from different periods and cultures, and understand the relationship of works of art to their social and historical contexts.</p> <p>18. Understand, interpret, and compare examples of literature from different periods and cultures, and understand the relationship of works of literature to their social and historical contexts.</p>
<p>understand the important political issues, economic processes, and social movements that have shaped history</p>	<p>20. Understand and analyze the concepts of freedom, diversity, and tolerance, their historical development, and their influence in human history.</p>
<p>understand and model the democratic principles of freedom, diversity, and tolerance</p>	
<p>have conversation skills at a novice level in a language, other than English, as defined by the associated council on the teaching of foreign languages</p>	
<p>have studied an area of the world outside the United States</p>	

Appendix B: Alignment of O*NET Requirements

The table below shows the alignment of the OGET competencies to the expectations identified in the O*NET for teacher occupations.

Table B.1: Alignment of OGET Competencies with O*NET Expectations for Teacher Occupations

O*NET Expectations for Teacher Occupations ⁵	Aligned OGET Competencies
English Language — Knowledge of the structure and content of the English language including the meaning and spelling of words, rules of composition, and grammar. [K, E, M, S]	6. Recognize effective organization in writing. 7. Recognize sentences that effectively communicate intended messages. 8. Recognize standard conventions of formal written English usage in the United States. 21. Prepare an organized, developed composition in edited English in response to instructions regarding content, purpose, and audience.
Mathematics — Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications. [E, M, S]	9. Solve problems involving data interpretation and analysis 10. Apply mathematical reasoning skills to analyze patterns and solve problems. 11. Solve applied problems using a combination of mathematical skills (including word problems involving one and two variables). 12. Solve word problems involving integers, fractions, decimals, and units of measurement. 13. Graph and solve algebraic equations with one and two variables. 14. Solve problems involving geometric figures. 15. Understand and analyze major scientific principles, concepts, and theories, and apply skills, principles, and procedures associated with scientific inquiry.
Sociology and Anthropology — Knowledge of group behavior and dynamics, societal trends and influences, human migrations, ethnicity, cultures and their history and origins. [E, M, S]	19. Understand and analyze the major political, social, economic, scientific, and cultural developments that shaped the course of history. 20. Understand and analyze the concepts of freedom, diversity, and tolerance, their historical development, and their influence in human history.
Philosophy and Theology — Knowledge of different philosophical systems and religions. This includes their basic principles, values, ethics, ways of thinking,	19. Understand and analyze the major political, social, economic, scientific, and cultural developments that shaped the course of history.

⁵ Each aligned expectation is noted with the source by occupation [K=Kindergarten, E=Elementary, M=Middle School, S=Secondary School]

O*NET Expectations for Teacher Occupations ⁵	Aligned OGET Competencies
customs, practices, and their impact on human culture. [E]	
History and Archeology — Knowledge of historical events and their causes, indicators, and effects on civilizations and cultures. [E]	<p>16. Understand and analyze the historical development and cultural contexts of science and technology and the impact of science on society.</p> <p>17. Understand, interpret, and compare representations from the visual and performing arts from different periods and cultures, and understand the relationship of works of art to their social and historical contexts.</p> <p>18. Understand, interpret, and compare examples of literature from different periods and cultures, and understand the relationship of works of literature to their social and historical contexts.</p> <p>19. Understand and analyze the major political, social, economic, scientific, and cultural developments that shaped the course of history.</p> <p>20. Understand and analyze the concepts of freedom, diversity, and tolerance, their historical development, and their influence in human history.</p>
Critical Thinking — Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems. [K, E, M, S]	3. Use critical reasoning skills to evaluate written material.
Writing — Communicating effectively in writing as appropriate for the needs of the audience. [K, E, M, S]	21. Prepare an organized, developed composition in edited English in response to instructions regarding content, purpose, and audience.
Mathematics — Using mathematics to solve problems. [E, S]	<p>9. Solve problems involving data interpretation and analysis.</p> <p>10. Apply mathematical reasoning skills to analyze patterns and solve problems.</p> <p>11. Solve applied problems using a combination of mathematical skills (including word problems involving one and two variables).</p> <p>12. Solve word problems involving integers, fractions, decimals, and units of measurement.</p> <p>13. Graph and solve algebraic equations with one and two variables.</p> <p>14. Solve problems involving geometric figures.</p>
Written Comprehension — The ability to read and understand information and ideas presented in writing. [K, E, M, S]	3. Use critical reasoning skills to evaluate written material.

O*NET Expectations for Teacher Occupations⁵	Aligned OGET Competencies
Written Expression — The ability to communicate information and ideas in writing so others will understand. [K, E, M, S]	21. Prepare an organized, developed composition in edited English in response to instructions regarding content, purpose, and audience.
Deductive Reasoning — The ability to apply general rules to specific problems to produce answers that make sense. [K, E, M, S]	3. Use critical reasoning skills to evaluate written material. 10. Apply mathematical reasoning skills to analyze patterns and solve problems.
Inductive Reasoning — The ability to combine pieces of information to form general rules or conclusions (includes finding a relationship among seemingly unrelated events). [K, E, M, S]	3. Use critical reasoning skills to evaluate written material. 10. Apply mathematical reasoning skills to analyze patterns and solve problems.
Mathematical Reasoning — The ability to choose the right mathematical methods or formulas to solve a problem. [E]	11. Solve applied problems using a combination of mathematical skills (including word problems involving one and two variables).
Making Decisions and Solving Problems — Analyzing information and evaluating results to choose the best solution and solve problems. [K, E, M, S]	10. Apply mathematical reasoning skills to analyze patterns and solve problems.
Processing Information — Compiling, coding, categorizing, calculating, tabulating, auditing, or verifying information or data. [E, M, S]	12. Solve word problems involving integers, fractions, decimals, and units of measurement.