

Targeting Success. An Evaluation of Information Literacy Standards: A Mixed Method
Approach Utilizing the Judgments of National Board Certified Teachers

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Abstract

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Information literacy—the ability to recognize when information is needed and then to locate, evaluate, and effectively use that information—is an essential skill set for 21st century students. In order for students to be prepared for college and career readiness, the component skills of information literacy should be explicit in educational policy documents that establish standards for student learning (Partnership for 21st Century Skills, 2009). Standard statements are guides for developing curriculum and instructional programs for students, and therefore should reflect what is known of cognitive development and must be clearly written so that all stakeholders—including policy makers, teachers, parents, and students—understand what students are being asked to do (Kendall, 2001). This research project sought to establish to what extent information–literacy-related standard statements represent developmentally appropriate grade-level designations. I did this by determining how well the Common Core State Standards (CCSS) and the American Association of School Librarians (AASL) standard statements reflect the information problem-solving process as represented by the Big6 model, and to what extent expert, experienced teachers (as represented by National Board Certificated Teachers [NBCTs])

in the state of Washington) agree with both the grade-level, developmental appropriateness and the importance of teaching from these standard statements.

The research process utilized a mixed-method design, consisting of a content analysis of the standard statements, a quantitative survey of NBCTs, and a series of four focus groups for explanatory feedback on the results of the survey.

Standard statements from CCSS and AASL were first sorted into Big6 stages (Task Definition, Information Seeking Strategies, Location and Access, Use of Information, Synthesis, Evaluation) and analyzed for the clarity of writing and the number of tasks involved. The content analysis of the standard statements found that the CCSS emphasized Big6 stage five (synthesis), while lacking three of the Big6 stages of the information problem solving process (task definition, information seeking strategies, and evaluation). The AASL standard statements included all six of the information problem solving stages, but both task definition and evaluation were underrepresented.

A survey then was created using the standard statements that represented three Big6 stages. This survey was sent electronically to NBCTs in the state of Washington. Ninety-six NBCTs completed the survey. Volunteers were recruited from the survey respondents to form four focus groups to provide explanations of the survey results from the participants' views.

Findings indicate that there is disagreement between NBCTs on the grade level designations assigned in the standard statements. Subjects were able to match 67% of second-grade standard statements as belonging to second grade, but only 49% of fifth-grade standard statements as belonging to fifth grade, and only 29% at eighth grade. However, in the section of the survey where respondents examined the standard statements closest to their own grade level, the NBCTs

did tend to agree with both the developmental appropriateness and the importance of teaching from the standard statements. This finding differs with the results of the first half of the survey and points to potential issues with the clarity of the standards and perhaps with teacher professional development. Without having the grade-level context, teachers had difficulty placing standard statements at the grade level intended by the authors of the standard statements. Whether this discrepancy is due to the lack of clarity of the standard statements, the lack of knowledge of the teachers, or perhaps the fact that teachers being given the grade level before the survey predisposes them to think this was an appropriate placement, is unclear and is therefore an area for further research.

The major contributions of this work point to the need 1) for the entire information problem-solving process to be explicitly included in national policy documents such as the CCSS and the AASL standards, so that the component skills of information literacy can be consistently reflected in and taught from standards statements for each grade level in increasing complexity; and 2) for greater collaboration between the writers of standards statements and classroom teachers with the aim of creating standard statements that are comprehensible to all stakeholders, including parents and students.

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1. Overview

This is a study of how expert, experienced educators view educational standards that address students' abilities to solve information problems as students develop from kindergarten to grade eight. The study sought to determine the current view of these abilities as : (1) operationalized by educational standards that deal with information problem solving, and (2) assessed by expert and experienced educators including classroom teachers, special education teachers and teacher/librarians. The study examined the results in order to identify areas of alignment and areas where gaps exist between educational standards and the views of expert, experienced educators. The resulting analysis provides a justification and insights for a developmental theory of information problem solving and inform instructional techniques for teaching information problem solving.

Chapter One of this dissertation first discusses the importance of information literacy and the need for research in information literacy and developmental changes. Second, the need for research in the area of information literacy and educational standards is reviewed. Third, the research questions this dissertation addresses are discussed. Fourth is an overview of the methodology. Fifth, delimitations of this study are described. Finally, contributions of this research are stated.

1.1 Introduction

This section will discuss the importance of information literacy, give an overview from the literature of current views of information problem solving and development, discuss different models of information problem solving, and identify the central concern of this research project.

1.1.1 Why information literacy and developmental theories?

The importance of information literacy is well agreed upon in library science, education, and among policy makers (American Association of School Librarians, 2009; American Association of School Librarians & Association for Educational Communications, 1998; Bruce, 2002; Considine, Horton, & Moorman, 2009; Eisenberg, 2008; Geyer, 2008; Heider, 2009; Johnston & Webber, 2005; Julien & Barker, 2009; Kong, 2009; Kovalik, Yutzey, & Piazza, 2012).

Information literacy has become such an important concept that President Barack Obama declared October 2009 National Information Literacy Awareness Month (Obama, 2009). It has become a cliché to announce that the amount of information available to individuals has exploded. Nonetheless, it is true. However, as the Presidential Proclamation points out, this explosion has not necessarily made the ability to find any particular piece of information easier and much of the freely obtained information on the World Wide Web is of limited value, especially to school-aged students engaged in research. Much information on the Web is repetitive, is biased because it is actually advertising, and in some cases it is deliberately meant to deceive. Information literacy is seen as one answer for dealing with both the explosion of information and the quality of that information.

One key issue of information literacy is: what are the capabilities of children of different ages to solve information problems?¹ This issue derives from a basic question of human developmental research which is, “How do individuals develop over time?” (Bjorklund, 2005; Miller, 2002).

Considering this question from the perspective of Information Science and information literacy,

¹ This dissertation uses the phrase information problem solving as the application of information literacy skills to solve information problems. Information literacy skills and information problem solving will be discussed in greater detail below.

a narrower question emerges, “How does the ability to solve information problems change as individuals develop over time?”

An important early step in problem solving is to define the task (J. D. Bransford, Brown, & Cocking, 2000). Part of defining the task is to identify what is already known. In this case, identifying how information problem solving changes as individuals develop over time, the first and seemingly easiest would be to examine what work has already been done in the field of information science. However, it appears that little research in information science or education has been directed at answering this question. Eastin, in describing the need for research in the area of cognitive development and the ability to make credibility judgments regarding digital media goes so far as to call the opportunities “wide open” (2008, p. 42).

In particular, little empirical work in the field of information science exists on children’s developmental changes in relation to information literacy skills (Kovalik et al., 2012; Latham & Gross, 2008) making it necessary to look to other fields, particularly psychology. Educational standards are the method that the education establishment determines what is to be taught at what grade level. Curriculum development theory advocates for a spiraling curriculum, one that revisits topics in more depth as children progress through the grade levels of school (Marzano, 2001). Thus information literacy standards should deal with concepts in an increasingly more complex manner as grade levels increase. This research project examines educational standards that apply to information problem solving through the use of the judgments of expert, experienced practitioners as a lens to examine current knowledge of the changing abilities of students to solve information problems at different grade levels.

1.1.2 Theoretical approach

This research takes a constructivist approach to knowledge. In a traditional educational system instruction comes from the authority of the teacher and the students are seen as vessels to be filled with knowledge. In constructivism, students create their own new knowledge based on their past experiences and their interaction with new experiences (DeLay, 1996; Savery & Duffy, 2001). The teacher goes from being the “sage on the stage to the guide by the side.” This same constructivist rationale may be applied to the learning standards. Standards should not just be handed down from committees of experts. Teachers must have some say in the creation and implementation of these standards. Before being able to guide students to new learning, the teachers must construct their own knowledge base around the standards and the content and processes covered by the standards.

1.1.3 Central concern of this research

This dissertation sought to explore issues related to how the abilities involved in solving information problems change over time in school-aged children. In other words, what are the capabilities of children of different ages to solve information problems? Is there an identifiable developmental sequence that individuals proceed through as they develop information processing skills? And, if so, what is it? More narrowly, this dissertation sought to explore to what extent are developmental differences exhibited in educational standards that are concerned with information literacy and to what extent to the developmental levels found in those statements are aligned with the views of expert, experienced teachers.

Conceptually this research project proceeds from two ideas:

First, as noted above, individuals undergo developmental changes during the time they are in school. As a result, one common method of curriculum planning is the spiral curriculum. In a spiral curriculum topics and or concepts are introduced at a basic level and as the school years pass, the topics/concepts are revisited at a more complex level. In essence, the spiral curriculum accounts for increased capability with increasing complexity of the material to be taught (Marzano, 2001). Scope and sequence is the phrase used in education referring to the material that will be taught (scope) and the order in which this material is to be taught (sequence). In library and information science, as noted above, there are existing documents that deal with scope and sequence; however, none of these documents are research-based (Zenger & Zenger, 2002, 2003). Thus there is a need in information science for research to understand how developmental changes impact information problem solving.

Second, existing information literacy standards (which are also scope and sequence documents) are one way current knowledge of developmental differences in information problem solving abilities of school-aged children is defined. Educational standards have a variety of shortcomings that will be discussed below. There appears to be no existing analysis of information literacy documents that is similar to the work done critiquing other sets of standards. Information literacy standards may not have the shortcomings identified in other sets of standards, but this is currently unknown due to the lack of research. This indicates the need for research concerning information literacy standards and will be expanded on below.

1.2 The need for research in information problem solving and development

Kuhlthau (1981, 1987; 1988) is one of the few library and information science authors who deal with scope and sequence of library or research skills to describe developmentally appropriate lessons for elementary school children. Callison's (2002) work on scope and sequence refers to

developmentally appropriate instruction, though he relies on Kuhlthau's work as the basis for what consists of developmentally appropriate practice. However, neither Kuhlthau or any of the more recent works examined (see below) that provide scope and sequence for information literacy education relied on cognitive development theory or validated research in cognitive or developmental psychology to justify the placement of learning activities at a particular grade level. Rather, these works are based on the authors' practice and do not draw on research in either library and information science or cognitive psychology.

For example, Harker & Putonti (2008) assigned lessons to grade levels but bypassed the challenge of determining appropriate content by advising the Library Media Specialists (LMS) to leave content decisions to the classroom teacher. This is understandable: the classroom teacher is the expert for his or her classroom. But, as a result, Harker and Putonti avoid discussing how they decided what level of cognitive load is assigned to each grade-level lesson. Messner & Copeland (2007) simply provide a compendium of teacher created lessons linked loosely to information literacy standards with no reference to developmentally appropriate practice. Jansen (2009) does provide a chapter on developmentally appropriate practice for early learners. The core of this chapter is a series of lists of what accomplishments can be expected by the end of the year for kindergarteners through third graders. Riedling (2007) in a book subtitled "What Every High School Senior Needs to Know" draws on both the AASL and ACRL standards, but fails to mention developmental differences. The closest she comes to acknowledging children's different levels of capabilities are two charts in the final chapter. These charts list all twelve grades – but there is no differentiation based on grade level or age level for any of the 15 skills listed. There is simply a list of skills listed in grade one and a corresponding essential question listed in grade two. The remaining columns for grades 3 – 12 are blank. One assumes these skills continue

through grade 12, but there is no indication of increasing complexity. Stripling & Pitts (1988) describe a taxonomy of skills for the library research process starting at grade one and proceeding with increasing complexity to grade 12. However, they also fail to mention any basis in developmental research for assigning skills to certain grade levels.

Authors dealing with scope and sequence in information literacy, with a few exceptions, appear to be addressing developmental levels based on their own ideas of the capabilities of students gained from personal practice and anecdotal evidence. Little effort to apply theories of child development is evident and there appears to be little, if any, research into a theory of development for information literacy skills. In general these authors, if they refer to theories of development, refer to and apply the principles of cognitive development of Piaget (1969) and/or Vygotsky (1978) for application to information literacy at the K-12 level or they refer to the ideas of William Perry (1968) in higher education.

Piaget's work though ground breaking in its time, is no longer considered to be a completely accurate view of child development (Berk, 2009; Bjorklund, 2005; Kuhn, 2006, 2008; Moshman, 2005). Competing theories have arisen and provide a more effective description of development, especially in adolescents and in the transition from childhood to adolescence. According to Moshman (1998) the description of formal operations put forth by Piaget and Inhelder is no longer given much weight in the literature. "Adolescent thinking develops, but not through a fixed sequence leading to a universal state of maturity" (Moshman, 2005, p. 24). Kuhn (2008) identifies two particular areas of difficulty with Piaget's formal operations. Formal operational thought does not appear "predictably and universally at a specific point during adolescence" (p. 51). Piaget's assertion that the formal operations stage appears in the individual as a single entity is also not supported by current research. What Piaget does appear to have correctly identified is

the shift in thinking that occurs at about age eleven; adolescents become able to “think about thinking” (Kuhn, 2008; Moshman, 1998).

Authors who mentioned Vygotsky (Vygotsky & Cole, 1978) focus on his Zone of Proximal Development (ZPD) and fail to examine with any depth his theories of socio-cultural development. This dissertation is focused on the development of information problem solving skills in grades K-8 and thus will not address William Perry’s theory of post-secondary development (W. G. Perry, 1968).

Few authors have applied cognitive development principles to information literacy skills in the grades prior to college—even Kuhlthau, who consistently calls for consideration of cognitive development in teaching library or research skills starting with her early works on developmentally appropriate library skills by grade level (1981, 1987) as well as her later work with coauthors describing inquiry learning (Kuhlthau, Caspari, & Maniotes, 2007; Kuhlthau & Maniotes, 2010). While her early 1980’s work did refer the developmental theories of Piaget, as noted above, Piaget’s work concerning formal operations is now considered incomplete.

Adolescents do not move neatly all at once into formal operations and several different types of thinking emerge at this time. Change in adolescent thinking also becomes driven by individual interest and choices (Kuhn, 2006; Moshman, 1998, 2005). We must conclude that although Kuhlthau’s writings often mentioned the need to consider developmental changes in information literacy instruction, her Information Problem Solving model does not incorporate developmental differences (Kuhlthau, 2004).

McGuire’s (1998) work describes an elementary school’s effort to create a developmentally appropriate library skills program designed with input from the teachers and instructional

assistants at each grade level in the school. Eastin (2008) describes the need for the application of cognitive development stages to analyze children's ability to make credibility judgments. Eastin's work also relies on Piaget for theories of adolescent cognitive development without taking into account the more current work in this field described by Kuhn (2006, 2008) and Moshman (2005). Kuhn (2006) points out that most adolescent development texts are not current in this area, which may explain why Kuhlthau and Eastin are still heavily dependent on Piaget.

There is no specific theory that describes the changes in information problem solving abilities that children progress through as they mature and little empirical research on the topic (Kovalik et al., 2012). Many authors have recognized the importance of cognitive development to information literacy instruction (Eastin, 2008; Jackson, 2007, 2008b; Kuhlthau, 1981, 1987; Kuhlthau et al., 2007; McGuire, 1998; Orme, 2008). Kuhlthau's (1981) book is a guide enabling teacher librarians to implement developmentally appropriate library skills lessons, a pre-cursor to both the current standards movement and the concept of information literacy skills. Eisenberg has modified the Big6 Information Problem Solving approach to the Super3 for younger children (2001).

Intuitively, fifth graders should be more capable of any particular task (defining problems for example) than first graders. Age and education should make a difference. Developmental psychology tells us that there is a shift in children's thinking between the ages of five and seven and again around the ages of 11 to 13 (Bjorklund, 2005; Daniels & Clarkson, 2010; Kuhn, 2006, 2008; Moshman, 2005; Sameroff & Haith, 1996). In addition, older children have more years of education, giving them more experience. Are information literacy standards aligned with these shifts? Differences should exist between, for example, the task definition skills of a fifth grader

and those of a first grader. A developmental theory focusing on information problem solving should be able to explain these differences. Thus this research has importance in identifying areas of agreement and disagreement between educational standards documents and practitioners. These areas of agreement potentially lay the groundwork for a developmental theory of information problem solving.

1.3 The need for research to inform information literacy standards

This section provides an overview of educational standards and their limitations, including the Common Core standards and standards that apply to information literacy.

1.3.1 Standards

The question of how the ability to solve information problems changes as individuals mature is particularly relevant in the educational system. Students enter the K-12 system as five- or six-year-old children and exit at age 18, the age of legal adulthood. Children generally undergo two shifts in the ability to think during this time period. First there is a shift that occurs during the range of five- to seven-years-old. There is also a second shift when children enter adolescence (Bjorklund, 2005; Daniels & Clarkson, 2010; Kuhn, 2006, 2008; Moshman, 2005; Sameroff & Haith, 1996). These shifts in thinking suggest that during the span of time children spend in the K-12 education system there are also changes in their abilities to solve information problems.

In order to teach a skill, it is necessary to know what the abilities of the student are prior to instruction (Goertz, 2010; Marzano, 2004). This information gives the teacher a baseline to work from, making it possible to assess progress and to make a judgment of the effectiveness of instruction. Educating children differs from educating adults, in that children not only have a level of ability based on prior experience, they also a level of ability based on their

developmental level. Physically, one would not expect a first grade student to be able to run a 50-yard dash faster than a fifth grade student. Similarly, one would not expect a first grader to have the same cognitive skills as a fifth grader, due to both the lack of experience and due to the lack of cognitive development. There may be individual exceptions to these patterns, both in the physical act of a 50-yard dash and in applying cognitive skills, but for the most part we would expect these generalizations to hold true.

One way educational systems at different levels (e.g., local school districts, state, national) operationalize developmental changes is through standards. Standards are the defined goals and objectives for instruction and learning. McClure states, “Standards as an organizing principle make the enterprise of education transparent. From the classroom to the statehouse, all participants know what is to be accomplished. Standards are also useful in educating parents and students about what is expected” (2005, p. 10). Standards are important in education because they are a guide for increasing achievement in all students, but they do so only if they are clear, rigorous and understood by students, teachers, administrators, and parents (Bartow, 2009; Goertz, 2010).

1.3.2 General issues with standards

“No solid basis exists in the research literature for the ways we currently develop, place and align educational standards in school curricula. If this sounds shocking, it should not. The same holds true for placing subject-matter content at specific grade levels (scope and sequence)” (Zenger & Zenger, 2002, p. 212). Content has been placed in scope and sequence documents based on tradition, individual teachers’ expertise, because it is the textbook, professional judgment, or current practice and standards documents appear to be no different (Zenger & Zenger, 2002, 2003).

Others besides the Zengers have found problems with educational standards. Marzano and his colleagues at the Mid-continent Regional Educational Laboratory (McREL) have researched and written extensively on standards and the national movement for standards, identifying several problems with standards as currently written while maintaining that creating a standards-based curriculum is essential to educational reform. Issues identified by Marzano and Kendall (1996a, 1996b, 1996c, 1997) include: multiple documents, varying definitions, and varying levels of generality. Brief examples of these issues follow.

School districts, individual schools, or teachers trying to identify which information is of most importance to teach according to the various standards would have to consult 116 documents (Marzano & Kendall, 1998). In a study on relevance clues for possible use in information retrieval, Reitsma, Marshall, and Zarske (2010) report finding over 60,000 math and science standards in state standards on the Achievement Standards Network.

The word standard is itself ambiguous (Placier, Walker, & Foster, 2002). Kendall defines a content standard as “summary description regarding what it is that students should know and/or be able to do within a particular discipline” (2001, p. 2). Other terms that are used as equivalents to content standards include “goals,” “expectations,” and “learning results” (Kendall, 2001).

There are also different types of standards – curriculum standards, content standards, and performance standards. Each has its own varying definition. Another term used in the discussion of standards is “benchmark.” Bodrova, Leong, Paynter, & Semenov (who define standard in a way similar to Kendall) define a benchmark as “a subcomponent of a standard. Specifically, it is a statement that reflects expected understanding or skill at a specific developmental level” (2000, p. 4). Yet, as Kendall (2001), Bodrova et al. (2000), and Hebbeler & Taylor (2012) point out, the use of these terms varies from one issuing organization to another.

In discussing varying levels of generality, Marzano and Kendall (1997, p. 32) compare a national art standard, “Understanding the arts in relation to history and cultures” to a national history standard “Students should understand the causes of the Civil War.” The art standard is clearly aiming at a very high level of generality while the history standard is aiming at the causes of a specific incident in United States history.

Standard statements often cover a band of grade levels (e.g. Grades 1-3) defining an expected outcome only at the end of third grade. As Marzano (2001) points out, this method leaves teachers in first and second grades without clear guidance as to what to expect of their students. Thus a developmental theory of information problem solving that could be used to establish standard statements at a level so that standard statements could be clearly differentiated for each year in school would (continuing with Marzano’s example of a first, second, and third grade band) be useful for teachers in first and second grade. This may not be possible. Marzano (2001) describes this as a problem with standard statements in general. The shifts in thinking may cover too broad an age range to be able to generate such fine-grained differentiation. However refining standard statements to be as finely grained as possible is still an important goal.

More currently, criticism of standards comes from Phillips (2009, p. 28) who states that standards derive from a “political sausage factory, in which the most important goal is to respect each individual committee member’s personal, cherished opinions.” Goertz (2010) writes that standards are driving educational change, but, “Policy makers must reach consensus on the type, content, and specificity of the standards; determine who will develop the standards; and facilitate the implementation of the standards”(p. 52).

Many authors have identified problems with existing educational standards (Berger, 2000; Bodrova et al., 2000; Florian, 1999; Goertz, 2010; Kendall & Marzano, 1994; Marzano & Kendall, 1996b, 1996c, 1997, 1998; Peterson & Hess, 2008; G. W. Phillips, 2014; V. Phillips, 2009; Placier et al., 2002; Zenger & Zenger, 2002, 2003). The issues identified will be discussed more thoroughly below, but one important note is that a similar analysis of standards dealing with information literacy has not apparently been done.

1.3.3 Common Core standards

The most recent work related to standards is the work of creating the Common Core standards in Mathematics and English/Language Arts (National Governors Association & Council of Chief State School Officers, 2014). The Common Core standards are educational standards in English/Language Arts (E/LARs) and Mathematics that will be used in common by all states choosing to adopt these standards. The idea behind the Common Core standards is that reading is reading and mathematics is mathematics whether the subject is being taught in Kentucky, California, Maine, Georgia, or Hawaii. The United States Constitution leaves education to the states and as a result, prior to the Common Core movement, all 50 states set their own educational standards. These standards varied a great deal in quality (Carmichael, Martino, Porter-Magee, & Wilson, 2010; G. W. Phillips, 2014). The Common Core standards were created under the auspices of the National Governors Association (NGA) and the Council of Chief State School Officers (CCSSO) to replace the differing state standards with one set of uniform standards. As of November 2014, forty-three states have adopted the Common Core standards (National Governors Association & Council of Chief State School Officers, 2014).

1.3.3.1 Issues with the Common Core

The Common Core standards are not without issues. Tienken (2010) questions the basic assumptions for the need for the Common Core. He argues that the United States' educational system neither lags behind the rest of the world nor that the scores of United States' students on international tests are an indicator of a coming economic disaster. Thus Tienken does not think the effort and change needed to have new common standards are required or worthwhile. Porter, McMaken, Hwang, & Yang (2010) using the Survey of Enacted Curriculum (SEC), found low to moderate alignment between both state standards and assessments and the Common Core. The National Council of Teachers of Mathematics (NCTM) standards did not exhibit a higher degree of alignment with the Common Core standards than the state standards on average. Porter et al. also compared the National Assessment of Educational Progress (NAEP) to the Common Core standards and found only slightly higher alignment than with the state assessments.

1.3.4 Standards and information literacy

Standards may be viewed as experts' opinions on what students are capable of and should be doing at a particular grade level. The national standards movement emerged out of the educational reform movement of the 1980s and 1990s that was sparked by the report *A Nation at Risk* (National Commission on Excellence in Education, 1983). As a result, standards have been created at national, state, and local levels. Standards are generally established for each subject and grade level by states and subject area associations. In many cases, these subject area standards include items that clearly deal with information literacy (Murray, 2008a; Smith, Churchill, & Mason, 2005), although information literacy is not necessarily the primary focus.

A comprehensive framework of developmentally appropriate information literacy standard statements is important for a variety of reasons. Understanding the differing capabilities of

children of varying ages allows for the creation of standard statements that are appropriate for different developmental ages. Appropriate in this case refers to concepts or instructional matter that it is reasonable to expect children of a given age to master. Standard statements allow curriculum planners and teachers to plan and implement lessons that are appropriate to the children in a particular grade level or classroom (Dickinson, 2009; Stoll & Giddings, 2012).

Developmentally appropriate lessons and standard statements allow for the proper assessment of children's learning and for assessment of instruction (Bodrova et al., 2000; Ehri, 1999; Zenger & Zenger, 2003).

Information literacy standards have been written as both a separate set of library media skills and as a set of technology skills (American Association of School Librarians, 2009; International Society for Technology in Education, 2007) and they have been incorporated into content areas such as History (National Center for History in the Schools, Crabtree, & Nash, 1994), Social Studies (National Council for the Social Studies, 2010), National Council of Teachers of English and International Reading Association (1996), and Math (National Council of Teachers of Mathematics, 2000). An important point is that information literacy standards are created by two different components of the K-12 educational system in the United States. According to Smith et al. (2005, p. 7) "Information literacy can now be found in every national curriculum document, establishing a connection between information literacy and the content standards²." The second area is what this dissertation will refer to as the technical area, which is comprised of technology specialists and library media specialists. Content areas all include standards that address information literacy skills but from the view of that particular content area. These standards address research, or information problem solving skills from the perspective of the individual

² The content standards Smith et al. are referring to are Social Studies/History, Science, Mathematics, and English/Language Arts.

discipline. These standards are created by national level content organizations such as those noted above. At the same time the technical areas has standards for information literacy that are designed to address the needs for students to develop a competency in information problem solving without regard to a particular content area. These standards are generated by organizations such as the AASL and ISTE. This bifurcation in the creation of the standards is one of the issues with information literacy standards that will be addressed in greater detail below.

Marzano and Kendall (1996a, 1996b, 1996c, 1997), Porter and colleagues (A. Porter et al., 2010; A. C. Porter, Polikoff, & Smithson, 2009), the Fordham Institute (Carmichael et al., 2010) and the Common Core (National Governors Association & Council of Chief State School Officers, 2014) have analyzed standards, but an analysis of any type has not been done on standards focusing on information literacy. The issues noted by Marzano and Kendall of multiple documents is also an issue with information literacy standards. There are multiple organizations and agencies (as noted above) that have issued standards in this area. There is little reason to think that information literacy standards differ from other curriculum matters. Thus it seems likely that varying definitions, levels of generality, and levels of subordination are also concerns in information literacy and indicates a need for research in this area.

1.3.5 Operationalizing the term “standard”

For the purpose of this dissertation the term “standard statement” is defined and will be used to mean a specific task that a student is to perform at a specific grade level. For example a third grade standard statement would be: *the student will be able to locate a book given a call number.*

1.4 Models of information problem solving

Existing research generally deals with only fragments of the information problem solving process. When analyzing the research, it is useful to have some model of the information problem solving process to use in categorizing the different research projects. A wide variety of information problem solving models exist. Callison and Lamb (2011) list 13 Information Search Models, four Information Inquiry Models and two Discipline Specific models. Eisenberg and Brown (1992) used four different models in their comparison on information problem solving models. Wolf, Bush, and Saye (2003) identified three information problem solving models (Kuhlthau's information problem solving, Eisenberg & Berkowitz's Big6, and Stripling and Pitts' research process model) as possible candidates for use in metacognitive scaffolding and chose to use the Eisenberg Berkowitz Big6 model as it was not tied to any particular subject area. Brand-Gruwel, Wopereis, and Walraven (2009) reviewed information problem solving models identifying the same three models Wolf et al. used as "prominent" models. However, this group of researchers rejected these models as all being over ten years old and created before the World Wide Web. Brand-Gruwel et al. did use these older models as the basis for the creation of their own Information Problems Solving – Internet model.

This dissertation chose to use the Eisenberg-Berkowitz model of information problem solving, the Big6³, as a model to serve as a framework for discussing information problem solving. There are four reasons for this decision. First, as noted above, both Wolf et al. and Brand-Gruwel et al. found the Big6 to be one of three prominent information problem solving models. Second, the Big6 is widely used in the K-12 educational system in the United States, and educational standards are a major focus of this dissertation. Eisenberg claims that the Big6 is "the most

³See Table 3.2 for an overview of the Big6 model of information problem solving.

widely-known and widely-used approach to teaching information and technology skills in the world” and is used in thousands of schools (Eisenberg, 2007), though there is only anecdotal evidence and no formal research to support this claim. However, a Google search on “Big6 research skills” returns over 6.6 million hits including schools from such diverse places as Longmont, Colorado, Mechanicsburg, Pennsylvania, and Goldsboro, North Carolina and organizations at the state level such as the Washington Library Media Association and Utah Education Network. Third, while none of the three main information problem solving models, (Kuhlthau, Eisenberg Berkowitz, or Stripling Pitts) has a research based adaptation to differing developmental stages, Eisenberg and Berkowitz’s Big6 has a simplified model called the Super 3 aimed at primary level students. Fourth, and finally, Murray (2008a, 2008b, 2010, 2011) has done extensive work aligning various standards to the Big6 model. This work is particularly useful to this dissertation as it examines existing information literacy standards and neither Kuhlthau nor Stripling Pitts models have been aligned to the standards.

Analyzing examples of research in information problem solving and seeing where they fit into a model of the information problem solving process reveals most work is in the areas of search strategies, locating information and selecting information for use. A few examples of research in these areas include Moore and St. George (1991) who studied the cognitive difficulties of New Zealand sixth graders engaged in a information retrieval task. Schacter, Chung, & Dorr (1998) examined fifth and sixth graders’ abilities to find information in either a well-structured or ill-structured task. Fidel et al. (1999) studied the information seeking behavior of high school students. Bilal (2000, 2001, 2002) studied the cognitive and physical behaviors of seventh graders while they used a web search engine, Yahoooligans, specifically designed for children. Bilal and Kirby (2002) compared the information seeking abilities of seventh graders to graduate

students while using Yahoooligans. Cooper's (2002) studied second graders engaged in an information seeking task in their school library. Rouet & Coutelet (2008) looked at 9 – 13 year-olds' ability to find information within sources. Spink, Danby, Mallan & Butler (2010) studied the web searching capabilities of kindergarteners.

The strengths of these studies are identifying and describing information problem solving behaviors of children and adolescents and providing a basis for further research. Additionally these studies are research-based rather than based on anecdotal evidence or opinions of the author. Thus they provide some research basis for connecting information problem solving skills with various age groups and grade levels. Weaknesses tend to be the small numbers of subjects studied and the resulting lack of generalizability. Due to rapid changes in the world of Information Communication Technology, (for example – Yahoooligans no longer exists in the same form as Bilal investigated and Google did not exist prior to 1998) focusing on a general information problem solving model such as the Big6 makes more sense than studying a particular search engine (Yahoooligans) or even “web searching” since these items can be subject to rapid change. Apple Computer's release of the iPhone4 introducing voice activated search (“Siri”), has already been upgraded, and is surely not the last change in technology or search.

1.5 Research questions

The purpose of this dissertation is to contribute towards a better understanding of the differing capabilities of children of different ages to solve information problems. Findings will help to identify standard statements and curriculum that are both developmentally appropriate and viewed by practitioners as important. The end goal is to make a contribution toward a coherent, comprehensive framework describing developmentally appropriate information literacy standards for youth of different ages. Three main questions are explored:

1. What developmental differences in information problem solving abilities are reflected in educational standard statements as they relate to youth at different ages?
 - a. To what extent are the developmental differences in information problem solving abilities reflected in educational standard statements as they relate to youth at different ages consistent with the judgments of expert, experienced teachers?
 - b. To what degree do standard statements deal with a single concept?
 - c. To what extent does clarity of writing impact interpretation of standard statements?
2. What developmental differences in information problem solving abilities do expert practitioners identify as they relate to youth at different ages?
 - a. To what extent do expert practitioners agree with the grade level appropriateness of individual education standards concerning information literacy?
 - b. To what extent do expert practitioners view the importance of individual education standards concerning information literacy?
3. How do information problem solving abilities, at different developmental levels, as reflected in educational standards (both subject area and information literacy), match those identified by expert practitioners? What areas are aligned and where are the gaps?

1.5.1 Research question 1

The first question asks: do standard statements expect older students to do more difficult tasks than younger students? Do they do this in a consistent manner? Are standards more rigorous as they increase in grade level? Are these changes discernible by classroom teachers?

This question is based on the assumption that there are changes in information literacy skills that are developmental--i.e., abilities change as students mature. This assumption is the foundation of the organization and practices of educational systems. Students from kindergarten to graduate school are expected to master material that progresses in difficulty as they advance through the various levels of their schools. Educational systems assume and operate on the idea that students do exhibit changes over time and this has led to the creation of standards that expect progressively higher levels of achievement by students. The assumption is clearly present, but do the standards for information problem solving consistently and appropriately increase in level, both in terms of level of difficulty and in quantity? Do they accurately reflect the developmental levels that would be derived from an analysis of current theories of cognitive development in psychology?

1.5.2 Research question 2

Question two asks what do expert practitioners expect of students at different grade levels in terms of information problem solving abilities? The sub questions address to what extent expert practitioners view any individual standards statement as grade level appropriate and as an important standard for their students to learn. Teachers must implement a given curriculum and, as described above, there are more standards to implement than time to implement them (Marzano & Kendall, 1998). This leaves teacher discretion as an important factor in what is

actually taught. The standard statements teachers view as both grade level appropriate and as important are more apt to be taught.

1.5.3 Research question 3

The last question is motivated by the need for developmentally appropriate standard statements in information literacy, the criticisms of standard statements in general, and the lack of an analytical review of information literacy standard statements. Do expert, experienced classroom teachers agree with the information literacy standard statements and to what extent? Are the views of expert, experienced classroom teachers aligned with the standard statements? To what degree are they aligned? Are there gaps in agreement, and if so, what and where are they?

What is taught in schools can be viewed in three ways: the intended curriculum, the enacted curriculum, and the received curriculum. The intended curriculum is the material covered by the standard statements. This is what the state, the school board, and the local administration intends to be taught in any particular classroom. The enacted (or taught) curriculum is what the teacher actually teaches, while the received curriculum is that actually learned by the student. The enacted curriculum can vary from teacher to teacher and the received curriculum will vary from student to student as each student takes away their own individual learning (Glatthorn, 1999; A. C. Porter & Smithson, 2001; Schubert, 2008).

These questions were aimed at examining the potential gap between what is intended to be taught at different developmental levels and what practitioners believe should be taught based on their experience.

1.6 Methodological overview

This study was a mixed method research project utilizing a sequential explanatory design (Creswell, 2009). It sought to describe and evaluate information literacy standards from the perspective of expert teachers. This was achieved by combining a quantitative survey of National Board Certified Teachers (NBCTs) from the state of Washington with two qualitative methods: 1) a content analysis of information literacy standards from the AASL and the Common Core; and 2) a series of focus groups of NBCTs to examine and offer explanations of the data collected in the survey and the content analysis. The use of a combination of quantitative and qualitative methods can lead to a richer understanding of the research questions (Creswell, 2009; Fidel, 2008; Krathwohl, 1998). The investigation consisted of three phases.

The main focus of the research is on expert, experienced practitioners – experienced classroom teachers who have earned National Board Certification. There are multiple possibilities for gathering information from teachers – surveys, interviews, observations, and focus groups. Two methods were selected: a survey and focus groups.

The first phase of the research project was a content analysis of the AASL and the Common Core standards statements. The first step in this process was to determine which of the standards statements fit into a particular stage of the Big6 model of information problem solving. Only those standard statements that deal with information literacy as operationalized by the Big6 information problem solving model stages two, three, and four were included in this research project. Specific questions the content analysis will address are related to research question number one: “What developmental differences in information problem solving abilities are reflected in subject area educational standard statements as they relate to youth at different ages?” The content analysis will address the following sub-questions of RQ1:

- b) To what degree are standard statements internally (within one document, i.e. the AASL or the Common Core standard statements) consistent in content level and rigor at each grade level? To what degree do the standard statements ask students to perform tasks of the same magnitude, or level of difficulty, at the same grade level, and consistently increasing as grades levels increase.
- c) To what degree are standard statements internally consistent in content level and rigor at each level?
- d) To what degree are standard statements externally (across standard statements issuing organizations, i.e. between AASL and Common Core) consistent in content level and rigor?
- e) To what degree are standard statements externally consistent in content level and rigor at each level?

In phase two, a survey of NBCTs was used to collect quantitative data. The survey asked NBCTs to complete a rating scale ranking standards statements according to the perceived level of students' ability to accomplish each item. The survey had three sections.. The first section will randomly mix standard statements and ask teachers to assign the statement to a grade level. The second section asked teachers to examine standard statements from the grade level they teach and judge the standard statement for it grade level appropriateness and its importance for that grade level. This section of the survey is modeled on work completed by Florian (1999) for the Mid-Continent Research Laboratory (MCREL). The third section collected demographic data including years taught; National Board certificate area, grade level taught, age, gender, size of school, rural or urban school district

In the third phase, a qualitative method, focus groups of NBCTs, was used to address RQ 3. How do information problem solving abilities, at different developmental levels, as reflected in educational standards (both subject area and information literacy), match those identified by expert practitioners? What areas are aligned and where are the gaps? Results of the survey and the content analysis will be utilized to generate the discussion questions for the focus groups. Kuhlthau (1993) used a similar method (using both focus groups and a survey) in a case study examining the implementation of a process approach for a library skills curriculum. Gullkikson (2006) surveyed higher education faculty concerning information literacy standards and recommended using focus groups to analyze the results. Analysis of the results of all three phases was ongoing and was used to address RQ3.

Both the second and third phases will draw on the knowledge of teachers who have years of experience with teaching children on a daily basis. Probert (2009) found that teachers generally have a good knowledge of what information literacy entails. Research done in reading development indicates that experienced teachers are able to successfully judge the difficulty levels of texts (Chall, Bissex, Conard, & Harris-Sharples, 1996). Several authors have used teachers to analyze the importance and developmental appropriateness of standards (Florian, 1999; Gallant, 2009; Hebbeler & Taylor, 2012).

PHASE	Action	Rationale
1	Content Analysis	Standards documents represent the education establishment's views of what children should know and when they should know it. This phase addresses the consistency of content and rigor of information literacy standards within and across standard statements from AASL and Common Core.
2	Survey of Teachers	Standards documents, as operationalized by the AASL & Common Core, represent the education

PHASE	Action	Rationale
		establishment’s views of what children should know and when they should know it. Expert, experienced teachers’ (NBCTs) judgments of information problem solving capabilities at different grade levels are used to evaluate standards documents.
3	Teacher focus groups discuss results of and survey	Focus groups of NBCTs provide an input for an evaluation of the content analysis and the survey results.
On going	Qualitative Analysis	Evaluation of information literacy standards based on survey, content analysis, and focus groups’ discussion

Table 1.1 Overview of research plan

1.7 Delimitations

1.7.1 Information problem solving stages to be investigated

Table 1.2 shows the information problem solving stages will be investigated at the shown grade levels.

Information Problem Solving Stages	Basic Activities (Murray, 2010)	Grades
Big6 #2 Information Seeking Strategies	Subject Directories Evaluating Web sites	2, 5, & 8
Big6#3 Location and Access	Keyword Searching Search Strategies	2, 5, & 8
Big6 # 4 Use of Information	Extract Information Analyze Sources Bibliographic Citations	2, 5, & 8

Table 1.2 Information problem solving stages and grade levels to be investigated

1.7.2 Grade levels in this research project

This research project is being restricted to grade levels to grades 2, 5, and 8. These are the grade levels that the AASL has benchmarks for its standards statements. Additionally, this separation offered enough spread in grade levels that it was assumed differences in grade levels would be discernible to expert practitioners. Grades 9 – 12 are not being considered because they have been the slowest to adapt to standards at this point in time (McClure, 2005).

1.8 Contributions

This research project makes contributions in the following areas: theory, methodology, and pedagogy.

1.8.1 Theoretical contributions

First, this project points to the need for more empirical data to be collected on children's abilities to solve information problems across differing ages. The differences found between the authors of the standard statements and the capability of NBCTs to place those standard statements at the intended grade level, indicates a need for more in-depth study of how children's abilities to solve information problems changes as they mature.

Second, this research by identifying areas of alignment and also areas where gaps exist between expert practitioners' judgments and educational standards. indicates the need for the establishment of a developmental theory of information problem solving. There is currently no developmental theory of information problem solving skills. Such a theory could be used both to inform practice and to guide the authorship of education standard statements that establish the curriculum for information problem solving in schools. A developmental theory of information problem solving would help to align the knowledge of both the authors of standard statements and that of the practitioners who implement these standard statements..

1.8.2 Methodological contributions

A second area is a methodological contribution. Focus groups have been used as a source of data for a variety of topics in information science, but not for determining appropriate developmental levels of educational standards for information literacy. The focus groups in this research utilized NBCTs, as opposed to Library Media Specialists or Technology Educators. This is similar to

research done by Gullikson (2006) in higher education but not previously done in information problem solving at these grade levels.

1.8.3 Pedagogical contributions

Third, the research indicates areas where the views of expert, experienced teachers tend to agree that the grade levels of standard statements are appropriate, providing evidence validating the information literacy standard statements where agreement exists. This provides support for instructional practices based on current standard statements where there is agreement between the authors of the standard statements and the NBCTs. The research also reveals inconsistencies between the views of expert, experienced teachers and the authors of the standard statements, indicating areas for further research.

1.9 Summary

Information problem solving standards exist in many different forms. There are standards produced by national content area organizations, by organizations focused on technology, by the various states, and by local school districts. Standards are important tools that allow educators to design lessons and assessments and therefore should be developmentally appropriate. This research proposes to make a contribution toward the creation of a coherent, comprehensive framework, which describes developmentally appropriate information literacy standards for youth of different ages.

As a means of addressing this question, the investigation proposed three research questions that were explored in three phases. This research project involved a sequential explanatory mixed methods design. A content analysis of the AASL and Common Core standards, a survey of

NBCTs based on existing standards, and an analysis of the survey and content analysis results via focus group input were conducted.

This examination of what are appropriate standards in information literacy is of practical importance because it may lead to more effective teaching, and it is of theoretical importance as it will be a step in the process of developing a developmental theory of information problem solving. By examining the intersection of these fields – information science and educational standards – this research advances the understanding of what appropriate standards for information literacy should be.

2. Relevant Literature

2.1 Introduction to relevant literature

This research project examined education standards that deal with information literacy through the lens of expert, experienced practitioners with the goal of identifying what are current views on the changes that take place in children as they develop from kindergarten to grade eight. As there is no theory of development that specifically addresses information problem solving skills, this chapter draws together theory and empirical research from education, psychology and information science to provide the background this project is based upon. This chapter deals with the relevant literature from information science concerning information literacy, from education concerning learning standards, and from psychology in two areas - development and problem solving. The intersection of these areas provide a background of what is currently known that is applicable to the development of information problem solving skills and how these abilities change over time from kindergarten to eighth grade.

2.2 Information literacy and educational standards overview

The idea of information literacy standards rests on other concepts. It is important to discuss and gain an understanding of some of these underlying concepts in order to understand the state of information literacy standards. Understanding underlying concepts is important in any field of study, but it is distinctly important in studying information literacy standards because there has not been a comprehensive study of these standards that includes national professional organizations, state educational organizations, and local school district level organizations.

Examining the state of information literacy standards requires an analysis of the component parts and then using this analysis to make conclusions about information literacy standards.

One of those underlying concepts is that information literacy is a subject that is important enough that it should be taught in schools with standards demarcating what aspects of information literacy students are to be taught. Understanding information literacy standards requires understanding what information literacy is and understanding what educational standards are.

One might first ask, “Why is information literacy important enough to be taught?” One answer is that information literacy is rapidly becoming the fourth “R”, reasoning, to go along with reading, writing, and arithmetic (Thompson & Henley, 2000). A more thorough answer to this question requires a definition of information literacy, and then an examination of its importance. After defining information literacy and its importance, the second part of the concept of information literacy standards – the concept of standards in education will be addressed.

What are educational standards? How are they created? How are they used? How do the creators of standards assign the standards to different grade levels? Once an understanding of standards has been established, it will be possible to put this understanding together with the definition and importance of information literacy and then examine information literacy standards.

Information literacy standards are multidimensional. Information literacy is a concept that has its own advocates/practitioners (i.e. Teacher/Librarians and Technology Instructors) while at the same time it has been incorporated into numerous content areas in the K-12 educational system (i.e. Social Studies, History, Science, Mathematics, English, and Reading). This leads to two of the dimensions of information literacy standards, one in the content areas and the other in areas that tend to be centered on the technology-based aspects of information literacy.

Another dimension of information literacy standards is the educational organizational level at which the standards are created. Standards themselves are created at national, state, and local levels. National organizations in both information literacy pathways create standards. Examples of professional organizations that have created technology-based standards at the K-12 level include, but are not limited to, the American Association of School Librarians (AASL)(American Association of School Librarians, 2009; American Association of School Librarians & Association for Educational Communications, 1998) and the International Society for Technology in Education (ISTE) (American Library Association, 2006; International Society for Technology in Education, 2007). The Association of College and Research Libraries (ACRL) also has information literacy standards (American Library Association, 2006), while these are aimed at higher education rather than the K-12 system they are important for high school teacher/librarians and content area teachers to be aware of as they describe the skills necessary at the next level of education. Examples of organizations that create content area standards are created by the National Council for the Social Studies (NCSS) (National Council for the Social Studies, 2010), the National Center for History in the Schools (National Center for History in the Schools et al., 1994), the National Research Council (National Research Council, 1996), the National Council for Teacher of English (NCTE) and the International Reading Association (IRA) (National Council of Teachers of English & International Reading Association, 1996), and the National Council of Teachers of Mathematics (NCTM) (National Council of Teachers of Mathematics, 2000). Recently the Common Core standards (National Governors Association & Council of Chief State School Officers, 2012) have also created national standards for English Language Arts and Mathematics. The standards for English Language Arts include subsections

for reading and writing in content areas such as Science and History and these areas have standards pertaining to research skills thus incorporating information literacy.

Information literacy standards are also created at the state level by state educational organizations. Here again information literacy is included in the dual dimension of content area standards and in technology-based standards. Finally, information literacy standards are also created at the local school district level. These local level standards repeat the pattern of including information literacy standards in technical areas and in content areas.

Sections 2.3 through 2.7 discuss the state of information literacy standards by defining information literacy, describing educational standards, exploring how standards are created and assigned to grade levels, examining the different dimensions in which information literacy standards are created, and then analyzing how information literacy standards are assigned to different age or grade levels in the K-12 educational system. Sections 2.8 through 2.11 review concepts related to cognitive development, problem solving, information problem solving, and finally the intersections between these three areas. Section 2.12 summarizes the review of literature.

2.3 Information literacy

It is easy to find quotes from educators and theorists on the growing amount of information students need to be able to deal with. In the 1980s Irving (1985, p. 11) used the phrase “information explosion”; in the 1990s Eisenberg and Berkowitz (1990, p. 6) turned the words around and used the phrase “explosion of information.” Lazonder, Biemans, and Wopereis a decade later (2000, p. 576) wrote of an “impending information overload.” Kuhlthau, Maniotes,

and Caspari in 2007 (p. 2) wrote of “vast quantities of information.” Kuhlthau had earlier written that, “Information seeking is a primary activity of life” (2004, p. 13).

It seems clear that the amount of information is rapidly expanding. We live in the information age and the ability to find the useful information amid all the background noise is a skill that will benefit students their entire lives. Information literacy may be the most important skill that students will take away from their education years. In 2009 President Barack Obama even declared October as National Information Literacy month (Obama, 2009). But what is information literacy? This section offers a definition of information literacy at the beginning of the 21st century.

2.3.1 Information literacy defined

If one is literate one has the ability to read and write, or in other words to derive meaning and to express meaning using words. Information literacy then is the ability to derive meaning from information (Thompson & Henley, 2000).

The term “information literacy” was first used by Paul Zurkowski in 1974 (Doyle, 1994; Eisenberg, Lowe, & Spitzer, 2004). Information literacy has been interpreted to mean a variety of different things. Should it include computer literacy, visual literacy, media literacy, and library literacy, or are these separate concepts? Is information literacy best viewed as information technology literacy? The definition that appears to have become most widely accepted (Bruce, 1997, 2000; Eisenberg et al., 2004) was put forth in the American Library Association Presidential Committee on Information Literacy’s *Final Report* (1989), “To be information literate, a person must be able to recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information.”

There are a variety of other versions of definitions of information literacy. In addition to the ALA Presidential Committee *Final Report*, Eisenberg, Lowe, and Spitzer (2004) list an additional seven definitions of information literacy. Bruce (1997) includes a chapter concerning descriptions of information literacy with over half a dozen varying definitions. These definitions differ in the level of specificity dealt with, or through describing different the need for different types of sources of information to be dealt with (visual literacy, media literacy, network literacy, etc.). However these definitions differ, their essence is that information literacy means dealing with information through active and critical thinking.

2.3.2 What is an “information literate” person?

Information literacy standards are created to help generate an information literate person. What then is an information literate person? Doyle provides one answer. She offers an expanded definition of information literacy, which derives from a Delphi study carried out in 1991 and 1992 for the National Forum on Information Literacy. She defines information literacy as “the ability to access, evaluate, and use information from a variety of sources” (Doyle, 1992). Doyle expanded this concise definition by providing a list of characteristics of an information literate person. This list is shown in Table 2.1 below.

An information literate person is one who:
Recognizes that accurate and complete information is the basis for intelligent decision-making
Recognizes the need for information
Formulates questions based on information needs
Identifies potential sources of information
Develops successful search strategies
Accesses sources of information including computer-based and other technologies
Evaluates information
Organizes information for practical application
Integrates new information into an existing body of knowledge
Uses information in critical thinking and problem solving
(Doyle, 1994, pp. 29-33)

Table 2.1. Doyle: An information literate person

Integrating the various definitions of information literacy with Doyle's characteristics of an information literate person it is apparent that information literacy requires thinking and processing information in a useful manner along with the ability to seek out needed information. It is not enough to simply absorb information; information literacy requires critical thinking skills. Shapiro & Hughes even call for information literacy to be an entirely new liberal art.

But information literacy should in fact be conceived more broadly as a new liberal art that extends from knowing how to use computers and access information to critical reflection on the nature of information itself, its technical infrastructure, and its social, cultural and even philosophical context and impact--as essential to the mental framework of the educated information-age citizen as the trivium of basic liberal arts (grammar, logic and rhetoric) was to the educated person in medieval society. (Shapiro & Hughes, 1996, p. 4)

Francis Bacon once said, "Knowledge is power." A modern day Bacon might say that an information literate person is one who can use information literacy skills to gain knowledge and thus be empowered.

2.3.3 Information problem solving vs. information literacy

As noted in chapter one, information problem solving is a phrase often used in conjunction with information literacy. This dissertation uses the phrase information problem solving as the application of information literacy skills to solve information problems.

2.4 Educational standards

Ravitch⁴ (1995) poses the question, “What are standards?” Her answer is that the word has a dual meaning. It implies both a model of achievement and the gauge by which the achievement is measured. Standards in education may be viewed as experts’ opinions on what students are capable of and should be doing at a particular grade level (Lee, 2002; A. C. Porter et al., 2009). The national standards movement emerged out of the educational reform movement of the 1980s and 1990s that was sparked by the report *A Nation at Risk* (National Commission on Excellence in Education, 1983).

In education, standards establish what is to be learned. In layman’s terms, standards are the defined goals and objectives for instruction and learning, which are often established for each subject and grade level by states and subject area associations. Two other terms often used in conjunction with standards in national and state documents are “benchmarks” and “strands.” However, there are a variety of different uses of these terms (Berger, 2000; Bodrova et al., 2000). These are discussed below.

2.4.1 Standards terminology

It is important to understand how the terms standard and benchmark are differentiated in education. Standards come in several types including content standards, performance standards, and curriculum standards (Goertz, 2010; Kendall, 2001; Marzano & Kendall, 1996c; Ravitch, 1995).

⁴ In Ravitch’s latest book she comes out against standardized testing, the No Child Left Behind Act, and charter schools. She argues that the national standards movement died in 1995 with the controversy over the United States History standards. Standards creation was left to the states and she offers many of the same criticism of standards as others which are discussed later in this dissertation (Ravitch, 2010).

2.4.1.1 Content standards

One type of standard is the content standard. This type of standard defines what it is that is to be learned. A content standard equates to Ravitch's first definition of standard as that of a model of achievement.

Academic content standards indicate what a student should know and be able to do in the areas such as mathematics, history, reading, and science (Goertz, 2010; A. C. Porter et al., 2009; Stecher et al., 2008). Content standards, as defined by Marzano and Kendall (Kendall, 2001; Marzano & Kendall, 1996c) are summary descriptions used to organize entire disciplines. As such they tend to be statements that are broad and inclusive. A relatively few standards will encompass an entire discipline of study. One example is the AASL's new standards of which there are only four (American Association of School Librarians, 2009). These four AASL standards are shown below in Table 2.2. An example from a national content area organization is the NCTM standards, which include five content standards (Numbers and Operations, Algebra, Geometry, Measurement, and Data analysis and probability) and five process standards (Problem solving, Reasoning and proof, Communications, Connections, and Representations) (National Council of Teachers of Mathematics, 2000). An example from a state level organization content area is the state of Washington's social studies standards. Washington, has only five social studies standards, one for each of the discipline areas, civics, economics, geography, and history, and a fifth for social studies skills (Washington Office of the Superintendent of Public Instruction, 2008). (Washington refers to its standards as Essential Academic Learning Requirements or EALRs). Each of the EALRs is broken down into three to five components, but Marzano and Kendall's description of standards as overarching descriptions of the knowledge in a discipline still applies.

AASL standards	
1	Inquire, think critically and gain knowledge
2	Draw conclusions, make informed decisions, apply knowledge to new situations, and create new knowledge
3	Share knowledge and participate ethically and productively as members of our democratic society
4	Pursue personal and aesthetic growth

Table 2.2. AASL’s Four standards (2009, p. 7)

It should be recognized that in common usage the term “standard” refers to general descriptions of what should be learned in an academic discipline.

2.4.1.2 Performance standards

The second type of standard is the performance standard. Performance standards, also referred to as “achievement standards,” establish at what level a student is to perform a particular task demonstrating his or her ability in mastering a particular content standard (Goertz, 2010; Stecher et al., 2008). This is Ravitch’s second meaning of the term standard, that of a gauge of measurement. Both performance and content standards are obviously important. Students, teachers, parents, and administrators need to know what is to be learned or taught and how well students should perform to demonstrate that they have learned the intended material.

2.4.1.3 Curricular standards

Curriculum standards describe what should take place in the classroom in terms of instructional technique. Content standards are those that refer to the material that is to be taught, while curriculum standards refer to the activities that are used to teach the content (Marzano & Kendall, 1996c).

2.4.1.4 Benchmarks

Benchmarks are indicators of progress toward achieving a standard, as such; benchmarks are a subcomponent of the more inclusive standards (Bodrova et al., 2000). Benchmarks have a more detailed description of what is to be learned. Benchmarks generally address what is to be taught at a particular grade level or band of grade levels (e.g. K-2, or 3-5). The AASL standards have benchmarks at grades 2, 5, 8, 10, and 12 (2009). NCTM's standards are broken into grade level bands with the subcomponent being "expectations" (2000). Washington's social studies standards have benchmarks, referred to as Grade Level Expectations (GLEs), at each grade level (Washington Office of the Superintendent of Public Instruction, 2008).

Benchmarks are more finely grained than standards. Standards represent the big overarching picture. They are the main ideas of a particular discipline. Benchmarks are the narrower (though not necessarily narrowly) defined topics of a discipline. Marzano and Kendall suggest thinking of standards as what a student will achieve by the end of their time in school, and benchmarks as those items to be achieved at specified grade levels or even grade bands (i.e. grades 3-5). Neither standards nor benchmarks are so finely grained that they can be learned in a single afternoon (Kendall, 2001).

2.4.1.5 Strands

Kendall defines a strand as a topic or level of content organization that falls between a standard and a benchmark. He uses the examples of Shapes and Figures in the NCTM standard of Geometry (Kendall, 2001). The AASL standards use the term strand in the same way. There are four strands that fit between the four AASL standards and the grade level benchmarks (2009).

NCSS uses the term “strands” to refer to the ten organizing themes of social studies. These content themes or strands, however, appear to be at much the same level as the “standards” for NCTM (Table 2.3). NCSS calls its standards “Curriculum Standards” (2010, p. 12), not content standards. NCSS sees its standards as higher-level guidelines for organizing an entire program of study in a state or a school district, not as a guide to content in a particular class.

Comparison of themes in NCSS and goals in NCTM	
NCTM Goals	NCSS Themes or Curricular Strands
Numbers and Operations	Culture
Algebra	Time, Continuity, and Change
Geometry	People, Places, and Environment
Measurement	Individual Development and Identity
Data analysis and probability	Individuals, Groups, and Institutions
Problem solving	Power, Authority, and Governance
Reasoning and proof	Production, Distribution, and Consumption
Communications	Science, Technology, and Society
Connections	Global Connections
Representations	Civic Ideals and Practices
(National Council for the Social Studies, 2010; National Council of Teachers of Mathematics, 2000)	

Table 2.3. Comparison of themes in NCSS and goals in NCTM

2.4.2 Problems with standards

Standards have quite a few problems as they currently exist in the United States. One acknowledgement of these problems is the Common Core movement that creating a unified collection of standards in English/Language Arts and Mathematics for all fifty states (as previously noted, over 40 of which have officially adopted (National Governors Association & Council of Chief State School Officers, 2012)). The idea behind the Common Core is that one set of national standards would be simpler and cheaper for the states to use as curriculum and assessment guides. Content areas subject should not differ from state to state. Math is math and math taught in Virginia should be the same as math taught in Texas or Oregon.

2.4.2.1 Identified issues with standards

Marzano and Kendall (Marzano & Kendall, 1996c, 1997, 1998) identified several major problems with national standards some of which as can be seen below are also problems with state documents. The first is the existence of multiple documents covering the same content areas. According Marzano and Kendall (Marzano & Kendall, 1998) a school district would have to consult 116 documents to make a comprehensive review of the various content areas.

A second area of concern is too much information. Marzano and Kendall quote educational researcher Chester Finn, Jr. who said the educational professional organizations “demonstrated gluttonous and imperialistic tendencies” (Marzano & Kendall, 1997, p. 30). Content area specialists love their subjects and no one ever wants to cut something out so content standards continue to grow. Gagnon (1994, p. 7) argues, “The central failure of the published standards documents is their length and pretension. They produced encyclopedia, not cores.” Researchers at the Mid-continent Research for Education and Learning (McREL) have estimated that it would take 21 years of schooling (compared to the current 13) to teach all the standards (approximately 200 standards and 3,090 benchmarks) that are promulgated by national organizations (Marzano & Kendall, 1998). Reitsma, Marshall, & Zarske (2010) found 60,000 state related science and math standards in the Achievement Standard Network. The sheer number supports Lee (2002, p. 39) who likens standards documents to laundry lists and claims, “All teachers recognize the foolishness of even attempting to teach everything in these lists.”

The problem with too much information has not gone away. Goertz (2010, p. 59) asserts, “In contrast with other countries our state standards are unfocused, lack coherence, and have led to a curriculum in the United States that is a ‘mile wide and inch deep’.” Linn (2010) contends that there are too many topics in science education standards. She uses the example of California

where 8th graders learn nine general science topics and 46 specific topics, which she compares to Japanese 8th graders who learn 8 topics – and outscore the United States on national tests.

According to Linn, “The only area we have been able to control this proliferation is in the weight of textbooks. Those concerned with stress injuries to children have succeeded in curtailing the weight of textbooks – for the moment” (p. 103). Interestingly, Linn would like to see engineering, computer fluency, 21st century thinking skills, and computational thinking added to the standards.

A third area of concern identified by Marzano and Kendall is controversial content. The history standards were criticized as being too politically correct and under representing the accomplishments of traditional historical figures such as George Washington and Robert E. Lee. The language arts standards produced by the Standards Project for the English Language Arts (SPELA) was dogged by controversy over instructional methods and which children’s literature was to be included (Marzano & Kendall, 1997). Goertz (2010) points to the controversy over the “math wars” and evolution at the state levels.

The fourth area Marzano and Kendall list as a problem is different levels of generality. As noted above Kendall defines a standard as an overarching statement that is used to organize disciplinary information into large categories of learning that can then be broken down into benchmarks.

Organization	Standard	Level of Generality
<i>National Standards for Arts Education</i>	Understanding the arts in relation to history and cultures	More general; less specific
<i>National Standards for United States History</i>	Students should understand the causes of the Civil War	Less general; more specific
(Marzano & Kendall, 1996b, 1997)		

Table 2.4. Problems with levels of generality

Another issue that is evident from the discussion above concerning definitions is that the terms associated with standards are themselves used in a confusing manner (Berger, 2000). Kendall refers to as a “strand” in the math goals as a subset of a standard. While in the NCSS standards what is referred to as a “strand” or “theme,” is more closely aligned to the meaning of the term “standards” in the NCTM document. The state of Washington uses neither the term standards nor benchmarks, but rather EALRs and GLEs. The different types of standards are in themselves confusing as Marzano and Kendall point out that they often find content and curricular standards mixed together (Marzano & Kendall, 1996c).

In work more current than that of Marzano and Kendall, Phillips (2009, p. 28) states that standards come from a “political sausage factory, in which the most important goal is to respect each individual committee member’s personal, cherished opinions.” This is quite similar to the comment by Chester Finn noted above from over a decade earlier. Goertz maintains that standards are driving educational change, but, “Policy makers must reach consensus on the type, content, and specificity of the standards; determine who will develop the standards; and facilitate the implementation of the standards” (2010, p. 52).

A separate issue is that most states have wanted to set their own standards (Marzano & Kendall, 1997). States historically have not been keen on simply adopting standards set by national organizations, as a result the quality level of state standards is inconsistent. When Peterson and Hess (2008) examined state standards compared to proficiency tests they found that the quality of state standards varied widely. One of their conclusions was “If Billy and Sally cannot read in South Carolina, they should not be able to pass muster simply by crossing the state’s western border” (p. 72). This particular concern is rapidly becoming a moot point as states adopt the Common Core curriculum.

2.4.2.2 Issues with the Common Core standards

The newest aspect of the standards movement is the work of creating the Common Core standards in Mathematics and English/Language Arts (National Governors Association & Council of Chief State School Officers, 2012). Forty-three states have adopted the Common Core standards, yet the Common Core standards are not without issues. Porter, McMaken, Hwang, & Yang (2010) using the Survey of Enacted Curriculum (SEC), found low to moderate alignment between both state standards and assessments and the Common Core. The National Council of Teachers of Mathematics (NCTM) standards did not exhibit a higher degree of alignment with the Common Core standards than the state standards on average. Porter et al. also compared the National Assessment of Educational Progress (NAEP) to the Common Core standards and found only slightly higher alignment than with the state assessments.

Tienken (2010) questions the basic assumptions for the need for the Common Core. He argues that the United States' educational system neither lags behind the rest of the world nor that the scores of United States' students on international tests are an indicator of a coming economic disaster. Thus Tienken does not think the effort and change needed to have new common standards are required or worthwhile.

2.5 Information literacy standards

Information literacy standards have several different dimensions. They are like other subject areas in that they are written at national, state, and local levels. They differ from other subject areas in that they are virtually always seen as a process skill that is necessary to learn or deal with the content in the various subject areas. As such information literacy standards are also created by and included within the various content areas. In many cases, these standards include information literacy standards, although information literacy is not necessarily the primary focus.

Professional organizations with a technology or information literacy concentration, such as ISTE and the AASL, have also established information literacy standards with a technology or information studies emphasis.

Table 2.5 shows the various permutations of information literacy standards and the flow from national organization to state to local school district. Standards may vary from being created in a content area by a local school district to being created by an organization with a technical focus at a national level. Theoretically the creation of standards flows from the expertise of the professional organizations to the states to the local school districts.

			Flow from national to local		
Type	Content Area	Science	→		
		History/Social Studies	→		
		English/Reading	→		
		Mathematics	→		
	Technology-based	Technology	→		
		Library - Bibliography	→		
Educational Organization Level			National Professional Organizations	State Educational Organizations	Local School Districts

Table 2.5. Information literacy standards variations

2.5.1 Technical standards

This dissertation uses the term “technical” standards to refer to those standards that have a basis in technology such as the ISTE standards or from a library background, such as the AASL standards.

2.5.1.1 AASL standards

AASL released its first set of standards in 1998 as Information Power (American Association of School Librarians & Association for Educational Communications, 1998). Updated standards were released in 2009 titled *Standards for the 21st-Century Learner In Action*. These new standards include a greater emphasis on different types of literacy – including digital, visual, textual and technological than the 1998 standards (American Association of School Librarians, 2009). As noted above, there are only four AASL standards. There are also four strands between the standards and the benchmarks. Benchmarks are for grades 2, 5, 8, 10, and 12.

2.5.1.2 ISTE standards

First released in 1998, the ISTE National Educational Technology Standards for Students (NETS*S) were updated and rereleased in 2007. There are six standards and each standard has four performance indicators. Five of the six standards are related to information literacy skills in terms of critical thinking, while the sixth, “Technology Operations and Concepts” is aimed at technological literacy, the ability to understand technology concepts, systems and operations.

2.5.1.3 Critiques of technical information literacy standards

Johnson (2007) argues for a combined set of technology and information literacy skills, urging the ISTE and AASL to work together to produce one joint set of standards. He contends there is quite a bit of overlap between the standards and that the voices of educators who are concerned with information literacy and technological literacy would be stronger if they were united behind one set of standards. Others disagree with Johnson. Donham (2008) argues that the various sets of standards are more complementary than overlapping and at this point we still need both. Bartow (2009), in her account of the revision of Information Literacy/Library Media and Technology Content Standards of Montana, asserts that it is premature for Montana to combine these two as areas of its state’s performance standards.

2.5.2 Information literacy skills in content area standards

Information literacy skills show up in content area standards that originate in subject areas such as English/Language Arts, Social Studies, History, Science, and Mathematics. These areas all have standards dealing with research skills or problem solving skills that can easily be interpreted to be information literacy skills.

2.5.2.1 National level content area standards

Table 2.6 shows examples of information literacy skills in the content areas of Science, Math and Social Studies.

	NCTM Principals and Standards for School Mathematics (2000)	NRC National Science Education Standards (1996)	NCSS National Curriculum Standards (2010)	National History Standards (1994)
Information Literacy Skills	Instructional programs from prekindergarten through grade 12 should enable all students to — Build new mathematical knowledge through problem solving; Solve problems that arise in mathematics and in other contexts;	Science as Inquiry. As a result of activities in grades 5-8, all students should develop: Abilities necessary to do scientific inquiry. Identify question that can be answered through scientific investigations; Design and conduct a scientific investigation;	Students should be able to: Formulate historical questions from encounters with historical documents, eyewitness accounts, letters, diaries, artifacts, photos, historical sites, art, architecture, and other records from the past.	Learners will be able to: Ask questions related to culture and find, select, organize, and interpret data from research to address research questions. P. 28
	Apply and adapt a variety of appropriate strategies to solve problems; Monitor and reflect on the process of mathematical problem solving. P. 255	Use appropriate tools and techniques to gather, analyze, and interpret data; Think critically and logically to make the relationships between evidence and explanations. P. 143-145	Obtain historical data from a variety of sources, including library and museum collections, historic sites, historical photos, journals, diaries, eyewitness accounts, newspapers, and the like; documentary films; and so on. P. 30	Learners will be able to: Formulate research questions to investigate topics in history, identify possible answers, and use historical methods and literacy skills to select, organize, analyze, synthesize, and interpret sources, and present findings. P. 32

Table 2.6. Examples of Information Literacy Skills in Content Area Standards National Professional Organizations

Each of these standards include some portion of the skills identified in the Final Report of the Presidential Committee on Information Literacy (1989) - recognize when information is needed and have the ability to locate, evaluate and use effectively information.

2.5.2.2 State level content area standards

Table 2.7 shows examples of information literacy skills in the content area standards from five states. The states were chosen for examination for the following reasons. Texas represents a large (population) state and a state that has not joined in the Common Core movement. Montana was selected for its work with Library Media and Information Literacy standards. Iowa represents the

middle of the country. North Carolina is representative of the south and the east coast. It combines Computer/Technology Skills standards with Information Literacy standards.

Washington was selected for its west coast location and because it is the state where this work is being done.

Three areas were picked for review – Social Studies, Science, and Mathematics. Each state except Iowa had content area standards in all three areas. Iowa has content standards only in the areas of Science, Math, and Reading. Table 5 shows typical content standards from these states that concern information literacy skills. These standards deal with locating, synthesizing, and evaluating information – critical thinking skills, or the fourth “R” reasoning as Thompson and Henley (2000) said. As in the national content areas these are also the skills identified in the Final Report of the Presidential Committee on Information Literacy.

State	Content Area		
	Science	Math	Social Studies
Montana	Students, through the inquiry process, demonstrate the ability to design, conduct, evaluate, and communicate results and reasonable conclusions of scientific investigations.	A student, applying reasoning and problem solving, will use data representation and analysis, simulations, probability, statistics, and statistical methods to evaluate information and make informed decisions within a variety of relevant cultural contexts, including those of Montana American Indians	Students access, synthesize, and evaluate information to communicate and apply social studies knowledge to real world situations.
Iowa	Analyze and interpret information from scientific studies	Interpret data from a variety of sources	Not applicable
Texas	Scientific processes. The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom.	Use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution and evaluating the problem-solving process.	The student applies critical-thinking skills to organize and use information acquired from a variety of valid sources, including electronic technology.
North Carolina	Design and conduct scientific investigations to answer questions related to earth and environmental science. <ul style="list-style-type: none"> • Create testable hypotheses • Identify variables. • Use a control or comparison group when appropriate. • Select and use appropriate measurement tools. • Collect and record data. • Organize data into charts and graphs. 	Use logic and deductive reasoning to draw conclusions and solve problems.	The learner will acquire strategies to access a variety of sources, and use appropriate research skills to gather, synthesize, and report information using diverse modalities to demonstrate the knowledge acquired.

	<ul style="list-style-type: none"> Analyze and interpret data. Communicate findings. 		
Washington	Investigate Scientific progress requires the use of various methods appropriate for answering different kinds of research questions, a thoughtful plan for gathering data needed to answer the question, and care in collecting, analyzing, and displaying the data.	Synthesize information to draw conclusions and evaluate the arguments and conclusions of others	The student understands and applies reasoning skills to conduct research, deliberate, form, and evaluate positions through the processes of reading, writing, and communicating.

Table 2.7. Examples of State Content Standards that contain Information Literacy components

These states and standards were chosen to illustrate the various areas where information literacy standards are found in state standards. Forty-three states have moved to adopt the Common Core standards, thus it appears to be somewhat of a moot point to look at state standards. However, table 2.7 does give an indication of the pervasiveness of standards that are information literacy related.

2.5.3 Issues with information literacy standards

Marzano and Kendall (1996a, 1996b, 1996c, 1997), Porter and colleagues (A. Porter et al., 2010; A. C. Porter et al., 2009) and the Common Core (National Governors Association & Council of Chief State School Officers, 2012) have analyzed standards, but a comprehensive analysis of standards focusing on information literacy has not been done. The issue noted by Marzano and Kendall of multiple documents is also an issue with information literacy standards. There are multiple organizations and agencies that have issued standards in this area. As previously noted some writers view these multiple documents as complementary and others urge for their unification.

One aspect of the issue of multiple documents is the potential conflict between the demands standards place on classroom teachers and the desires of Teacher/Librarians to incorporate information literacy skills into the curriculum. Standards and high stakes testing do make a difference in what teachers teach. There are more content area standards to teach than time to

teach it; as a result, teachers focus on that material that is tested (D. Johnson, 2007; Julien & Barker, 2009). Eisenberg calls this issue “curriculum information overload” and goes on to assert that, “The last thing that faculty and students need is more content” (Eisenberg, 2008, p. 45). The resulting problem is that unless there is a clear connection between the content area standards and the information literacy standards there may well be a disconnect in attempts to coordinate teaching information literacy skills with classroom teachers.

In addition, there is little reason to think that information literacy standards differ from other curriculum area. Thus it seems likely that varying definitions, levels of generality and levels of subordination are also concerns in information literacy.

Finally, both Marcoux (2008) and Ballard (2009) have written of the need for Teacher/Librarians to adopt the new AASL standards. There is almost a tone of pleading in these articles for Teacher/Librarians to (using Ballard’s metaphor) “join the wagon train.” Marcoux argues that “more and more influential people perceive that the school library program and profession aren’t necessarily succeeding with these expectations” (p. 18). She goes on to say instead of working out a partnership with school libraries, these groups are, “incorporating them without the inclusion of the school library program and professional”(p. 18). Ballard writes, “If all our efforts do not pay dividends, school libraries and school library media specialists will be a bust” (p. 15). These comments leave one with the sense that the standards are not as useful for Teacher/Librarians (and thus not being adopted as widely) as the national organization would have hoped.

2.6 How are standards created?

2.6.1 Standards in general

Standards are frequently created by a group of “experts” (Ballard, 2009; Barnett, 2008; Lee, 2002). The data in Table 2.8 shows an overview of the process that six national professional organizations used to create their standards documents. In each a task force or committee was authorized to fabricate the standards. In three of the six organizations a process of sharing a draft or gathering input was described as being carried out. The feedback obtained was then incorporated into a draft set of standards, another round of feedback occurred and then a final version was produced. According to Goertz (2010), the NCTM has used consensus methods to develop standards. The United States History Standards were developed through a “broad-based national consensus building process” (National Center for History in the Schools et al., 1994, p. iii). Apparently the consensus building was not broad-based enough. Shortly before the United States History standards were released Lynne V. Cheney, the chairperson of the National Endowment for the Humanities, attacked them. This was particularly damaging because she had funded the standards development. “Cheney lambasted the standards as the epitome of left-wing political correctness, because they emphasized the nation’s failings and paid scant attention to its great men” (Ravitch, 2010, p. 17). Consensus building would appear to be the method used by the other professional organizations given their descriptions of committees of focus groups and committees. One often repeated criticism of standards is that they are bloated since compromise equals addition without subtraction (Lee, 2002; Marzano & Kendall, 1996c, 1998; V. Phillips, 2009; Schmoker & Marzano, 1999). This criticism supports the idea that standards are developed through an attempt to reach consensus.

Process or Committees used to generate standards	AASL (2009)	ISTE (2007)	National History Standards (1994)	NCSS National Curriculum Standards (2010)	NCTM Principals and Standard for School Mathematics (2000)	NRC National Science Education Standards 1996
	Learning Standards Rewrite Task Force	ISTE Accreditation and Standards Committee	National Council for History Standards – 30 members	Task Force of the NCSS	Commission on the Future of the Standards	National Committee on Science Education and Standards
	Learning Standards Indicators and Assessment Task Force	ISTE Stakeholders Advisory Committee	National Forum for History Standards – provided feedback	Approved by NCSS Board of Directors	Standards 2000 Writing Group & the Standards 2000 Electronic Format Group. Each included teachers, teacher educators, administrators, researchers, and mathematicians	Three working groups: Content, teaching, and assessment
		ISTE Board of Directors	Three Curriculum Tasks Forces (more than 50 members; veteran classroom teachers and academics)		Fourteen Association Review Groups	150 + public presentations to solicit input/feedback
					Draft version – 30,000 copies distributed	“Predraft“ released to five focus groups
					Presentations and discussion sessions were held at all NCTM regional conferences	Draft copy released to 18,000 individuals and 250 groups – Comments collated and analyzed
					Reactions submitted by 650+ individuals & more than 70 groups (ranging from school study groups to graduate seminars to sessions held by NCTM Affiliates). Reactions were coded and entered into a qualitative database	Final National Science Standards
					National Research Council committee to review process of gathering and analyzing reactions to discussion draft	
				Final version		

Table 2.8. National Professional Organization Standards – Overview of process to generate standards

2.6.2 How are information literacy standards developed?

Bartow (2009) in Montana and Barnett (2008) in Arkansas have each written accounts of the development of information literacy standards at the state level. Both processes seem similar to that described by the national professional organizations. Montana had formed teams of educators to create their original standards, and used the AASL Information Power standards and

the Big6 information problem solving process as references. In revising their standards, focus groups were used to gather input and a standards committee was formed with Dr. Michael Eisenberg of the University of Washington contracted to act as a consultant. Bartow describes using the new standards from AASL, ISTE and the ACRL as guidelines along with writings from a variety of experts.

Barnett describes the process of writing state standards for Arkansas as having several major differences when compared to writing national standards for AASL. First, while the national standards focused on outcomes, the state standards focused on skills at a particular grade level. Second, the state required broad representation on the committee resulting in a 45-member committee. Barnett comments, “My previous experiences have shown that it is nearly impossible to get that many people to agree on anything” (2008, p. 22). Two other areas of difference concerned the structure of the frameworks and the level of confidentiality required by the Arkansas was much greater than that of AASL. Arkansas requires all its subject frameworks to have the same structure. Barnett asserts that the required framework made it difficult to write standards for a subject needing to be integrated into other content areas.

2.7 Developmental levels and standards

Understanding the differing capabilities of children of varying ages allows for the creation of standards that are appropriate for different developmental ages. Appropriate in this case refers to concepts or instructional matter that it is reasonable to expect children of a given age to master. The goal of age appropriate standards is to allow curriculum planners and teachers to plan and implement lessons that are appropriate to the children in a particular grade level or classroom. Developmentally appropriate standards also allow for the proper assessment of children’s learning and for assessment of instruction.

2.7.1 Educational standards and children's development

Benchmarks should be developmentally appropriate (Bodrova et al., 2000). However there is scant documentation to help standards writers to know how to place benchmarks at particular grade levels (Zenger & Zenger, 2002, 2003). Kendall's work is a guide for school districts writing their own standards. He states:

The individual state standards documents should be particularly helpful when outside comparison is needed to determine at what grade a benchmark would best be placed. Absent a substantive body of knowledge based on empirical research on such a question, we must rely heavily upon the knowledge and experience of classroom teachers and other educators to help inform decisions concerning the appropriate grade placement. Considering the consensus process by which they were formed, these documents represent that information fairly well. (Kendall, 2001, p. 11)

Kendall goes on to say, "Because there is no definitive work on what knowledge and skills should be addressed at each and every grade level, the work of grade placement of content is at best an 'educated guess,' at worst, and arbitrary assignment" (p. 17). According to Peterson and Hess (2008) one national metric does exist, the National Assessment of Education Progress (NAEP) test. How does the NAEP assign a difficulty level to each of its items? "Basically, it asks informed experts to judge the difficulty of each of the items in its test bank" (Peterson & Hess, 2008, p. 70).

2.7.2 Information literacy standards and children's development

Many authors have recognized the importance of cognitive development to information literacy instruction (Eastin, 2008; Jackson, 2007, 2008b; Kuhlthau, 1981, 1987; Kuhlthau et al., 2007;

McGuire, 1998; Orme, 2008). Kuhlthau's (1981) book is a guide enabling teacher librarians to implement developmentally-appropriate library skills lessons, a pre-cursor to the both the current standards movement and the concept of information literacy skills. However, there is little to indicate that information literacy standards are based on empirical research any more so than other educational standards. Kuhlthau's 1981 work was written based on her personal experience and through her application of the theories of the theorist Jean Piaget.

Standards often cover a band of grade levels (e.g. Grades 1-3) defining an expected outcome only at the end of third grade. Educators would find finely grained standards more useful than benchmarks covering grade bands. Most useful for educators would be a developmental theory of information problem solving that could be used to establish standards at a level so that standards could be clearly differentiated for each year in school (Marzano, 2001). This may not be possible. The shifts in thinking may cover too broad an age range to be able to generate such fine-grained differentiation. Marzano (2001) describes this as a problem with standards in general. As Marzano points out, benchmarks covering grades 1-3 leaves teachers in first and second grades with out clear guidance as to what to expect of their students. Therefore refining standards to be as finely grained as possible is an important goal.

The dynamic ecological perspective emphasizes each individual child's unique development (Daniels & Clarkson, 2010). Thus, since all individuals are unique, it becomes impossible to have "standards" for grade levels based on age appropriate developmental differences. This, however, is an intolerable situation given the current structure of the educational system in the United States. Educational systems have been and are based on age specific grade levels. Each grade level is expected to teach children age appropriate content. Here then is a conundrum, children are developmentally unique but placed in a system of standardized grades and advanced

by age cohorts whether they are ready or not (Daniels & Clarkson, 2010). Does this mean educators should abandon the search for developmentally appropriate information literacy standards? No, but it must be recognized that some of what is done is really a best guess approximation. What might be more important is to begin searching for a developmental sequence or pattern that is exhibited by learners as more sophisticated information literacy skills are developed.

2.7.3 Information literacy and educational standards conclusion

A comprehensive framework of developmentally appropriate information literacy standards is important for a variety of reasons. Standards themselves are important to the process of education as they provide a roadmap of what should be taught. Information literacy is an important subject for students to learn at the start of the 21st century as has previously been noted. Developmentally appropriate standards are important to insure students have the abilities to accomplish the tasks set before them.

There has been no comprehensive study of information literacy standards. It is necessary to look at the critiques of standards in general and then apply these critiques to the various levels of information literacy standards. Doing so this dissertation has found –

- Information literacy standards are multi-dimensional:
- They exist in content areas (English/Language Arts, History, Science, Mathematics)
- They exist in technical areas (ISTE and AASL standards)
- They exist at different levels of educational organizations:

- National
- State
- Local
- They are part of the standards movement

No comprehensive examination of the information literacy standards has been completed, but we do know there are problems with standards in general –

- Lack of consistent terminology
- Too many
- Too much information packed into the standards documents
- Lack of a consistent level of specificity
- Confusion & mixing among types of standards
 - Performance
 - Content
 - Curricular

Information literacy standards have been created in a similar manner to the standards of other national organizations and thus there is reason to believe they may be afflicted with the same issues as other types of standards.

2.8 Cognitive development and information problem solving

Information problem solving is often said to be the key skill of the 21st century (Eisenberg, 2008; Eisenberg et al., 2004; Heider, 2009; Heinstrom, 2006; Kuhlthau, 1994, 2004, 2008; Marchionini, 1999; Partnership for 21st Century Skills, 2009). It is a skill that has been taught in the past, often referred to as “research skills” or “library skills.” With the advent of the World Wide Web, and an ever-increasing number of sources of information, the ability to expertly navigate these sources and find the required or desired information has become increasingly difficult. Yet, as information sources move to electronic versions, this ability is increasingly important. One result has been an increasing number of proponents urging the inclusion of information problem solving skills into the formal school curriculum across all grade levels (American Association of School Librarians, 2009; American Association of School Librarians & Association for Educational Communications, 1998; Eisenberg, 2008; Eisenberg et al., 2004; Large, Nasset, & Beheshti, 2008; Walraven, Brand-Gruwel, & Boshuizen, 2008).

When new areas are introduced into the curriculum it would seem logical to review the material to ensure it is developmentally appropriate for the intended audience (Vygotsky & Cole, 1978). Applying this to the introduction of information problem solving into the school curricula, one would imagine that it would be important to link the skills and tasks taught at each grade level to the theoretically appropriate developmental level. However, little research or attention has been paid to the general area of assigning content to a particular grade level (Kendall, 2001; Zenger & Zenger, 2002, 2003). According to Peterson and Hess (2008) one national metric does exist, the National Assessment of Education Progress (NAEP) test. How does the NAEP assign a difficulty level to each of its items? “Basically, it ask informed experts to judge the difficulty of each of the

items in its test bank” (Peterson & Hess, 2008, p. 70). This work of basing instructional standards on research remains to be done in information problem solving.

In psychology the field of cognitive development examines the changes in children’s cognitive abilities as they mature. A second area of psychology investigates the field of problem solving. It seems reasonable and useful to take the findings from these areas and use as a lens for interpreting the question, “What skills should be taught at what grade levels?” This research project is particularly focused on how these factors apply to children of school age, those in the pre-adolescent and early adolescent age groups, roughly ages 7-14.

A third area of interest is learning theory. The effects of development and learning are often difficult to distinguish. “Development and learning are not two parallel processes” (J. D. Bransford et al., 2000, pp. 112-113). Differences in development and learning are discussed in greater detail below.

This section first discusses a selected views of key theorists from the field of cognitive development, next the general area of problem solving, then examines some of the key ideas of how people learn, a brief overview of different models of IPS and finally attempts to put these areas together to how they might inform teaching and learning of information problem solving in K-12 education.

2.8.1 Introduction

The study of cognitive development began in the late 1800’s with the work of James Baldwin (Case, 1996; Moshman, 1998). Since then a vast literature and competing interpretations have developed around the subject. Garton (2004) writes that cognitive development generally divides into either Piagetian or Vygotskyian lines of research. Miller (2002) on the other hand offers

seven major theories and an additional five emerging theories. Miller (2002) and Bee & Boyd (2010) argue that a result of the existence of competing theories is that most developmental scientists favor the use of an eclectic approach using multiple theories to gain insight into development. This last approach, carefully applied, is the one taken in this dissertation.

This project is focused around school age children (ages 7 – 14); so cognitive developmental issues dealing with children younger than five to six years of age are not addressed.

The following sections define the terms cognition and development and briefly describe some of the key concept of various theorist that may later be useful in examining IPS.

2.8.2 Definitions

2.8.2.1 Cognition

Flavell, Miller & Miller’s first sentence in their text on cognitive development is, “The really interesting concepts of this world have the nasty habit of avoiding our most determined efforts to pin them down, to make them say something definite and then make them stick to it” (2002, p. 1). Flavell et al. are writing about cognition and say it is usually applied to the higher mental processes (similar to those noted below by Berk) but that most modern psychologists would also want to include areas such as motor movement and perception. Flavell et al. assert that once you open the process of including items in cognition it becomes hard to know where to stop.

Berk and Bjorklund offer more concise definitions in their textbooks as seen by the definitions in Table 2.9.

<p>“Cognition refers to the inner processes and products of the mind that lead to ‘knowing.’ It includes all mental activity – attending, remembering, symbolizing, categorizing,</p>	<p>“Cognition: The processes or faculties by which knowledge is acquired and manipulated. Cognition is usually thought of as being mental.”</p>
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planning, reasoning, problem solving, creating, and fantasizing”	
(Berk, 2009, p. 223)	(Bjorklund, 2005, p. 3)

Table 2.9. Textbook definitions of cognition

2.8.2.2 Development

Bjorklund defines development as, “Development refers to changes in structure or function over time” (2005, p. 3). Miller defines a developmental theory in much the same way, “What is critical about a developmental theory is that it focuses on change over time” (2002, p. 8). Table 2.10 provides a comparison of development and learning.

Development	Learning
Example: Puberty – attaining sexual maturity	Example: Learning to stop when the light is red and go on green
Changes are extended – a substantial period of time	Not necessarily dependent on time; can vary from minutes to hours to days
Directed from within	More likely to a result of external forces
Qualitative – puberty is a qualitative change	Learning a rule represents a Quantitative increase in knowledge
Progressive – extends over time in a systematic way; has a natural progression	Learning is often culturally based, and varies according to culture
Adapted from (Moshman, 1998, 2005)	

Table 2.10. Development vs. Learning

2.8.2.3 Cognitive development

Berk defines cognitive development as “how the intellectual capacities of infants change into the capacities of a child, adolescent, and adult” (2009, p. 223). Moshman defines cognitive development as, “the development of knowledge and inference” (2005, p. 2). In other words, cognitive development is how an individual’s ways of knowing and thinking change over time.

2.8.3 Piaget: Stage theories of development

Jean Piaget (1896-1980) was not the first developmental psychologist even though it often appears so when reviewing the literature, but he has been the most influential (Bee & Boyd,

2010; Berk, 2009; Bjorklund, 2005; Case, 1996; Flavell et al., 2002; Lourenco & Machado, 1996; Miller, 2002). Piaget built upon the ideas of Mark Baldwin, using Baldwin's developmental stages as a base and extending, modifying and renaming some of Baldwin's stages (Case, 1996, 1998).

In Case's view Piaget's most important contribution to Baldwin's theory was, "the notion of a 'logical structure,' that is, a coherent set of logical operations that can be applied to any domain of human activity and to which any task in the domain must ultimately be assimilated" (1996, p. 1). Flavell defined Piaget's principal scientific interests as, "the theoretical and experimental investigation of the qualitative development of intellectual structures" (1963, p. 15). Piaget viewed the child's cognitive processes as qualitatively different from an adult's, not simply as a miniature version of an older person's. He thought that children created cognitive structures and that these structures proceeded through four separate stages: 1) Sensorimotor, 2) Preoperational, 3) Concrete Operations, and 4) Formal operations (Bjorklund, 2005). See Figure 2.1 below for a graphic depicting these stages.

This dissertation is concerned with school age children so concrete operations and formal operations will be discussed in somewhat greater depth. The child who has obtained concrete operations is "a logical and systematic thinker who can transcend misleading appearances by coordinating multiple aspects of a situation. She or he understands the logic of classes, relations, and numbers, and routinely makes proper inferences on the basis of coherent conceptual frameworks" (Moshman, 2005, p. 8). Piaget appears to have the description of the child at this age correct (DeLoache, Miller, & Pierroutsakos, 1998; Kuhn, 2008; Moshman, 2005).

One area of particular interest is the transition between pre-adolescence and adolescence, the shift from concrete operations to formal operations is described by Inhelder and Piaget as a matter of the child subordinating *reality* to *possibility* (Inhelder & Piaget, 1958). For the concrete operational child possibilities are limited to what can be derived from their experience of reality (Inhelder & Piaget, 1958). The formal operations child, however, now considers all potential outcomes.

Looking at education and learning through the lens of Piaget's theory indicates that children learn best when they are working at a level that is appropriate to the stage that they are in. Children will have difficulty successfully retaining material that is not at that stage. Piaget viewed the environment around the child as an important part of development, but in terms of influencing the rate at which a child proceeded through the stages of development rather than affecting the order of the stages. Piaget's theory also generally treats development as domain general, meaning intelligence is a general ability and that developmental changes happen simultaneously across a wide spectrum.

As noted above many texts laud Piaget for his contributions to developmental psychology (Berk, 2009; Bjorklund, 2005; Case, 1992; Daniels & Clarkson, 2010; Flavell et al., 2002; Miller, 2002). That said, they also offer criticisms of his theories. First, his stages are seen as too rigid. Second, many children are capable of completing the tasks of a more advanced stage at an earlier age when they are provided training or when they have the appropriate content knowledge. In addition, many argue that Piaget had several things wrong about the stage of formal operations.

Moshman (2005) and Kuhn (2006) both describe Piaget's work concerning the adolescent and post adolescent ages as being both too wide and too narrow. It is too wide in the sense that many

adults never reach the stage Piaget described as formal operational (abstract) thinking. It is too narrow because many children younger than adolescents demonstrate abstract thinking in certain areas and additionally there are other ways of thinking than the hypothetico-deductive form that Piaget used to define formal operations. Though, one thing that Piaget did have right about the shift in thinking at adolescence is that the ability to think about thinking, or metacognition, does emerge at this time (Kuhn, 2006, 2008; Kuhn & Franklin, 2006; Moshman, 2005; Wigfield, Byrnes, & Eccles, 2006). Though, “what needs to be abandoned is the idea that we can pinpoint its emergence to some narrow window of months or years in late childhood or early adolescence, or indeed any time” (Kuhn & Franklin, 2006, p. 956).

Moshman asserts that to a large degree adolescents direct their own development through the process of focusing on their own interests. Thus in areas of interest, adolescents may develop the ability to think quite abstractly while other areas remain in Piaget’s concrete operational stage. Learning is also an important factor in adolescent cognition. As a result, one may expect to see wide variation among adolescent information problem solving skills based on the amount of interest or teaching individuals have had in information problem solving. Discussed below, Siegler’s (2005) overlapping wave theory of learning may prove to be a more reasonable explanation of variation in adolescent information problem solving.

2.8.4 Vygotsky: Socio-cultural theories

Lev Vygotsky (1896-1934) was a Soviet Russian psychologist who proposed that cognitive development of children occurred through interaction with the child’s culture. According to Bjorklund, “Vygotsky, writing in the 1920s and 1930s, emphasized that development is guided by adults interacting with children, with the cultural context determining largely how, where, and when these interactions take place” (2005, p. 61).

One of Vygotsky's important contributions was his description of the Zone of Proximal Development (ZPD), the mental area in which children learn best (Berk, 2009; J. D. Bransford et al., 2000). He defined this as "the distance between the actual developmental level as determined by independent problem-solving and the level of potential as determined through problem solving under adult guidance or in collaboration with more capable peers" (Vygotsky & Cole, 1978). The ZPD describes the functions of areas that are emerging and not yet fully developed. For Vygotsky, development does not precede learning; it is learning that drives along development. Development results from the proper integration of learning (Vygotsky & Cole, 1978). This is one area where Vygotsky clearly differs from Piaget. Vygotsky sees learning as pulling development along, while Piaget views development as necessary for learning to occur.

Learning for Vygotsky occurs best when the practice of scaffolding is used. Bjorklund describes scaffolding as occurring, "when experts are sensitive to abilities of a novice and respond contingently to the novice's responses in a learning situation, so that the novice gradually increases his or her understanding" (2005, p. 65). Scaffolding works best in the ZPD and it differs from the ZPD in that scaffolding describes the strategy for the actual instruction occurring, while the ZPD describes the ability level of the child. Learning depends upon having an interaction between the learner and an expert and thus is a social interaction. Also, as learning is based on specific interactions occurring within a cultural setting, a child's developmental level will vary widely depending upon the opportunities available in the child's past social interactions. This is another clear difference with Piagetian theory as Piaget viewed the development of children as universal across cultures.

2.8.5 Siegler: Information Processing and Overlapping Waves Theory

Siegler's premise is that stage theories of development are inadequate to describe how change actually occurs in the development of children's thinking. In Siegler's view, variability is the common denominator of children's and adult's thinking.

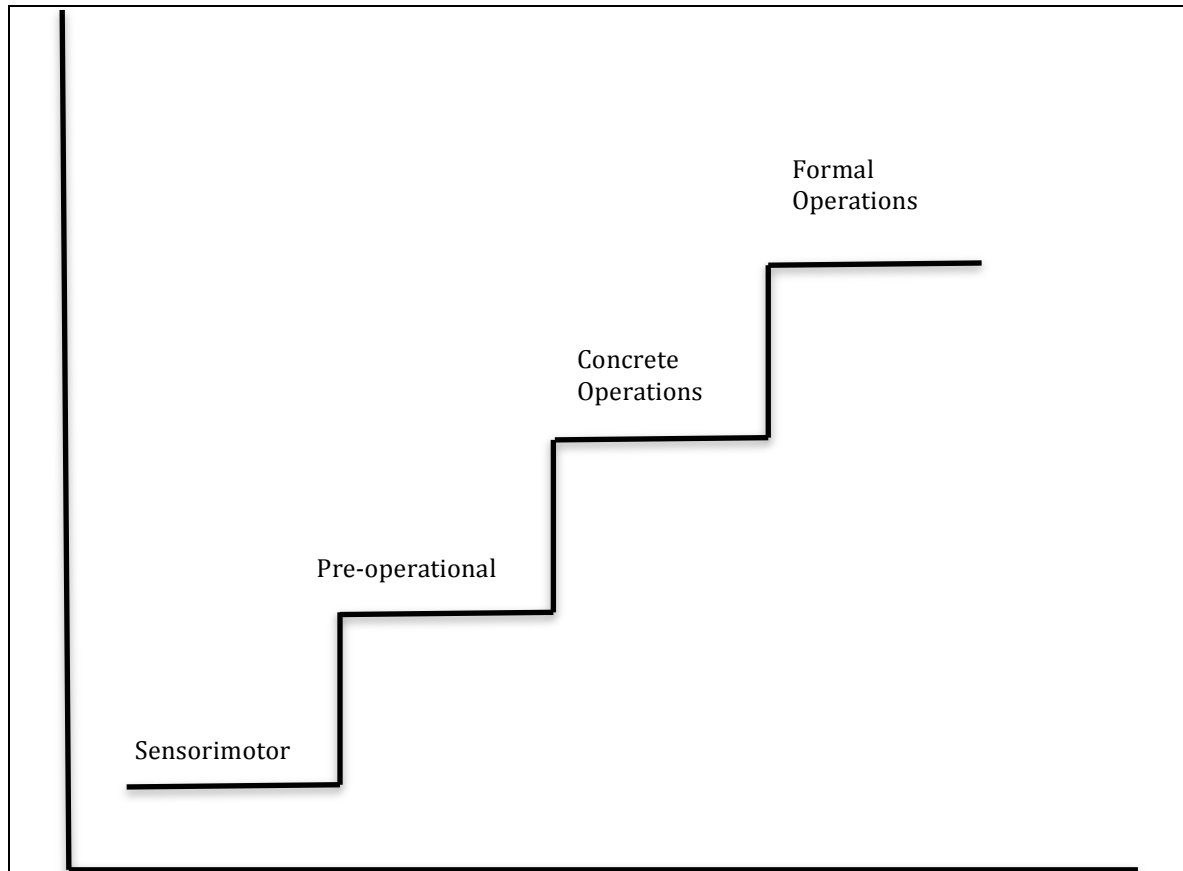


Figure 2.1. Siegler's Piagetian State Model (Siegler, 1996, p. 85)

Siegler's model of Piaget's theory is shown above in Figure 2.1. As seen, in the Piagetian model, children's thinking works at a particular level for an extended period of time and then suddenly shifts to a new, higher level. Neo-Piagetians, such as Robbie Case, also use "stair-case" models and Siegler goes on to write that this model is not specific to Piaget and Neo-Piagetians but is "omnipresent" as a model in cognitive development (Siegler, 1996). Differences between models

tend to focus on what skills are tested, what ages various skills are “discovered” at, and vocabulary.

Based on microgenetic studies, Siegler proposes an alternative theory of overlapping waves (Siegler, 1996, 2006). According to this theory, children develop successive strategies for thinking as they mature, but these strategies are supplemented by new strategies instead of being completely replaced. Siegler’s graphic depiction of overlapping waves theory is below in Figure 2.2 (Siegler, 1996).

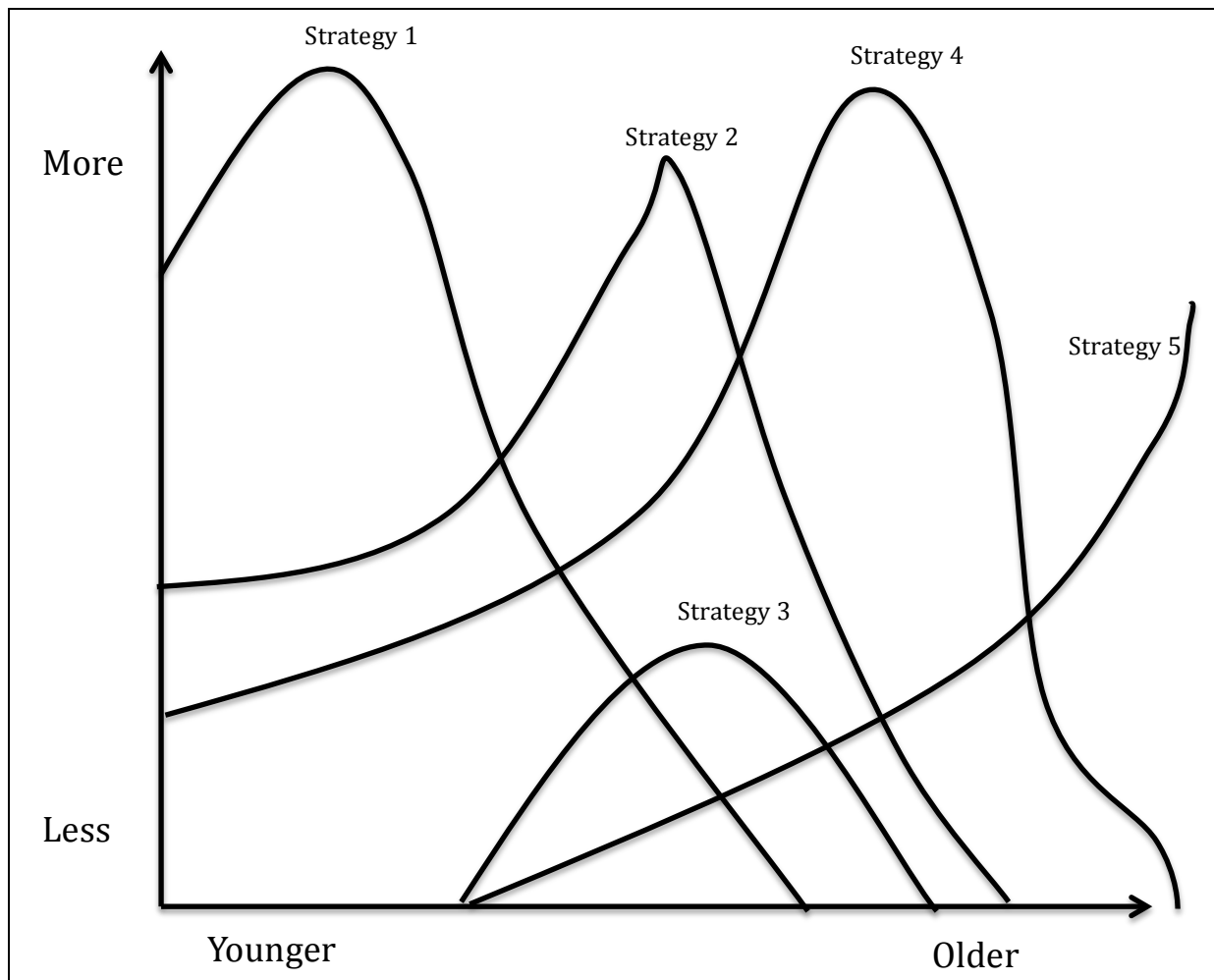


Figure 2.2. Overlapping Waves Theory (Siegler, 1996, p. 89)

As children get older the original strategies are still present and may still be used. Children may develop a preferred strategy, but other strategies may still be used according to the particular context.

2.8.6 Bronfenbrenner: The Ecological Model

Bronfenbrenner’s ecological model has been described as similar to Russian nesting dolls, one layer inside another (Miller, 2002). Bronfenbrenner’s model views the child as encircled by four different layers.

Microsystem	Individual’s unique characteristics and events experienced in a face-to-face setting
Mesosystem	Events that are linked between two or more microsystems
Exosystem	Events between two or more settings, of which at least one or more does not include the individual
Macrosystem	Interaction of microsystem, mesosystem, and exosystem with the larger culture
(Daniels & Clarkson, 2010; Miller, 2002)	

Table 2.11 Bronfenbrenner’s Ecological Model

One important assumption of the Ecological model is that the subsystems are dynamic. The individual is growing and changing and at the same time the systems around the child are also changing. The combination of these interactions then impacts how an individual performs in a setting such as school.

2.8.7 General shifts in cognitive ability

During the school years, there appears to be two general qualitative shifts in children’s thinking. The first is between the ages of five and seven (Sameroff & Haith, 1996). The second occurs as children enter into adolescence between the ages of 11-13 (Bee & Boyd, 2010; Moshman, 2005). Consistent with these shifts, Berk (2009) suggests five periods of development including middle

childhood, ages 6 – 11, and adolescence, ages 11 – 18. Bee & Boyd (2010) suggest four periods of development, which include the “School-Aged Child” and Adolescence with age periods similar to Berk’s.

According to Kuhn (2006) there is great individual variability during and after adolescence. Some adults never achieve levels shown by some adolescents. “Variation in positions along developmental pathways becomes pronounced. In addition, within specific domains, the range and depth of individually acquired expertise becomes much greater than in childhood” (p. 65).

These shifts imply that changes in information problem solving skills within these periods will be due to factors other than development. These factors seem likely to include learning and experience, both in a formal educational environment (i.e. school) and informal educational environments; and individual interests and motivation.

2.9 Learning

Learning theories offers several ideas that are adaptable to information problem solving. First ideas addressing the construct of expertise are described. Second are ideas from Bereiter & Scardamalia’s Learning by Design curriculum.

2.9.1 Expertise

As noted above, Kuhn suggests that expertise varies widely after adolescence. Bransford, Stevens, Schwartz, et al. (2006) offer the following insights from learning theory about expertise.

Expertise and noticing – experts notice feature of problems that are not obvious to others and may escape the notice of novices.

Expertise and Knowledge organization – Experts organize their knowledge conceptually and have readier access to it than do novices. They also appear to be able remember more, but this is most likely due to their ability to “chunk” together larger pieces into one whole.

Expertise and Teaching – Teachers need considerable content knowledge to teach, but they if they lack pedagogical knowledge they may struggle to get across concepts to novices. Often experts’ knowledge has become tacit and automatic and they are unable to remember what it was like to be a novice. Expert teachers, besides content knowledge, need to have the Pedagogical Content Knowledge (Buschang, Chung, Delacruz, & Baker, 2012) required to teach the information to novices.

2.9.2 Learning by Design

A 1998 University of Washington study cited by Bereiter & Scardamalia (2006) surveyed graduates five and ten years after graduation. Essentially they were asked what are the most important skills in your life today. The number one answer was the ability to define and solve problems. The other top answers that (rating a four out of five) were:

- Locating information needed to help make decisions or solve problems
- Working and/or learning independently
- Speaking effectively
- Working effectively with modern technology, especially computers (p. 697).

Bereiter & Scardamalia call these soft skills as opposed to more job-specific and objective skills and refer to them as clearly “knowledge age” skills. The first two skills seem to be taken almost

directly from a definition of information literacy and the last is a skill that is often linked to information literacy. Bereiter & Scardamalia suggest that Learning by Design is one curriculum that could be used to teach these skills. Learning by Design includes design problems, problem based learning, project learning, and knowledge building. These cover a wide range of learning from designing a car that will cover the most distance by being propelled from the air expelled from a balloon, planning a mission to Mars, to coming up with plausible solutions to real problems. In general students are engaged in designing solutions to real situations.

Using a curriculum with multiple possible outcomes fits with the variability noted above in cognitive development. If students possess a wide variety of skills, abilities, and interests, it seems logical to address those through a curriculum that has multiple possibilities both in learning activities and in cognitive requirements of the learners. In assessing educational standards statements that apply to information literacy, an important consideration will be do the standards statement include the principals exemplified by this curriculum.

2.10 Problem solving and cognitive development: Overview

This section reviews key aspects of the literature related to problem solving and begins to apply some of the principles of cognitive development to problem solving. The goal of this process will be to apply cognitive development principles to problem solving to identify age appropriate practices that can be used to teach problem solving around information based problems.

2.10.1 Basic elements of problem solving

Problem solving has been defined as having four basic elements. These are a goal, obstacles preventing one from achieving the goal, strategies for overcoming the obstacles, and an evaluation of the process – was the goal achieved (Bjorklund, 2005; DeLoache et al., 1998).

Planning is a skill that requires an individual to combine the four aspects of problem solving into a method or strategy for achieving the goal. Reasoning is another cognitive skill involved with problem solving. Children's abilities to plan and to reason both improve through maturation. Both of these cognitive abilities will be discussed in more detail below.

Mayer and Wittrock (2006, p. 287) define problem solving as a "cognitive process directed at achieving a goal when no solution method is obvious to the problem solver". They identify four characteristics of problem solving arising out of this definition.

- Problem solving is cognitive.
- Problem solving is a process.
- Problem solving is directed.
- Problem solving is personal.

2.10.2 Categories of problems

Mayer and Wittrock identify two categories of problems. Problems can be well defined or ill defined; they can be routine or nonroutine. Well-defined problems have the parameters clearly stated. Ill-defined problems lack a clear goal statement and the allowable operators are not clearly defined. They note that well-defined problems are what schools tend to give children, while ill-defined problems tend to more closely resemble the real world. Their article discusses several instructional strategies for improving problem solving by students. These include strategies for teaching content such as load-reducing strategies by increasing the efficiency of automatic aspects of cognitive processing (drill and kill), or using advanced organizers to tie new

material to previous experience. Meyer and Wittrock advocate teaching thinking skills that will transfer to solving new problems.

2.10.2.1 Categories of problem solving situations

Deloache et al. (1998) analyzed problem solving by looking at two different categories of problem solving situations, knowledge-lean and knowledge intensive. Knowledge-intensive situations are domain specific. Possessing content knowledge makes a large difference in problem solving ability, with experts having clear advantages over novices. Knowledge-lean situations are not domain specific and thus describe circumstances that apply over a range of possibilities. Three general knowledge-lean strategies are trial and error, means-ends analysis, and hill-climbing. Trial and error is exactly what it sounds like; an individual keeps making trials at solving a problem and continues through errors until the problem is solved. An individual using a means-end analysis approach analyzes the difference between the current situation and the desired and makes a plan for reducing or eliminating that difference. In other words, means-end analysis requires coming up with a plan for all aspects of solving a problem. Hill-climbing is a less sophisticated problem solving method where the problem solver chooses the path that leads most clearly toward the goal. It differs from means-end analysis in that the solver does not need to envision the entire path at once. Hill-climbers constantly choose uphill paths to close on their goal. They do not consider the possibility of going down and around to reach a higher point.

2.10.2.2 Educating for problem solving

Mayer (1987) posed the question, “what type of an education does it take to develop students who are excellent problem solvers?” He explored the possibility of teaching problems through the use of algebra. Another proposed method is teaching toward improving students’ attitudes

about problem solving skills. Pfeiffer, Feinberg, & Gelber (1987) focus on having teachers work with students in developing attitudes that accept having a high tolerance for ambiguity, complex situations, and conflict while maintaining self-confidence and a respect for the facts. They also suggest that teachers need to change their attitudes away from a mode of providing information to passive students to one of coaching a skill akin to riding a bicycle or shooting a basketball. It also seems that in addition to having teachers change their attitude towards their instructional methods, teachers also need to adopt the attitudes towards problem solving that Pfeiffer et al. propose.

Problem solving and thinking skills are not just an issue for K-12 education. College students have difficulty thinking at the abstract level. Halpern (1987) reports that less than 25% of first year college students score at the formal level of thinking on a series of Piagetian tests designed to test skills for logical thought. Nummedal (1987) reports that less than 50% of all college students are able to use formal reasoning and that as a result the California State University system instituted a critical thinking skills requirement in 1983. This requirement is still in place (Reed, 2008).

Pitt (1983) in a study combining ideas from information processing and Piagetian models, compared the problem solving abilities of 10th graders to college juniors using a series of chemistry problems. She found that the 10th graders had difficulty using formal operational thinking and that they performed more poorly than the college juniors in the areas of generating accurate hypotheses and coordinating information. Requiring the students to plan their steps exacerbated the differences. The results supported the idea that both high school sophomores and the college juniors used a form of formal operational thinking, but that 10th grader were not as capable using this mode of thinking as were the college juniors.

2.10.3 Problem solving and cognitive development

When are children first capable of problem solving? How do their abilities change as they mature? The answer seems to be “it depends.” Piaget thought problem solving did not begin until a child was about eight-months-old (Berk, 2009; Bjorklund, 2005). Problem solving requires a child to have both a need (goal) and a means (strategy) to achieve the goal. Although some experiments point to children of earlier ages (2 – 6 months) being able to problem solve, this seems to be mainly attributable to different authors’ definitions of problem solving (Bjorklund, 2005). Problem solving in some form clearly appears by the end of a baby’s first year (Berk, 2009; DeLoache et al., 1998; Poole, Miller, & Church, 2004). As children mature, the quality of a child’s problem solving varies greatly with his or her development. DeLoache, Miller, Pierroutsakos, & Damon (1998) use the metaphor of a *bricolage*, a French word most closely approximating “tinkerer” – a worker who uses whatever materials are available to build or solve a problem – to represent a child’s problem solving. As children mature, they have more mental resources available and greater domain knowledge, both of which they can make use of to improve their problem solving abilities.

2.10.4 Planning

Planning is often seen as difficult and adults, as well as children, apparently prefer hill-climbing strategies. They tend to avoid the complexity of means-end analysis and are reluctant to make moves that lead temporarily away from their goal although the path may achieve a higher outcome in the long run (DeLoache et al., 1998). Bjorklund (2005) lists five reasons why planning is viewed as something to avoid.

- Planning requires inhibition of current desires/behavior

- Planning takes time
- Planning is viewed as difficult, wasteful of time, and subjectively unpleasant
- Plans are not always successful, so why do it?
- It's more fun without a plan.

Planning tends to be a skill that humans develop late, and, as noted above, even adults tend to approach problems with as little planning as possible. The overriding concept here seems to be, “as little planning as possible,” not that adults cannot plan, just that it is difficult and thus easier paths are chosen if possible.

2.10.5 Knowledge-intensive problem solving

Knowledge-intensive problem solving relates to domain specific areas in which individuals have developed expertise. Experts are clearly better problem solvers than novices. Research in this area has compared the ability to recall the layout of chess pieces by child chess experts to graduate students who are novices. The children consistently beat the adults. When the task is changed to recalling numbers sequentially, the graduate students win (Bjorklund, 2005; DeLoache et al., 1998).

2.10.6 Reasoning

Reasoning is another area of problem solving that changes as children develop cognitive ability. If planning is the problem solving skill that leads to the creation of a strategy to achieve a goal and overcome obstacles, reasoning is the problem solving skill that applies logic to the plan. There are several different types of reasoning that psychology has identified – analogical reasoning, formal reasoning, and scientific reasoning. Analogical reasoning is reasoning by

analogy, how does something you already know apply to a new situation? Formal reasoning is reasoning in which the form of the argument is important and is often decontextualized. The relationship to the real world is not necessarily important. Syllogisms and propositional logic are examples of formal reasoning. Scientific reasoning involves creating hypotheses about something in the real world and then systematically proving or disproving each hypothesis. Scientific reasoning is logic in context.

2.10.7 Reasoning and cognitive development

How do various types of reasoning change as children mature? How are these changes in reasoning viewed by the theories of Piaget, Vygotsky, Siegler, and Bronfenbrenner? First, examining the ideas of Piaget, he thought that analogical, formal, and scientific reasoning did not first appear until adolescence (Bjorklund, 2005; Inhelder & Piaget, 1958). As noted above, there seems to be general agreement that Piaget was correct that some forms of reasoning begin to emerge in adolescence. Analogical reasoning, however, has advocates for a much earlier appearance, with some arguing that it is present at birth (Bjorklund, 2005). One experiment that indicated analogical reasoning appears much earlier than Piaget theorized involved one-year-old infants solving a toy retrieval problem (either on their own or with parental coaching). Once they solved the first problem the infants were able to solve similar second and third problems with greater efficiency. This experiment indicated that infants can learn through the process of analogical reasoning (Berk, 2009; Bjorklund, 2005; Flavell et al., 2002). Preschoolers also are able to reason analogically when using information from stories. One explanation for these findings differing from Piaget's is the level of knowledge required to answer and explain the analogies. When children are asked things that are appropriate to their individual knowledge

level, they can, as early as 24 months, provide answers requiring analogical reasoning (DeLoache et al., 1998; Gholson, Morgan, Dattel, & Pierce, 1990).

Piaget's theory of development is a stage theory in which all children go through similar stages in the same order. Vygotsky, however, did not address normative development (Garton, 2004). Development is based on a child's interaction with other more advanced individuals in a social setting. For Vygotsky a child's ability to solve problems will be based on a combination of environmental, biological, and social issues that are unique to the individual and it becomes difficult or impossible to make general claims about the problem solving abilities of fifth graders, 10th graders, or college juniors.

In analyzing the abilities of children to problem solve, DeLoache et al.'s metaphor of the *bricolage* appears appropriate. Children (as well as adults) use the cognitive abilities available at any given time. Not everyone thinks at all levels at all times, and some adults never achieve formal operational thinking (Bjorklund, 2005; Kuhn, 2006; Kuhn & Franklin, 2006; Moshman, 2005). Individuals tend to use what is available and what is easiest. This concept of using what is available seems consistent both with Siegler's overlapping waves strategy and Bronfenbrenner's ecological approach. Individuals have multiple strategies available and use what seems to them to be appropriate at for the particular instance (Siegler, 1996). Varying strategies likely arise out of the varying experiences and environments as indicated by Bronfenbrenner's Ecological Model (Berk, 2009; Daniels & Clarkson, 2010).

2.11 Information problem solving & cognitive development

2.11.1 Information problem solving models

There are a number of different models of information problem solving. Eisenberg (2008) compared Kuhlthau's Information Search Process, Eisenberg and Berkowitz Information Problem Solving (The Big6 Skills), the AASL 2009 Information Literacy standards, the ACRL Information Literacy Competency Standards, and Stripling and Pitts Research Process. Eisenberg concluded the different models are more similar than different.

If the models are compared to the commonly accepted definition of information literacy from the American Library Association's Presidential Committee on Information Literacy Final Report (1989), it is clear they are all variations of the abilities of locating, evaluating, and using effectively needed information.

Kuhlthau's ISP (2004) is the only model that is research based. It is a descriptive model, describing the process of research based on studying students engaged in a research project. One aim of her research is to improve the knowledge of Teacher/Librarians concerning the process the students they are working are going through. One of Kuhlthau's important points for Teacher/Librarians is the Zone of Intervention, which she has modeled on Vygotsky's Zone of Proximal Development. This is the point in the research process where students realize they need help and are willing to take advice from an expert.

The other models are not research based, but rather based on experience and reflection. These models are prescriptive in addition to being descriptive. The Big6 not only explains how the research process works, it is a model of how it *should* work. The same is true of Stripling and Pitts Research Process model.

2.11.2 Writings on information science and cognitive development

A number of authors in the field of information science have recognized there is a need for information science research and ISP methods to be developmentally appropriate. Large, Nasset, & Beheshti claim that developmental theories are important for studying the information-seeking behavior of children for two reasons.

Firstly, they strongly suggest that it would be rash to apply findings gathered from adults' information-seeking behavior to their younger counterparts. Secondly, it also argues for the need to consider differently children at different ages and development levels. Therefore caution must always be applied when extrapolating research findings gathered from one age group to another. (2008, pp. 123-124)

Kuhlthau has been a leader in this movement. In 1981 she wrote a grade-by-grade curriculum guidebook for Teacher/Librarians applying the concepts of Piaget's stage theory to the teaching of a library skills program (1981). She has continued to be a strong advocate for teachers of information literacy skills to be well versed in Piagetian development (1987; 1988; Kuhlthau et al., 2007).

McGuire (1998) is a librarian who worked with the staff of her elementary school to determine developmental levels for teaching library skills to students. Her writing does not refer to any theories or theorists. Working with the different grade levels of the school's staff to develop a curriculum was the methods used for creating a consensus to determine appropriate grade levels for different skills.

Other writers in the field have also called for attention to developmentally appropriate practices. Eastin (2008) suggests the need for applying cognitive development ideas to teaching credibility.

Gelderblom & Kotze (2008, 2009), Bilal (2007), Cooper (2005), and Baumgarten (2003) all urge designers of children's software to be cognizant of cognitive development. However, along with Kuhlthau, they all rely almost exclusively on Piaget (with a smattering of Vygotsky thrown in) and have not taken into account any updated theories in the area of adolescent cognitive development. Gelderblom & Kotze do use an eclectic approach adding in Fischer and Case along with their Piaget and Vygotsky. Only Large, Nettet, and Behesti (2008) point out weaknesses in Piaget's theory – the too rigid stages and that children with instruction can do things earlier than predicted by his theory.

Kuhn (2006) points out that current scholarly thought has changed on its view of the development of adolescent cognition and that developmental textbooks have been slow to respond to this. This may be a reason why studies in Information Science often fail to go beyond reliance on Piaget and/or Vygotsky for theories of cognitive development.

Echoing and supporting the call for using cognitive development theory in education, Jackson (2007, 2008a), Orme (2008), and Gatten (2004) have all written of its importance in higher education. These writers dealing with higher education rely on the developmental theories of William Perry (1968).

Yan & Fischer (2004) reported on how children and adults learn to use computers and refer to both Vygotsky and Piaget. They use Vygotsky to emphasize the socio-cultural approach while using Piaget for his emphasis on the constructivist process of education rather than his developmental theories. One interesting point they make is:

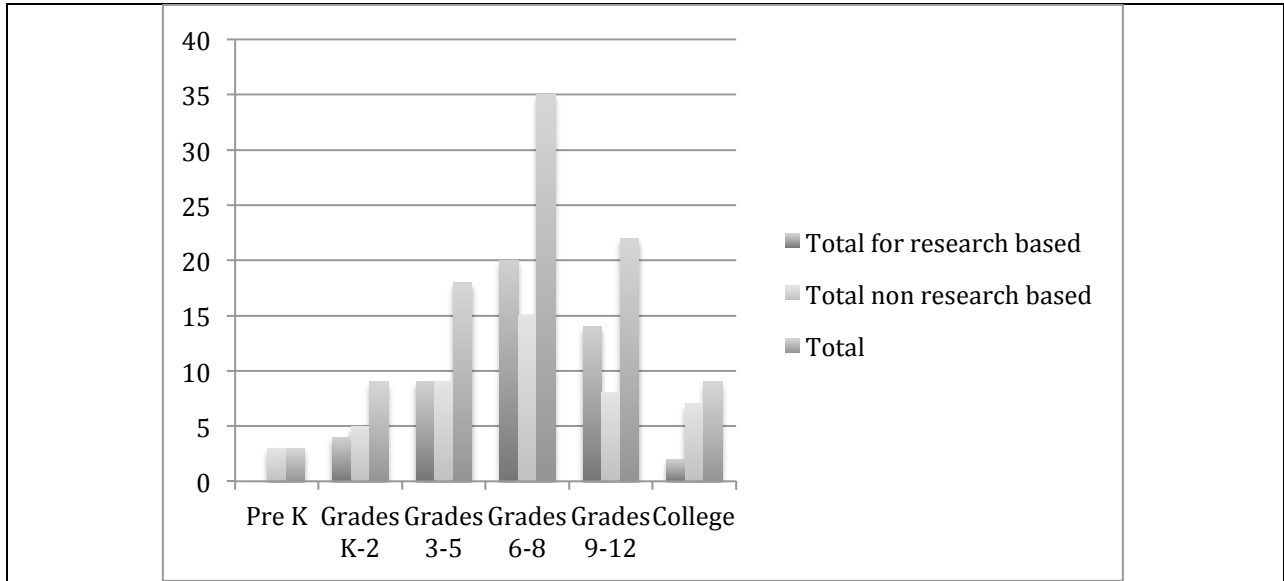
For example, a myth about learning to use computers has been popular for years: that it is easy for children to learn to use computers but difficult for old people to learn. However, there have

been only anecdotes from daily life and not empirical evidence from scientific research to support this myth. Very little is known about developmental differences between children (especially young ones) and adults (especially older ones) in learning to use computers (2004).

Yan (2006) also studied children's understanding of the Internet and found that while students in grades 5 and 6 have an adult level of understanding of the technical aspects of the Internet; it is not until grades 7 and 8 they have an adult understanding of the social aspects of the Internet. Yan's study of children's understanding of the Internet found age differences. This suggests that one might also find age differences in studying what children information literacy skills children of different ages have.

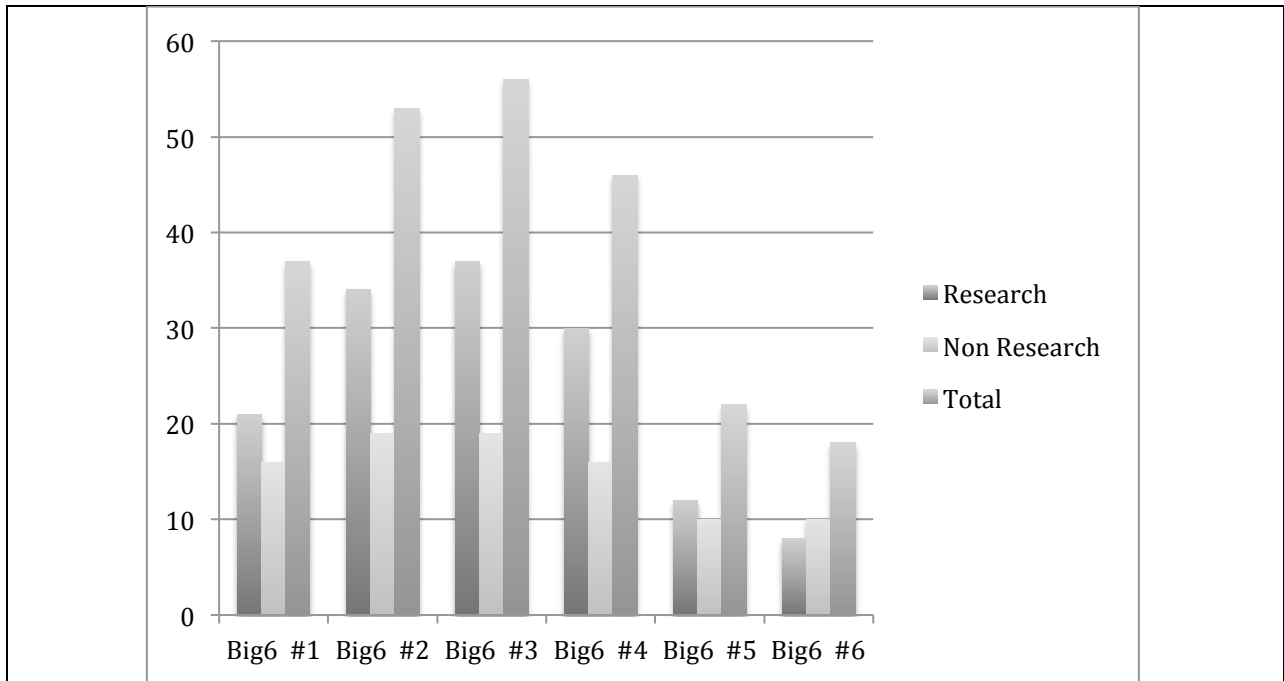
2.11.3 Cognitive development related research in information problem solving

A review of 65 papers (listed in Appendix 3) in information science addressing cognitive development and information problem solving reveal the following. The research studies tend to be qualitative studies involving small groups or just one classroom of students. The few quantitative studies tend emphasize a measurement technique invented by the author such as the Internet Savviness Index (Geyer, 2008) or Web Traversal Measure (Bilal, 2000) that have not been widely adopted by others. The most commonly studied age group is that of the middle school years, ages 11-14 (see Figure 2.3). Using the Big6 as a model to categorize studies shows that most studies involve steps 2 through 4 (see Figure 2.4). Researchers tend to study information searching behavior or more precisely, web searching behavior. These tend to correlate to Big6 # 2 Information seeking strategies; #3 Location and Access, and #4 Use of information – engage and extract relevant information for a particular researcher imposed task.



A list of the studies is in Appendix 3.

Figure 2.3 Ages groups in information problem solving studies



A list of the studies is in Appendix 3.

Figure 2.4 Graph of Big6 stages in information problem solving studies

The following three points stand out.

2.11.3.1 Importance of domain knowledge

Domain knowledge is important whether it about the subject being searched for or if it expertise in searching the web. Burnett & Wilkinson studied sixth graders home use of the Internet and found that there were able to solve many problems that stymied them in school. Students' lack of restrictions at home and the use of their prior knowledge allowed them to adopt a problem-solving attitude to finding information on the web.

Chung & Newman found that students put little cognitive effort into searching and the school librarian in their study said, "I don't think even the honors kids sit down and really think through a topic before they start doing research . . . I think they form their research after they read what its about" (2007, p. 1514). This suggests searching among high school students may be linked to domain knowledge. High school students are rarely experts or even very knowledgeable in a specific domain, thus making it difficult for them to begin a search. It seems logical that this leads them to begin a search and then backfill with knowledge gained from searching.

Madden, Ford, Miller, & Levy found in a small (N=15) "think aloud" study that an understanding of the subject area in addition to the amount of experience a child had in using the internet affected their searching ability.

2.11.3.2 Learning vs. development is not clearly addressed

As noted above, it is often difficult to tell the difference between learning and developmental factors. Few studies compare two different age groups. Thus it is difficult to tell whether age and or development is a factor in the findings. In one study that did compare different age groups, Bilal & Kirby (2002) found that graduate students were more likely to find correct answers than were seventh graders and that the graduate students were more focused in their searching.

However, the authors of this paper saw more similarities between the two groups than differences. Rouet & Coutelet compared 9- and 13-year-olds' ability to use document search strategies. Older students were significantly faster and more apt to use text organizers. However, it is not possible to tell whether this is a factor of development or learning. Some 13-year-old students in this study still used basic strategies such as flipping through the pages and not consistently using text organizers. This seems consistent with Siegler's overlapping wave theory.

In a study looking at supporting reflective web searching in elementary classrooms, de Vries, van der Meij and Lazonder's (2008) intervention failed to generate significant improvement and concluded that the students needed more support than their intervention had provided. They did not address the question of whether or not developmental factors might have been a cause.

Pritchard & Cartwright (2004) studied 54 children in grade 6 to determine how information use and location on the Internet can be improved. Products of the project were less than what was expected. The authors presented no clear picture of what children can really do. They reported that the children were engaged to different levels, but did address maturational level (i.e. development). Nahl and Harada (1996) looked at high school students who were novice searchers and their use of Boolean logic. The researchers provided a short booklet of instructions on Boolean logic, search term selection and search statement composition. Two other groups had other forms of intervention. The instructions on Boolean logic made no significant difference. The authors suggested two possible explanations. The tasks may not have been hard enough or since the students who received the instructional booklets on skimmed through them in less than five minutes, perhaps they did not gain any benefit from this level of instruction. Once again developmental level was not addressed as a possible factor, although it appears motivation may have been important.

2.11.3.3 Motivation is an important factor

The literature on problem solving indicates that “hill-climbing” is often the preferred mode of problem solving because it is easier than planning (DeLoache et al., 1998). Browsing may be seen as a form of hill-climbing in that searchers simply keep going until they find what they want. The finding that browsing is preferred to a planned search then is consistent with other types of problem solving. Browsing is preferred to planning a search (Bilal & Kirby, 2002; Chung & Neuman, 2007; Schacter et al., 1998). Students appear to often want to do the least amount of work possible. Burnett & Wilkinson students found that students did not read instructions, “It’s a load of words . . . can’t be bothered to read the words” (page 162). Shenton & Dixon (2004) in a survey of 188 English school children ranging in age from 4 to 18, found that students frequently consulted only the minimum number of sources to meet school requirements, while for personal research typically only looked at one source for information. This lack of effort in planning is consistent with what has been reported in the problem solving literature (DeLoache et al., 1998).

2.11.4 Cognitive development and learning - Implications for information problem solving

First, teachers of information problem solving in K-12 education must consider three groups of children (those under the age of six or seven; those who are above the age of 11-13, and those in between these two groups). These three broad splits will likely have cognitive abilities that are different from each other. (Always remembering that these are group tendencies and that there are likely to be individuals both above and below their age group peers.) Within each of these groups it may be that how children learn to solve problems is just as important if not more important than development.

Second, expertise and motivation matter in children's performance. Students who have greater expertise and experience are more capable. Learning theory argues that experts behave differently than novices. One way of using this in teaching IPS is to apply Vygotsky's Zone of Proximal Development. The ZPD is the most important aspect of Vygotsky's cognitive development principles for IPS. Children should be expected to solve information problems based on whatever level of development they are currently at and receive instruction that pushes them to a slightly higher level of ability. This argues for continual assessment of a child's IPS abilities and an instructor's thorough knowledge of IPS strategies in order to match a task to a child's ability level. A child's ability to think of sources of information will be based on past experience and instruction in thinking of sources. If a student has only ever been asked to use a textbook or an encyclopedia for a source that is all that should be expected. If a child has been in a class where brainstorming all the possible different sources of information has been modeled, then that student can be expected to use a wide array of sources of information. A child's individual experience with his or her social, cultural, and biological environment will determine the quantitative and qualitative differences in their IPS abilities.

Third, one should expect children to engage in a variety of information problem solving strategies. This suggests teaching a variety of methods to children and allowing them to adopt those that fits their individual needs.

2.11.5 Information problem solving & cognitive development conclusion

There are a wide range of competing theories describing cognitive development and a sea of literature discussing problem solving, but Weir pointed out over 40 years ago that little of the literature on problem solving looks at developmental differences (1964). That seems to still be the case today in studies of IPS; perhaps because the competing theories in cognitive

development make it impossible to clearly state the way in which IPS is affected by changes in cognition as children mature. However, as noted above, it is possible to apply some of the ideas of cognitive development and learning theory to IPS.

2.12 Summary of relevant literature

This section reviewed relevant literature from the areas information literacy, educational standards, cognitive development, and problem solving. Additionally areas of intersection were examined.

Information literacy was defined as the ability to recognize an information need and to locate, use, and evaluate the appropriate information (Presidential Committee on Information Literacy, 1989). Educational standards were defined, the method of writing standards was discussed, and a variety of problems with standards were identified. These include ambiguous terminology, the sheer number of standards exceeding the amount of instructional time available, and the different levels of issuing organizations from national content organizations to local school districts.

Information literacy also has educational standards, however no study of these standards has been done so it is unknown if they suffer from the same issues, but there is no reason to think information literacy standards are the exception.

The theories of Piaget, Vygotsky, Siegler, and Bronfenbrenner in cognitive development were reviewed. None of these theories is seen as complete and they do have some complementary aspects. Researchers in information literacy have relied heavily on Piaget and neglected to include some of the more recent criticisms of his theory. Kuhn (2008) and Moshman (2005) have especially pointed to changes in views of adolescent development that no longer in agreement with Piaget's description of formal operations.

This research project proposes to use theories of cognitive development as one lens to examine information literacy standards statements. In a spiral curriculum standards statements should increase in difficulty as the grade levels increase, yet the tasks described by the standards statements should be within the capability of students to achieve. Questions arising from the cognitive development literature include the following.

- Do educational standard statement take into account the qualitative shifts that happen in children's thinking at ages 5 -7 and in early adolescence (ages 10-12)?
- Do educational standard statements allow for multiple strategies for problem solving consistent with Siegler's model of the overlapping wave theory or Bronfenbrenner's ecological model?
- Do educational standard statements adapt Vygotsky's ZPD, allowing for differences in problem solving ability with assistance from an experience peer or an adult as compared to problem solving ability when a student is working individually?

Problem solving has been studied in cognitive psychology and a variety of factors have been identified as important including planning, domain knowledge, reasoning, experience and learning. However, little work has been done in identifying developmental differences in problem solving abilities between adults and children.

Studying problem solving in information science has involved children of different ages but there has been no systematic study to identify developmental differences or a developmental progression of skills that individuals go through. Studies also fail to differentiate between

development and learning. It is clear that domain knowledge and motivation play important roles in children's ability to solve information problems.

The findings from studies on information problem solving have implications for educational standards statements that deal with information problem solving. Do expectations for planning, amount of domain knowledge, and level of reasoning increase as grade levels increase?

Information literacy is an important skill for individuals and as such there are educational standard statements that reflect information literacy skills. Standard statements should be developmentally appropriate, reflecting what is known from the field of cognitive development. Educational standard statements are known to have a variety of problems and as no study had addressed information literacy standard statements it is unknown if these same problems are applicable to information literacy standard statements.

3. Methodology

3.1 Introduction

This research examined aspects of school children's developmental levels of information problem solving as reflected by teachers' perceptions of information literacy standards. Research was conducted using a mixed methods approach. The use of mixed methods leads to a richer understanding of the research questions (Creswell, 2009; Fidel, 2008; Krathwohl, 1998).

Information literacy standards were chosen for examination because as education standards they represent what the educational establishment believes should be taught and at what grade level this material should be taught. Standards give insight into what the educational establishment believes is the developmentally appropriate sequence of instruction in information problem solving. However, as noted in the previous chapter, research on standards in other subject areas indicates many shortcomings with these standards. The goal of this research project is to address information literacy standard statements using the lens of expert practitioners to: 1) either provide support for validating the standards or identify shortcomings, and 2) to identify to what extent teachers believe the standard statements are grade level appropriate and the importance of the standard statements to be taught.

The purpose of this dissertation is to contribute towards a better understanding of the differing capabilities of children of different age to solve information problems. Findings will help to identify standard statements and curriculum that are both developmentally appropriate and viewed by practitioners as important. The end goal is to make a contribution toward a coherent, comprehensive framework describing developmentally appropriate information literacy standards for youth of different ages. Three main questions are explored:

RQ 1) What developmental differences in information problem solving abilities are reflected in educational standard statements as they relate to youth at different ages?

This question explores to what extent educational standard statements dealing with information literacy increase in complexity as grade level increases and to what extent the standard statements are conceptually consistent across grade levels. To what extent do standard statements deal with the same concept and to what extent do they ask students to deal with this concept in an increasingly complex manner?

RQ 2) What developmental differences in information problem solving abilities do expert practitioners identify as they relate to youth at different ages?

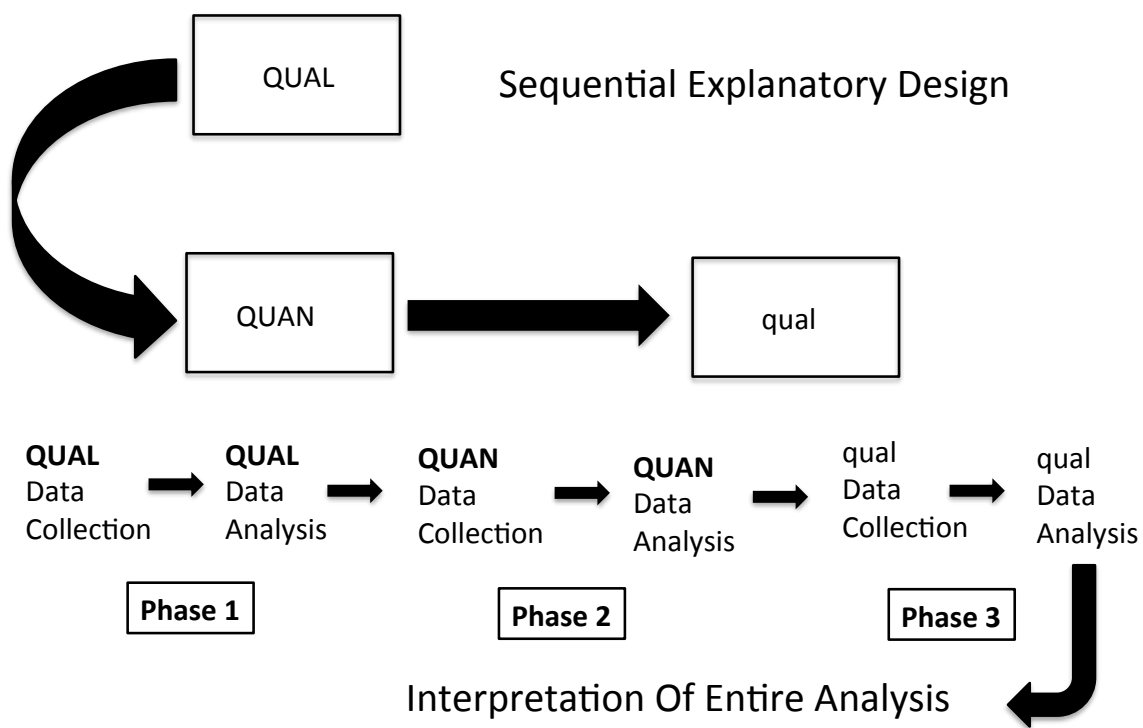
RQ 2 seeks to explore how expert practitioners view the abilities of children of different ages to solve information problems. To what extent do expert practitioners view the standards statements as applying to the same grade level as the issuing organizations intended? When asked to describe what children should be able to do, how do expert practitioners respond?

RQ 3) How do information problem solving abilities, at different developmental levels, as reflected in educational standards match those identified by expert practitioners? What areas are aligned and where are the gaps?

The last question is aimed at unifying the first two phases of the research project. How do the information literacy standard statements match up with the views of expert practitioners? The standard statements are guidelines for what is intended by the educational establishment to be taught in classrooms. The intended curriculum and what is taught should logically be the same. This research question aims at identifying to what extent the intended curriculum matches what

expert practitioners view as important and appropriate for teaching. The goal is to identify the areas of alignment and what gaps exist, if any.

The mixed method approach chosen is a modified Sequential Explanatory Design (Creswell, 2009). In this model quantitative and qualitative methods are used sequentially. Quantitative data is collected first and analyzed followed by qualitative data collection and analysis. The qualitative data collection is meant to inform and explain the data collected in the quantitative portion of the research. Interpretation is both ongoing during the entire research project and after the collection of all data in both phases (Creswell, 2009). The modified Sequential Explanatory Design as proposed for this research project is in Figure 3.1. The research project modified this design by collecting qualitative data prior to the quantitative phase and continuously through out all phases of the research project.



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Figure 3.1 Sequential Explanatory Design (Creswell, 2009, p. 209)

The research project included three separate phases. First, a team of experts was used to sort all the standard statements at grade levels 2, 5, and 8 from the CCSS and AASL into Big6 stages. Standard statements that were found to match with Big6 stages 2, 3, and 4 were then used to create a survey that was sent to National Board Certified Teachers (NBCTs) in the state of Washington. The survey was initially sent out to 3774 Washington NBCTs in the certificate areas listed in table 3.5. Later the survey was sent to all NBCTs in the state of Washington. A total of 291 responses were received of which 96 were completed. The survey sought to determine if educational standards statements concerning information literacy are aligned with the views of expert, experienced teachers. Expert, experienced teachers were asked to assess standards at the grade level at which each participant teaches both for importance in being taught

and grade level appropriateness. Expert, experienced teachers were operationally defined as those teachers who have earned National Board certification. The third phase used focus groups of NBCTs who indicated their willingness to take part in the focus groups as a part of the survey. These groups discussed feedback from the survey evaluating information literacy standards, the content analysis of information literacy standards statements, and provided teachers' insights into what information problem solving skills are typical of students at different grade levels.

This chapter discusses design rationale and assumptions, the research design, the participants and their selection, the piloting of the research instrument, data collection methods, data analysis and threats to the quality of research.

3.2 Design Rationale and Assumptions

This research project consisted of three phases, a content analysis of existing standards, a non-experimental quantitative survey, and a series of four focus groups informed both by the content analysis and the survey results. The goal of the content analysis was to map standards statements from the AASL and CCSS to the stages of the Big6 information problem solving process and to identify issues in these standards statements related to clarity of writing and number of concepts involved in each standard. The survey methodology was chosen to gather a large amount of data relatively quickly and allow statistical analysis of the data. The focus group methodology was chosen as a follow-up because it has similarities to the actual way educational standards are created, but allows the researcher to have insight into the level of consensus achieved by the group. This method, the use of a survey followed up by a focus group of expert educators to provide feedback on the results, was used by Easley II (2011) and recommended by Gullikson (2006).

The tripartite research methodology is used to provide greater understanding of any discrepancies that may emerge in the survey phase and to provide greater credibility to the results of the research (Creswell, 2009; McGrath, 1994; Patton, 2002). Each of the various methods has different strengths and shortcomings as shown in table 3.1. Combining these methods helps to overcome their individual shortcomings.

Strengths and Weaknesses of Methods		
Method	Strengths	Weakness
Content Analysis; part I	Team approach – experts with knowledge of information problem solving	Limited to individuals who were available to volunteer their time; Aimed at erring toward inclusion rather than being exclusive
Content Analysis; part II	Analysis of both AASL and Common Core standards for Task Count Identification is a clear and straight forward concept; use of recognized method (New Dale-Chall Readability Formula) of determining readability.	Readability formula not designed for short statements.
Survey of Washington NBCTs	Survey of population of NBCTs allows for greater generalization	Closed-ended; coverage error, non-respondents' bias; response rate
Focus Groups of Washington NBCTs.	Individual responses to questions; open-ended; responses stimulated by interaction of group; in-depth interpretation of survey responses and content analysis	Depends on strength of facilitator; danger of domination of strong individual(s); participants may not have shared honestly due to need to be perceived in a positive light

Table 3.1 Methodological Strengths and Weaknesses.

An assumption common to both the survey and the focus groups is that expert, experienced teachers are a group worth studying when it comes to educational standards and information literacy. Both the second and third phases drew on the knowledge of teachers who have teaching

experience with children on a daily basis. The sampling for the focus groups in phase three purposefully sampled expert, experienced teachers, NBCTs.

Other researchers, in information science and other fields have made similar assumptions that teachers' perceptions of issues relating to education are valuable (Chall et al., 1996; Easley II, 2011; Florian, 1999; Gallant, 2009; Hebbeler & Taylor, 2012; Kloepfel, Hodges-Kulinna, & Cothran, 2012; Maccini & Gagnon, 2002; Probert, 2009). Specifically, Probert (2009) found that teachers generally have a good knowledge of what information literacy entails, and Chall et al. found that experienced teachers are able to successfully judge the difficulty levels of texts when studying reading development (1996). Other authors have used teachers to analyze the importance and developmental appropriateness of standards (Easley II, 2011; Florian, 1999; Gallant, 2009; Hebbeler & Taylor, 2012). Kloepfel, Hodges-Kulinna, & Cothran (2012) used teachers to evaluate a physical education curriculum based on teacher implementation of standards versus pre-packaged curriculum in which the lessons for the entire course were provided to the teachers. Hebbeler & Taylor (2012) evaluated standards for early childhood education in the state of Connecticut by using experienced kindergarten and early childhood educators to rate the standards for grade-level appropriateness and content difficulty level. This study found that the Connecticut standards were to a very large degree grade-level appropriate.

National Board Certified Teachers are both expert educational practitioners and have years of first hand experience in the day-to-day life of school classrooms. These teachers are the individuals who are actually delivering instruction to students on a daily basis. This combination of expertise, experience, and daily immersion in the practice of education make this group's views on educational standards compelling.

3.3 Research Design

This section provides an overview of the design of the survey, the content analysis of information literacy standards, and the focus groups. It includes a discussion of the participants and their selection, the plan to pilot the survey collection and the method of data collection.

3.3.1 Design Overview

Phase One, part A was a content analysis of standards statements from the AASL and the CCSS at grades 2, 5, and 8. This purpose of this phase was to sort the standard statements into the stages on information problem-solving model. As previously noted, the Big6 model was chosen for this process.

The standard statements that were determined to reflect specific stages of the Big6 information problem solving model (see Table 3.2) were included in this research process for further analysis. If Big6 stages 2, 3, or 4 were addressed, the following questions were applied to each standard statement. If not, then the standard statement was not addressed by this research.

Big6 Information problem solving model		
Stage	Sub-stages	Actions
1. Task Definition	1.1 Define the information problem 1.2 Identify information needed (to solve the information problem)	What is my current task? What are some topics or questions I need to answer? What information will I need?
2. Information Seeking Strategies	2.1 Determine all possible sources (brainstorm) 2.2 Select the best sources	What are all the possible sources to check? What are the best sources of information for this task?
3. Location and Access	3.1 Locate sources (intellectually and physically) 3.2 Find information within sources	Where can I find these sources? Where can I find the information in the source?
4. Use of Information	4.1 Engage (e.g., read, hear, view, touch)	What information do I expect to find in this source?

Big6 Information problem solving model		
	4.2 Extract relevant information	What information from the source is useful?
5. Synthesis	5.1 Organize from multiple sources 5.2 Present the information	How will I organize my information? How should I present my information?
6. Evaluation	6.1 Judge the product (effectiveness) 6.2 Judge the process (efficiency)	Did I do what was required? Did I complete each of the Big6 Stages efficiently?

Table 3.2 Big6 Information Problem Solving Stages (Eisenberg, 2007)

Specific sub-questions to RQ 1 that were addressed in the content analysis phase B:

To what degree do standards statements deal with a single concept?

To what extent does clarity of writing impact interpretation of standards statements?

These questions probe deeper into RQ 1, “What developmental differences in information problem solving abilities are reflected in educational standard statements as they relate to youth at different ages?” To deal with development differences, it must first be ascertained if the standards statements refer to a single concept or multiple concepts. If the questions are referring to the same concept, developmental differences should lead to an increasing level of complexity or rigor as grade levels increase. Determining the number of concepts involved in each standard statement was operationalized by counting the number of tasks in each standard statement. Two coders reviewed each standard statement and determined the number of tasks in the standard statement.

Both clarity and specificity are interrelated concepts and important aspects of well-written standards (Kendall, 2001). Two methods were used to determine the clarity of writing in the standard statements. First, the coders were asked to rate each standards statement on a three point

scale for clarity (see Table 4.8). Second, the New Dale-Chall Readability Formula (Chall & Dale, 1995) was selected to determine the readability level of each standard statement. Using the New Dale-Chall Readability Formula has the advantage of being a pre-existing and recognized readability standard. Standard statements with a lower level of readability are clearer and easier to understand than those with a higher level. Standard statements were tested both individually and in groups based on both Big6 stages and categories used by the originators of the standard statements.

In phase Two a survey of teachers was used to collect quantitative data. The survey collected data to address RQ 1 and RQ 2. These questions ask what developmental differences in information problem solving abilities are reflected in educational standard statements and what developmental differences in information problem solving abilities expert practitioners identify. Sub questions address to what extent expert practitioners can discern the developmental differences in information problem solving standard statements, to what extent they agree with the educational appropriateness, and to what extent do they view the importance of the standard statements. The survey asked teachers first to assess the appropriate grade level of standard statements, and second to complete a rating scale ranking standards statements according to the perceived level of students' ability to accomplish each item and the standards statement's importance as part of the curriculum. An additional section of the survey asked for demographic data.

In phase Three, a qualitative method, focus groups of teachers, was used to address RQ 2, using the results of the content analysis and the survey to generate discussion questions for the focus groups. Kuhlthau (1993) used a similar method (using both focus groups and a survey) in a case study examining the implementation of a process approach for a library skills curriculum. Easley

II (2011) also combined a survey with focus groups in his study of the high school students' views of educational standards.

Data analysis was ongoing during the entire research project. Data collected during both the survey and the content analysis was used to form the questions for the focus groups. Focus groups responses were used to provide clarification of the data collected in phases one and two.

Table 3.3 provides an overview of the research plan showing the connection between the phases, research questions, actions, and the rationale.

Overview of Research Design	
Phase 1	
Questions addressed	What developmental differences in information problem solving abilities are reflected in educational standard statements as they relate to youth at different ages? To what degree do standards statements deal with a single task? To what extent does clarity of writing impact interpretation of standards statements
Actions	Content Analysis of AASL and Common Core standard statements addressing information literacy and Big6 stages 2, 3, and 4
Rationale	Standards documents represent the education establishment's views of what children should know and when they should know it. This phase addresses the consistency of content and rigor of information literacy standards within and across standard statements from AASL and Common Core.
Analysis	Qualitative Analysis done by research team and researcher.
Phase 2	

Overview of Research Design	
Questions addressed	<p>What developmental differences in information problem solving abilities are reflected in educational standard statements as they relate to youth at different ages?</p> <p>To what extent are the developmental differences in information problem solving abilities reflected in educational standard statement as they relate to youth at different ages consistent with the judgments of expert, experienced teachers?</p> <p>What developmental differences in information problem solving abilities do expert, experienced teachers identify as they relate to youth at different ages?</p> <p>To what extent do expert, experienced teachers agree with the grade level appropriateness of individual education standards concerning information literacy?</p> <p>To what extent do expert, experienced teachers view the importance of individual education standards concerning information literacy?</p>
Actions	Survey of National Board Certified Teachers in the state of Washington
Rationale	Gather expert, experienced teachers' judgments concerning information problem solving capabilities at grade levels 2, 5, and 8, as operationalized by the AASL and Common Core standards, to examine the extent to which NBCTs believe information literacy standards are developmentally appropriate and important.
Analysis	Descriptive statistics, Confidence intervals calculated to determine ability of teachers to match standards statements to intended grade level.
Phase 3 Focus groups and comparison	
Questions addressed	RQ 3) How do information problem solving abilities, at different developmental levels, as reflected in educational standards (both subject area and information literacy), match those identified by expert practitioners? What areas are aligned and where are the gaps?
Actions	Teacher focus groups provide feedback on results of survey and content analysis
Rationale	Focus groups of expert practitioners provide explanatory input for the evaluation of the content analysis and the survey results.
Analysis	Qualitative analysis for explanatory information to provide insight into the results of the survey and research questions.

Table 3.3 Overview of Research Design

3.3.2 Delimitations

This research project was delimited to studying information problem solving model as represented by the Big6 model. This dissertation used the Eisenberg-Berkowitz model of information problem solving, the Big6⁵, as a model to serve as a framework for discussing information problem solving. There were several reasons for this decision. The first reason, as noted in Chapter One, both Wolf et al. (2003) and Brand-Gruwel et al. (2009) found the Big6 to be one of three prominent information problem solving models. Wolf et al. point out two aspects of the Big6 that make it especially suitable for this research. First, the Big6 is a model specifically aimed at kindergarten through grade 12. This was an important consideration as the standard statements examined in this research fit into these grade levels. And second, the Big6 proposes to work through the cooperation of the classroom teacher and the school teacher/librarian. This research examined two sets of educational standard statements, one that is aimed primarily at classroom teachers (CCSS) and one set aimed at teacher/librarians (AASL), but both sets of standards aim to inform the practice of both classroom teachers and teacher/librarians. Using the Big6 as an information problem solving model helps to connect the classroom teacher and the teacher/librarian aspects of the information problem solving standard statements. The second reason for using the Big6 is that it is widely used in the K-12 educational system in the United States, and K-12 educational standards are a major focus of this dissertation. Eisenberg claims that the Big6 is “the most widely-known and widely-used approach to teaching information and technology skills in the world” and is used in thousands of schools (Eisenberg, 2007), though there is only anecdotal evidence and no formal studies supporting this claim (Wolf et al., 2003). A third reason was that while none of the three information problem solving models, Kuhlthau, Eisenberg Berkowitz, or Stripling Pitts has a

⁵See Table 3.2 for an overview of the Big6 model of information problem solving.

research based adaptation to differing developmental stages, Eisenberg and Berkowitz's Big6 has a simplified model called the Super 3 aimed at primary level students. This indicates that the Big6 recognizes the need for differentiation in instructional practices at different grade levels. Fourth, and finally, Murray (2008a, 2008b, 2010, 2011) has done extensive work aligning various standards to the Big6 model while neither the Kuhlthau nor the Stripling Pitts models have been aligned to the standards.

The research project used only Big6 stages 2, 3, and 4 as a further delimitation. The Big6 stages are described in Table 3.2. These steps were chosen because the researcher believed that teachers see these as the core of the information problem solving process in the classroom. Research-oriented assignments given by teachers in elementary and secondary schools most often are well-defined problems as opposed to ill-defined problems that require students to do the majority of task definition and evaluation (Mayer & Wittrock, 2006). For example, in the state of Washington students are required to do a Senior Project and in Social Studies classes, a classroom based assessment (CBA) research project. In both these students are given parameters of a task and may have to translate that into their own concepts, but the Big6 stage of task definition stage is clearly described for the student. Big6 stages 5 and 6, Synthesis and Evaluation, are important parts of information problem solving, but with well-defined problems, students tend to see the evaluation portion as something the teacher does when assigning a grade. Additionally as noted in chapter two, the review of research studies in information problem solving indicates that the majority of research in this area deals with Big6 stages 2, 3, and 4.

A second delimitation was the grade levels studied. This research project was delimited to grades 2, 5, and 8. These are the grades the AASL uses for the benchmarks of its standard statements. Also, McClure (2005) argues that standards have had more of an impact in elementary and

middle school than in high school, a second reason for delimiting this research to grades 2, 5, and 8. The difference of three grade levels was thought to be wide enough so that expert experienced teachers would be able to discern differences between educational standard statements written for these grade levels.

A third delimitation was restricting the standards statements to be studied to the AASL and the CCSS. The AASL statements are representative of both the standards statements from a national organization and those that address the technical side of information literacy standards. The AASL standards are the most detailed and extensive information literacy standards for K-12 students. The CCSS are in the process of replacing the state content standards for over forty states and thus represent the content standards side of information literacy standards statements.

3.4 Phase 1 Content Analysis of Standards

Phase One was to analyze the standards documents that are connected to information literacy for their content. Does the standard statement reflect the Big6 information problem solving process Stages 2, 3, or 4? If yes, then the following questions were applied and codes assigned to each standard statement. If no, then the standard statement were not addressed by this research.

Specific questions addressed in the second phase of the content analysis:

To what extent are the developmental differences in information problem solving abilities reflected in educational standard statement as they relate to youth at different ages consistent with the judgments of expert, experienced teachers?

To what degree do standards statements deal with a single task?

To what extent does clarity of writing impact interpretation of standard statements?

3.4.1 Mapping Standards to the Big6 Information Problem Solving Model

The AASL and CCSS standard statements were analyzed as part of an exploratory content analysis. The method used was a content analysis to examine how standard statements from the AASL and CCSS could be categorized into the Big6 information literacy process model by a team of coders with expertise in the conceptual and pedagogical aspects of information literacy. This sorting method was chosen in order to have multiple individuals with expertise in information literacy reviewing the standards statements and assigning the standards statements to Big6 stages. It combined both a straightforward system with increased assurance that the standards statements assigned to a particular Big6 stage belonged to that stage rather than if one or two individuals had assigned the standards statements to Big6 stages.

The researcher identified and recruited six individuals to serve as coders (see Table 1). Coders one through five all have expertise in information literacy and were used in both the sorting of standards into the stages of the Big6 model and the content analysis. Coder six took part solely in the second phase of the content analysis – counting the tasks and rating the clarity of the standard statements. Initial contact and all communications were by email.

Coder	Expertise
1	National Board Certified Social Studies teacher; doctoral candidate in Information Science
2	School librarian, Information School lecturer; doctoral candidate in Information Science
3	Research Assistant, National Center on Quality Teaching and Learning; School librarian, classroom teacher; doctoral student in Information Science
4	School Librarian, Information School lecturer; doctoral student School of Education
5	Director of Library and Media for state level office of Superintendent of Public Instruction.
6	Doctoral candidate in Information Science, researcher with emphasis in qualitative methodology

Table 3.4. Content Analysts Qualifications

This study uses the term “standard statement” to describe a discrete statement of what a student should be able to do or know. The AASL has four broad standards with benchmarks established for each standard at various grade levels. The CCSS are made up of strands, anchor standards, and grade-specific standards. This research focuses on the grade-specific standards and refers to these as standard statements. The AASL term “benchmark” and the CCSS phrase “grade-specific standard” are treated as equivalent to “standard statements.” The AASL standards are benchmarked at grades 2, 5, and 8. The CCSS standards statements were chosen from grades 2, 5, and 8 in order to align with the AASL standard statements.

Coders were asked to review all the CCSS standard statements (377) in English/Language Arts and Mathematics for grades 2, 5, and 8, and all the standard statements (313) at grades 2, 5, and 8 for all four of the AASL standards. These 690 standard statements were matched to stages of the Big6 information problem solving process.

Survey instruments were created using IT Connect Catalyst tools from the University of Washington for each content sub-area of the CCSS and each standard for the AASL. Examples of these areas from English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects include: Reading Standards for Literature K-5, Reading Standards for Informational Text K-5, Writing Standards, Speaking and Listening Standards K-5, and Language Standards 6-12. Examples from Mathematics include: Operations and Algebraic Thinking, Numbers and Operations in Base 10, and Geometry. A total of 20 separate surveys were created, 15 for the CCSS, four for AASL, and a final survey to deal with errors and omissions from the first 19.

3.4.2 Data Collection

The coders independently reviewed the 690 AASL and CCSS standards statements grouped into 20 surveys. Analysts sorted each of the standards statements into a stage or sub-stage of the Big6 information literacy process (see Figure 3.1 for example); analysts were given the choice to identify the standards statement as “not related” to the Big6. Moreover, analysts were able to evaluate standard statements as “Unable to tell” for statements that were ambiguous or poorly-worded and not clearly aligned with any stage or sub-stage.

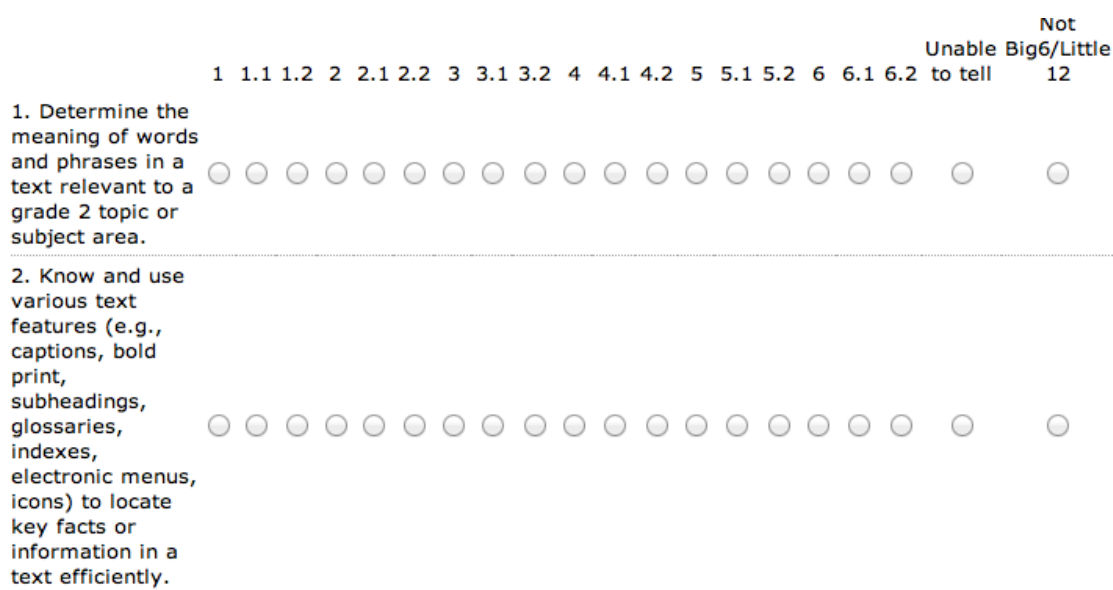


Figure 3.2 English/Language Arts Informational Text to Big6 Stage Rating Chart.

After all 20 surveys from each of the five content analysts were submitted to the researcher, a 60% level of consensus was used to determine where each item fit into the Big6 stages. This meant that three of the five coders agreed that the individual standard statement fit into a particular Big6 stage. The researcher then tabulated the results (see Figure 3.2). In Row 1, the standard statement was categorized as Big6 Stage 4, Use of Information, while in Row 2, the standard statement was categorized as Big6 Stage 3, Location and Access.

Using a 60% level of coder consensus, 81% of the 377 CCSS and 85% of the AASL standards statements were able to be categorized into either a Big6 stage or into the Not Able to Tell/Not Big6 category. This compared to only 41% of the CCSS and 63% of the AASL standard statements being categorized when using a consensus level of 80%. The 60% level of consensus was chosen in order to maximize the number of standard statements included in the research project. The researcher made a decision to err on the side of being inclusive rather omitting standard statements.

<i>Row 1:</i> 1. Determine the meaning of words and phrases in a text relevant to a grade 2 topic or subject area.			<i>Possible points: 0</i>
<i>Participant</i>	<i>Date</i>	<i>Response</i>	
Participant information (email address) has been omitted.			
<i>Row 2:</i> 2. Know and use various text features (e.g., captions, bold print, subheadings, glossaries, indexes, electronic menus, icons) to locate key facts or information in a text efficiently.			<i>Possible points: 0</i>
<i>Participant</i>	<i>Date</i>	<i>Response</i>	

Figure 3.3. Sample Results

3.4.2.1 Limitations in Matching Standard Statements to Big6

The researcher made the decision to err on the side of inclusion, through using a simple majority to include standard statements. Only one pass was made through the standard statements. This was also a result of the decision to be inclusive. No attempt was made to definitively place standard statements with a particular Big6 stage.

3.4.2.2 Content Analysis of Standard Statements for Number of Tasks and Readability

The standard statements that were determined to fit Big6 stages 2, 3, and 4 from both the AASL and the CCSS were analyzed for whether or not they contained a single or multiple tasks and the readability of each standard statement.

The Task Count Identification (TCI) code was created as a number to represent the total number of separate tasks included in the standard statement. The number of tasks in each standard statement was counted by multiple coding team members in order to establish an inter-rater reliability score. The number of tasks is related to both clarity and specificity. The higher the number of tasks the less likely the standard statement is to be either clear or specific, two specific characteristics of quality standards (Kendall, 2001). Clarity of wording for the standard statements was operationalized by using the New Dale-Chall readability formula (Chall & Dale, 1995).

One additional coder was used for the Content Analysis portion of the research. This was in addition to the coders who sorted the standard statements into the stages of the Big6 information problem-solving model.

3.4.3 Content Analysis Data Limitations

Not all AASL and CCSS standards statements could be placed in a Big6 stage; thus it was not feasible to look at a particular concept and follow it across each grade band. The original goal of tracking a concept across grade bands to look for increasing rigor and complexity was not possible. Not all concepts matched to a Big6 stage in grade 2 had a corresponding concept in grade 5 or grade 8. One effect of sorting the standard statements into Big6 stages was to make tracing a concept through multiple grade bands and looking for increasing rigor and complexity impossible. Content analysis for readability and single or multiple concepts was done on the standard statements that were matched to the Big6 stages 2, 3, and 4.

The initial analysis was done by the lead researcher and led to the development of the concept of Task Count Identification (TCI) for use in coding the standard statements with the number of tasks identified in each standard statement. Codes were validated by having multiple coders apply the TCI strategy in order to cross-check codes and determining a calculation for intercoder agreement. Creswell (2009) suggests an intercoder agreement of 80% as being good qualitative reliability.

3.4.3.1 Interater Reliability Calculations

Krippendorff's alpha (KALPHA) (Hallgren, 2012; Hayes & Krippendorff, 2007) was used to calculate an inter-rater reliability rating for both the clarity analysis and the task counting analysis of the standard statements.

Paired Judges	KALPHA for Clarity Rating	KALPHA for Task Count Index
Judge 1 & 2	1.000	.9056
Judge 1 & 3	.6877	.9209
Judge 1 & 4	.7282	.9656
Average of Ratings	.8053	.9307

Table 3.5 KALPHA Inter-rater reliability ratings for Clarity and Task Counting

Krippendorff (2004) argues against a standard scale for ranking inter-rater reliability ratings. He suggests analyzing the ratings based on the importance of the data (e.g. life threatening situations require a much higher inter-rater reliability than non-life threatening situations). Krippendorff also discourages averaging inter-rater reliability, suggesting that the lowest score should be used for judging how useful the inter-rater reliability ratings actually are. In this case, the lowest scores are .6877 for the clarity rating and .9056 for the task count. These are scores that the researcher believes are acceptable for rating standards statements in an exploratory project.

3.5 Phase 2 Survey Methodology

The survey was conducted on line using Qualtrics web survey tools (Qualtrics, 2013). Access to the survey was limited to those individuals having both the URL of the survey and a password.

The survey consisted of three main sections. The first section was of a series of standard statements from the AASL and the Common Core. In part one of the survey, information identifying grade level was removed, the statements were randomized and participants were asked to rate each statement as to its *earliest* appropriate grade level. The underlying idea for this part of the survey was to see if teachers agree as to what grade level is appropriate for standards statements. Standards statements are assigned to grade levels by the issuing organizations. Do expert, experienced teachers agree with these grade level assignments? If so, one would reasonably expect expert, experienced teachers to closely match the standards statements to the appropriate grade level. The second part of the survey was to ask teachers to address standards at their specific grade level and rate each standard as to its grade-level appropriateness and the importance of its being taught at that grade level. In this area of the survey, the questions were

arranged by grade level band so that each participant only answered questions at their own grade-level band.

The AASL standards are representative of standards based directly on information literacy skills. As of June, 2014, 43 states have opted to use the Common Core standards (previously the total was 45 but Indiana and Oklahoma have opted out in 2014) and as a result they represent state level standards for what children are expected to learn. A third area of the study collected demographic data on the participants.

3.5.1 Survey Participants

National Board Certified Teachers (NBCTs) from nine different National Board certificate areas from the state of Washington were recruited to participate. NBCTs from the areas shown in table 3.6 were recruited. The combination of surveying teachers with Generalist certificates and those with specific subject area certificates (English/Language Arts, Science, Mathematics, Social Studies/History) was aimed at ensuring the survey reached teachers in both elementary classrooms and middle school classrooms. The National Board certificate area of Exceptional Needs Specialists added NBCTs who are special education teachers.

Number in Washington state	Area of Certification
408	English Language Arts – Early Adolescence
382	Exceptional Needs Specialist – Early Childhood Young Adult
19	Generalist – Early Adolescence
506	Generalist – Early Childhood
959	Generalist – Middle Childhood
324	Mathematics - Early Adolescence
280	Science – Early Adolescence
133	Social Studies/History – Early Adolescence
763	Literacy: Reading Language Arts/Early Adolescence Young Adult
3774	Total

Table 3.6 Number of National Board Certified Teachers in Washington State by Certificate Area

3.5.2 National Board Certified Teachers as Expert Teachers

The National Board for Professional Teaching Standards (NPBTS) was created in 1987 to provide a method for national certification of accomplished teachers (National Board for Professional Teaching Standards, 2012). Since then research has shown, with a few exceptions, that NBCTs are more effective in the classroom than non-NBCTs. Cavalluzzo (2004) looked at student gains in 9th and 10th grade mathematics and concluded that being an NBCT is a marker of high quality teaching. Goldhaber & Anthony (2007) studied NBCTs in North Carolina and came to similar conclusions about the effectiveness of NBCTs. Berliner (2004) using the construct of “expertise” from cognitive psychology, concluded that NBCTs meet the criteria to be considered not just proficient or competent, but expert teachers.

This research project did not seek to identify expert teachers or what skills make a teacher an expert, but to make use of teachers already identified as expert. Using NBCTs as experts has been done previously by Hogan & Rabinowitz (2009) exploring the differences between novice expert teachers in problem representation and by Buschang, Chung, Delacruz, & Baker (2012) examining the differences in algebra instruction between beginning teachers, experienced teachers, and pedagogical content knowledge experts (NBCTs).

3.5.2.1 Survey Participant Selection

The Washington Education Association (WEA) maintains a list of NBCTs in the state of Washington. WEA agreed to send out an email containing a link to the survey and a invitation to participate to NBCTs with the desired certificates (Meadows, 2012).

The WEA database of NBCTs does not include grade level taught, just certificate area. As a result, participants were asked to answer questions by band levels or grades: 1-3; 4-6; and 7-8. This allowed analysis of responses at the specific grades levels of the standard statements, i.e. second grade, fifth grade, and eighth grade.

3.5.2.2 Survey Population and Frame

The survey population consists of all NBCTs in the nine selected certificate areas in the state of Washington. The survey frame is the list of NBCTs held by the WEA. WEA estimates that approximately 98% of the NBCTs teaching in the state of Washington are WEA members (Meadows, 2012).

3.5.3 Survey Instrument

The survey instrument was created specifically for this research project and was piloted prior to use. The survey instrument consisted of three separate sections.

The first section (example in Table 3.7, the survey is included in the appendices) used the standard statements from the AASL and CCSS that were identified in the content analysis of this research project as fitting Big6 stages 2, 3, or 4. These standard statements were stripped of grade level information and randomized. Respondents were asked to match the standard statement to the lowest appropriate grade level (2, 5, or 8). Additionally, respondents were asked to provide a confidence rating (low, medium, or high) for their selection.

The purpose of this section was to determine if standard statements are written in a way that expert, experienced classroom teachers can identify what grade level was intended for the standard statement. This section's goal was not to determine the ability of teachers to choose

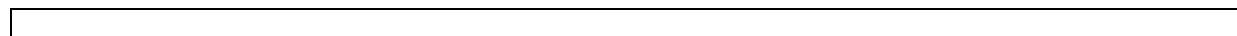
grade levels of the standard statements, but to evaluate whether the standard statements can be identified as to the intended grade level.

Section A. Please choose the earliest appropriate grade level that you believe the standards statement is developmentally appropriate to teach. Then provide a ranking of your confidence in your grade level rating. The items are in the form of: Standard Category. **Standards statement.**

	Grade Level			Confidence Level			Comments
	2nd Gr	5th Gr	8th Gr	Low	Medium	High	
Craft and Structure. Determine the meaning of words and phrases as they are used in a text, including figurative language such as metaphors and similes.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
Key Ideas and Details. Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
Key Ideas and Details. Determine a theme of a story, drama, or poem from details in the text, including how characters in a story or drama respond to challenges or how the speaker in a poem reflects upon a topic; summarize the text.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
Key Ideas and Details. Cite the textual evidence that most strongly supports an analysis of what the text says explicitly as well as inferences drawn from the text.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
Craft and Structure. Analyze in detail the structure of a specific paragraph in a text, including the role of particular sentences in developing and refining a key concept.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
Craft and Structure. Determine an author's point of view or purpose in a text and analyze how the author acknowledges and responds to conflicting evidence or viewpoints.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>

Figure 3.4 Survey Part 1 Placing randomly sorted standard statements to a grade level

The second section of the survey (example in Table 3.8, see the appendices for the entire survey) asked teachers to examine standard statements at the grade level that most closely approximated their own teaching assignment and to rate the standard statements for grade level appropriateness and importance (Florian, 1999; Hebbeler & Taylor, 2012). This provided information at each different grade level of teachers' perceptions of the grade level appropriateness and importance of each standard statement.



Section B.2.1. Please rate each Second Grade standards statement for its developmental appropriateness at Second Grade. Then please rate each standards statement for its importance in being taught at Second Grade. The scale for both items goes Strongly Disagree (SD) - Disagree (D) - Agree (A) - Strongly Agree (SA). The items are in the form of: Standard Category. **Standards statement.**

	Developmentally Appropriate for 2nd Grade				Important to teach at 2nd grade				Comment
	SD	D	A	SA	SD	D	A	SA	Comment
Key Ideas and Details. Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
	SD	D	A	SA	SD	D	A	SA	Comment
Vocabulary Acquisition and Use. Use sentence-level context as a clue to the meaning of a word or phrase.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
	SD	D	A	SA	SD	D	A	SA	Comment
Vocabulary Acquisition and Use. Use glossaries and beginning dictionaries, both print and digital, to determine or clarify the meaning of words and phrases.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
	SD	D	A	SA	SD	D	A	SA	Comment
Comprehension and Collaboration. Ask and answer questions about what a speaker says in order to clarify comprehension, gather additional information, or deepen understanding of a topic or issue.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
	SD	D	A	SA	SD	D	A	SA	Comment

Figure 3.5 NBCT survey on Standards Statements by grade level (Grade 2 example)

The final section collected demographic data including years taught; National Board certificate area, grade level taught, age, gender, size of school, rural or urban school district. (Florian, 1999; Gallant, 2009; Maccini & Gagnon, 2002; Simmerman et al., 2012). One use of this data was to sort the survey results by grade level taught. This enabled analysis of the results by grade level. Were second grade teachers more likely to identify second grade standard statements than teachers at other grade levels? Were fifth and eighth grade teachers better at matching their own grade level standard statements than teachers from other grade levels? The WEA database does not include information on what grade level NBCTs teach. The only way to access grade level taught information was by self-reporting in the demographic section of the survey.

3.5.4 Survey Testing

3.5.4.1 Survey Pilot and Advisory Group for Survey Feedback

The survey was piloted using 18 teachers from school districts in Skagit, Snohomish, and King counties, Washington. The sampling method for the pilot was a snowball methodology (Patton, 2002). Initial participants were known to the researcher, and other pilot survey participants came from input from the initial participants. Pilot survey participants agreed to take the survey and provide feedback. Teachers in the pilot survey were chosen from grade levels to match the plan for the actual survey.

Pilot participants provided constructive feedback about the survey organization, length, and graphic arrangement. These suggestions were incorporated in the final version of the instrument that was used for the survey.

The final version of the survey is included in the appendices.

3.5.5 Survey Data Collection

The survey was posted on-line using Qualtrics survey software (Qualtrics, 2013). Data on completed surveys was collected using the Qualtrics survey tools. An Internet based survey has several advantages over a mail survey. These include both reduced cost and elimination of data entry errors that can result from inputting results from a paper survey.

3.5.6 Survey Data Analysis

Survey results were downloaded into an Excel file for analysis. Excel files were imported into SPSS for statistical analysis. Part one of the survey data was analyzed in multiple ways.

Averages of the number of standard statements correctly matched for grade level of teacher and for type of standard were computed. Paired T-tests were computed to determine if a significant

difference existed between groups of teachers and the number of different types of standards they were able to match correctly. Each standard statement has three different options for each participant to choose (grade 2, 5, 8). The null hypothesis is that there is no relationship between teacher perceptions of grade level placement of standards statements and the actual placement of standards statements.

Part two of the survey data is a Likert scale. Participants were asked to rate standard statements for “Important to Teach” and “Developmentally Appropriate to Teach” on a scale of Strongly Disagree – Disagree – Agree – Strongly Agree. These statements were then coded as 1 for Strongly Disagree, 2 for Disagree, 3 for Agree, and 4 for Strongly Agree. Descriptive statistics were used to summarize the data. Scores of 3 or higher indicate teachers “Agree” to “Strongly Agree” the standard statement is appropriate or of importance to that grade level. No standard statements received a score less than 2.53 indicating general agreement with both the importance to teach and developmental appropriateness for teaching. Standard statements were ranked and the order of the ranking was used to indicate which standard statements teachers believe are most appropriate/important to least appropriate/least important. These ratings were used as a guide for questions in the focus group section of the search project and for the content analysis (number of concepts and readability) of the standard statements. Teacher focus groups were asked for their input on why particular standard statements were deemed to be important/not important or appropriate to grade level/not appropriate to grade level.

Part three of the survey data was summarized and descriptive statistics of the results of the demographic data were tabulated. The demographic data was used to seek out patterns in the matching of the standard statements and the to compare the survey respondents to the entire

population of Washington state NBCTs to determine to what extent did the survey respondents match the population.

3.5.7 Limitations of Survey Methodology

A general limitation of surveys is the desire of participants to appear knowledgeable and competent (McGrath, 1994). This survey asked teachers to assign grade levels to information literacy standard statements and many teachers, though familiar with information literacy/information problem solving through research projects assigned to students at their grade levels, may not have been familiar with the information literacy standards. This may be especially true of the standards statements from the AASL and the CCSS. The AASL standard statements were more apt to be familiar to library media specialists rather than classroom teachers. The CCSS statements are new and are in the process of being implemented by many states. This lack of familiarity may have resulted in frustration as participants attempted to assign standards to specific grade levels. This limitation was addressed in three ways. First, the instructions of the survey stressed that the researcher was interested in evaluating the standards, not the participants. Second participants were asked only for their best effort at selecting the appropriate grade level and were asked to provide a confidence rating of their choice. Third, all participants had the opportunity to be anonymous. This should also have helped alleviate participant concerns about appearing to lack knowledge of the standards.

Dillman, Smyth, and Christian (2009) identify four types of errors in surveys: coverage error, sampling error, nonresponse error, and measurement error.

3.5.7.1 Coverage Error

This type of error happens when not everyone who is in the group to be sampled have a known, nonzero, chance to be selected in the sample, and when those not included are in some way different from those included (Dillman et al., 2009). This research project's population was all NBCTs in the nine certificate areas identified in Table 3.5. Rather than sampling this population; this research project attempted to solicit responses from the entire survey frame. Electronic means of communication made this feasible to attempt. Coverage error will result from the gap of approximately 2% between the numbers of Washington state NBCTs and the number of Washington state NBCTs who are not members of the Washington Education Association.

3.5.7.2 Sampling error

Sampling error results from not everyone in the population being surveyed. In this case the sampling frame will include 98% of the population in the survey.

3.5.7.3 Nonrespondent Bias

A third limitation is nonrespondent bias. Nonrespondent bias results when the individuals chosen to be a part of the survey do not respond. If these individuals differ from the respondents this will result in the survey data being biased. Nonrespondents are a major concern in this study.

Three methods were used to deal with nonrespondent bias. Resending the survey link was the primary method. Sending out the survey link up to four times has been shown to be the mostly likely way to increase the response rate to web surveys (Dillman et al., 2009). This research sent out the survey link five times. Survey links were sent out October 25, 2013, November 16, 2013, December 3, 2013, February 6, 2014, and March 12, 2014. Resending the survey link was done by two different methods. The original email from WEA to the NBCTs was resent three times,

and, one announcement was included in an email newsletter to NBCTs by the Center for Strengthening the Teaching Profession (CSTP). Each email resulted in an increased number of respondents for the survey.

The second method was to analyze the demographic data of the respondents to estimate to what extent the respondents match the population of Washington NBCTs. This allowed for a determination of whether or not the participants differed in any consistent pattern from the population as a whole.

A third method to deal with nonresponse bias was to offer a lottery for a \$50 Amazon gift card for every 50 responses. This was an attempt to increase the number of respondents. Participants had the opportunity to leave contact information if they desired to enter the lottery for the Amazon gift card. Lottery winners had their Amazon gift cards delivered on June 18, 2014.

Additionally in order to develop an understanding of what factors differentiated those respondents who completed the survey and nonrespondents/nonfinishers, the focus groups members were asked to describe what motivated them to finish the survey.

3.5.7.4 Measurement Error

Measurement error occurs when the respondents answers are inaccurate and do not reflect the actual views of the respondent. This type of error can occur when questions are imprecise or confusing. This was dealt with by conducting a pilot survey and including changes in questions that the pilot participants indicated were unclear or confusing.

3.5.7.5 Validity

Validity issues are concerned with to what extent does this survey measure what it claims to measure, teachers' perceptions of information literacy standards. Validity threats were addressed by reviewing and adopting changes suggested both by the advisory group serving as an advisory panel and through the results of the pilot study.

3.5.7.6 Reliability

Does the survey measure what it claims to consistently? Cronbach's Alpha was calculated using the results of various sections of the survey to determine the survey's reliability (Hinton, 2004).

Table 3.7 shows the results for the different sections of the survey.

Type of Standard Statement	N	Cronbach's Alpha	Reliability
AASL Grade 2	26	.803	High
AASL Grade 5	31	.709	High
AASL Grade 8	28	.794	High
CCSS Grade 2	8	.605	Moderate
CCSS Grade 5	6	.214	Low
CCSS Grade 8	15	.771	High

Table 3.7 Cronbach's Alpha results

Hinton, McMurray & Brownlow (2014) suggest the following as a guide to reliability.

0.90 and above = excellent

0.70 to 0.90 = high

0.50 to .79 = moderate

0.50 and below = low

Table 3.9 shows that all sections of the survey had high to moderate reliability except for the CCSS Grade 5 with low reliability. This section also had the fewest items.

3.6 Phase 3 Focus Groups

3.6.1 Teacher Input - Focus Groups

This phase consisted of conducting a series of four focus groups with expert, experienced teachers. These focus groups provided insight into what teachers believe children should be able to do at different ages based on the teachers' years of observation and experience working with children. The focus groups served to offer explanations of the data gained in the survey of phase one of this research project.

The analysis of this information gained via the focus groups provided insights into what teachers view the different abilities of youths of different ages to be, and to what extent teachers view the grade level appropriateness and importance of information literacy standard statements from the AASL and CCSS.

Using teachers for their expertise in analyzing levels of difficulty has been done previously (for readability, for example) and is actually a long accepted and successful practice (Chall et al., 1996; Chall & Dale, 1995). The state of Washington's Superintendent of Public Instruction's report to the legislature on adopting the Common Core standards prominently mentions the results of a survey of National Board Certified Teachers (NBCTs) as experts (Dorn, 2011). Chall and Dale (1995) used teachers' judgments in rating the difficulty of reading levels of texts. As noted above, teachers and reading specialist scores paralleled those obtained with the New Dale-Chall Readability test. Feinberg & Shapiro (2009) reviewed a number of studies on the efficacy of teacher assessment of student success and concluded, "For predicting student success, teachers typically have the experience of a large, personal normative sample of students and an expertise in the particular curriculum. Research has been supportive of the assumption that teacher judgment information provides a generally accurate prediction of student achievement" (p. 453).

These results support Chall et al.'s (1996) point that using teachers for experts is a long accepted successful dating back over a century to Thorndike in 1910. The use of teacher focus will tap into this expertise by examining what teachers believe students are capable of in terms of information problem solving.

The focus group methodology was selected for its potential to both stimulate ideas and conversation while at the same time not demanding a consensus. The most important benefit of using focus groups for this research was the generation of ideas resulting from the interaction of the group members (Patton, 2002; Young & Von Seggern, 2001). Using focus groups allows the researcher to report on the level of consensus arrived at or the degree of the lack of consensus. This type of analysis, determining the level of consensus, is analysis that is not available from examining standards.

3.6.2 Focus group Use in Information Science

The use of focus groups is common in Information Science. They have been used for a variety of purposes including a case study evaluating a process approach to a library research program (Kuhlthau, 1993), examining the services offered by a library (V. Perry, 2002; Von Seggern & Young, 2003; Young & Von Seggern, 2001), children's Internet use at home (Burnett & Wilkinson, 2005) and the study of the information behavior of "tweens" (Meyers, Fisher, & Marcoux, 2009). In the realm of education, Kong (2009) used focus group methodology for curriculum development, and Shenton and Dixon (2004) used this method to study the information behavior of English school children. Kong (2009), Lundh and Limberg (2008) and Wen and Shih (2008) both used teachers as knowledgeable subjects in focus groups.

3.6.3 Focus groups as Different from Committees that Create Standards

Standards committees involved with creating standards related to information science typically include a variety of experts on information literacy, education and learning. Thus, on the surface it may seem that this study repeats work that has already been done. This study differs from previous work because, although similar on the surface, there are key differences between the use of focus groups of teachers and a standards creation committee.

First, the goal of a standards committee is to come to consensus, to achieve an end product, the set of standards that is ultimately issued or the sponsoring organization. According to Morgan & Krueger (1993) the goal of using focus groups in research is not to come to decisions. In fact, they argue that the free exchange of ideas will be limited when groups are pushed to reach a consensus. Bloor, Frankland, Thomas, & Robson (2001, p. 8) echo this argument writing that, “when one of the tasks of focus groups is to arrive at a group consensus on a given topic, it is to be expected that deviant experiences will be silenced”. The goals and processes of focus groups will differ significantly from the goals and processes of a committee that is creating standards. In this research, one of the goals of focus groups will be to discover differing opinions without attempting to come to a consensus. Members of the focus groups will be actively encouraged to state their own interpretations of the questions with the goal of taking advantage of the capability of focus groups to determine what the degree of consensus is on a particular question without attempting to move to consensus (Morgan & Krueger, 1993). By not trying to come to consensus, the “sausage factory” effect described above by Philips (2009) should be eliminated or reduced as a factor in the process. The use of focus groups may provide either a diverse range of answers to the questions, or, may trend to consensus. In either case, the responses will allow the researcher to report on the amount of consensus or diversity in the focus groups’ responses.

This is information that is absent from standards documents and is one significant way the use of focus groups in this study differs from the work of standards committees.

A second major difference between standards committees and the focus groups proposed by this research is the makeup of the groups. The AASL Learning Standards Rewrite Task Force (2006-2007) contained eight people, none of whom were classroom teachers. According to Johns (2008) the makeup of the committee was a high school librarian who was also the 2008-09 AASL president-elect, two library educators, a state librarian, an elementary librarian, and a school library system director. The acknowledgement in the standards document indicates there were an additional two members of the committee; one a AASL board liaison and the other a AASL staff liaison. The development of the first technology education standards by the International Technology Education Association (ITEA) (now the International Technology and Engineering Education Association (ITEEA)) involved 27 people divided into three grade band committees of nine. Analysis of the elementary committee shows that three of the nine members are affiliated with universities, one is an elementary school principal, one is a staff development expert, while the status of the remaining members is unclear (Kinser, Dugger, & Newberry, 1997).

Reports on state level committees on standards creation indicate more teacher involvement but the exact makeup of these committees is not clear. Barnett (2008) describes the Arkansas state committee on information literacy standards as having forty-five members representing large, medium, and small school districts, all grade levels, and urban, suburban, and rural areas. She also states, "My previous experiences have shown that it is nearly impossible to get that many people to agree on anything" (p. 22). This would seem to indicate a great deal of compromise was necessary to reach a final set of standards. Bartow (2009) indicates that the Montana Library

Media standards were created by teams including educators, post-secondary education faculty, K-12 school administrators.

The proposed research project consisting of focus groups of classroom teachers is clearly different in makeup from the committees of both national and state organization issuing information literacy standards. This research project running four focus groups of four to seven teachers resulted in quite probably having a greater amount of classroom teacher input than either national or state committees.

In summary this research project differed from the work of standards committees in two significant ways. First was the ability to report on the level of or lack of consensus achieved concerning the differing ability levels of students of various ages to solve information problems. Second, the makeup of the proposed focus groups differed from committees that have created standards

3.6.4 Focus Group Methodology

The third phase tapped into teachers' knowledge of student abilities through the use of a series of four focus groups. Focus groups allow members to express their ideas without the need to come to a final consensus to produce an end product. This type of forum also provides an arena for stimulating the thought of individuals through the interaction of the group.

The creation of standard statements appears to be an opaque process. Each standard statements document generally has a list of who was involved and a brief description of the process. This process can be summed up: "A group of experts formed a committee and through an iterative process came to consensus. These are the standard statements that resulted." This is a generalization. As noted earlier, a common criticism of standards statements is that consensus

comes from addition not subtraction. The use of teacher focus groups allows for the researcher to analyze the level of consensus present as the group discusses students' ability levels in solving information problems. This insight into the level of, or lack of, consensus achieved in the creation of information literacy standards statements is currently not available. This research project's focus group methodology will allow the researcher to report on the extent that the expert, experienced teachers reached consensus concerning the abilities of students of different ages to solve information problems.

The aim of the focus groups was to have teachers examine the results of the survey and provide explanatory input about these results. A goal was to address capabilities of students in grades 2, 5, and 8, in areas that the survey results indicate were not well agreed upon. This discussion was intended to provide a description of the ability levels of students at different grade levels and to provide insight into why a lack of consensus existed on particular skills. A discussion of how the focus group process differs from the process used to create standards and thus provides different forms of insight is included below in section 3.6.3.

Focus groups were made up of NBCTs recruited from the survey participants. Survey participants were asked to provide contact information if they would be willing to participate in a focus groups. A \$25 Amazon gift care was offered as a gratuity for all participants in the focus groups. Focus groups were ultimately organized based on the availability of the volunteers. A survey was created using the University of Washington's Catalyst tools and sent to those NBCTs who indicated they were interested in a follow-up focus group (see the appendices). NBCTs were offered ten different dates to choose from. The results of the survey led to focus groups being held on January 27, February 10 and February 19, 2014. As a result of increased participation

based on the additional recruiting emails, a second survey was sent out seeking focus group participants. This resulted in a fourth focus group that was held on May 5, 2014.

The focus groups were heterogeneous in terms of grade level and area of National Board specialization. An idea that had been considered, but was dependent upon the number of participants, was to have homogenous groups of teachers from second, fifth, eighth grades and special education. This was not possible due to the number and background of respondents volunteering to participate in the focus groups.

The focus groups were held entirely on-line using Adobe Connect. The first focus group on January 27 used both a video and audio interface. There were difficulties with participants attempting to use the audio and video capabilities in the first focus group, and these difficulties worsened at the start of the second focus group. The multiple audio and video difficulties were resolved by switching to a text-based interface for the second focus group. Success with the text based interface led to the third and fourth focus groups being entirely text based.

A standardized set of questions was designed to guide the focus group conversations. The focus group questions are included in the appendices. Copies of the survey results were provided to participants in advance. All focus groups members were sent a copy of the Informed Consent form that was approved by the University of Washington Institutional Review Board (IRB). The information provided to the focus groups is included in the appendices. All participants acknowledge the Informed Consent form and all agreed to being recorded.

3.6.5 Focus Group Data Recording

All focus groups were digitally recorded and the files were transcribed for analysis. The researcher took notes during each focus group.

3.6.6 Focus group participant selection and compensation

This research project drew a purposeful sample for the focus group participants. The survey included a question asking participants if they were willing to participate in a follow up focus group. One of the focus group goals was to explain the results of the survey and thus having members of the original survey was both logical and according to Creswell & Plano Clark, a requirement of an explanatory design (2011). Morse (2003) writes that different sampling methods will necessarily be used, and that the same participants may (rather than must) be used in qualitative study following a quantitative study.

Focus group members were compensated with \$25 gift cards from Amazon.com. Amazon gift cards were delivered to all participants email addresses during the week following each focus group.

3.6.7 Qualitative Data Analysis from Focus Groups

The focus groups were meant to provide explanatory evidence of the survey results, not necessarily to generate data for creation of a new theory. Thus the focus groups were used to generate a thick description of the views of NBCT participants concerning both the results of the survey and information literacy standard statements. The data from the focus groups (both recorded transcripts and the researcher's notes) were analyzed for the themes that arose from the focus groups. This was done in an ongoing basis with the analysis of the first groups helping to inform the questions directed at later groups. The website DeDoose ("Dedoose Version 5.1.26, web application for managing, analyzing, and presenting qualitative and mixed method research data," 2014) was used to analyze the transcripts and create codes.

The analysis of the data from the focus groups followed the steps outlined by Creswell (2009). Raw data was collected in the form of researcher's notes and transcripts of the focus groups. The raw data was organized, (transcription of session, typing and organizing of researcher's notes) and an initial read through was conducted to gain a general sense of the information. Codes were created for themes and a codebook created. The codes were used to generate themes and descriptions. Finally, the researcher interpreted the meaning of the themes/descriptions.

3.7 Ensuring Research Quality

This research project utilized several methods to increase the reliability and the validity of the results. Using a mixed method design data was collected by three separate methods, content analysis of standards documents, a survey, and focus groups. The combination of methods provided for triangulation of sources. The evidence was used to create a holistic portrayal of teachers' perceptions of information literacy standards. Specific steps included:

- Pretesting of survey questions;
- An advisory group for feedback before deploying the survey;
- Multiple email follow ups to reduce nonrespondent bias on the survey portion of research;
- Equipment testing and backups of electronically recorded focus group conversations;
- Member checks with teachers to ensure themes derived from the data are accurate and perceived by participants to be accurate (Creswell, 2009);
- For quantitative data, all statistical measures were performed using SPSS.

- Research design and specific tests were confirmed with on-campus statistical consultants (Statistical Consulting Services, Departments of Biostatistics and Statistics).

3.8 Ethical Considerations

This research was submitted to the University of Washington's Institutional Review Board for compliance with human subjects regulations. This research project was determined to qualify for exempt status in accordance with the federal regulations under 45 CFR 46.101/ 21 CFR 56.104 on August 21, 2013. (The determination letter is included in the appendices). All survey participants were asked to read an informed consent form before being able to access the survey questions. All focus group members were sent an informed consent form prior to focus group participation. All participants in the focus groups verbally confirmed receiving and reading the informed consent form and were given the chance to ask questions.

All data is in electronic form with personal identifiers removed from the data except where necessary for contacting participants. Contacting participants was necessary for scheduling focus groups, paying participants an honorarium for participating in the focus groups, and contacting the winners of the random drawing. Data collected is stored in a password protected computer hard drive.

3.9 Summary

A variety of issues have been identified that have a negative impact on various educational standard statements. Prior to this research project it was not known if these issues also affected information literacy standard statements, nor what the perceptions of classroom teachers were concerning these standards. This research project used a Sequential Explanatory mixed method design to examine perceptions of expert, experienced classroom teachers concerning information

literacy standard statements and the grade level appropriateness of these standard statements. Expert, experienced teachers were defined as those teachers who have earned National Board Certification in an applicable certificate area. The three phases of this research project included a qualitative content analysis of existing standards, a quantitative non-experimental survey, and, a follow-up phase of a series of four focus groups comprised of expert, experienced classroom teachers. The content analysis was used to identify standard statements that fit stages of the Big6 information problem-solving model, and to examine standards for conceptual complexity and readability. The survey was used to identify to what extent standard statements matched teachers' perceptions of grade level appropriateness and importance. The focus groups were used in an explanatory fashion to gain an understanding of the results from the first two phases. The use of multiple methods was used to increase research credibility through triangulation of data from different sources. The results of this research are intended to provide support for validating existing standards and to provide indications of areas where gaps may exist between the standard statements and teachers' views thus pointing to areas of future research seeking to explain any inconsistencies.

4. Results

4.1 Introduction

This chapter presents the results of all three phases this research project. The first section (4.1) describes the results categorizing both the American Association of School Librarians (AASL) and Common Core State Standards (CCSS) standard statements into the stages of the Big6 information problem-solving method. Section 4.2 describes the content analysis of the standard statements for concepts and clarity of writing. Section 4.3 describes the results of the survey of National Board Certified Teachers (NBCTs). First, the survey participants are described based on the information from the demographic portion of the survey. Second is a description of the results of part one of the survey in which the NBCTs matched randomized standard statements to the intended grade level. Third, is a description of the results of the NBCTs ranking the standard statements for both importance to teach and developmental appropriateness for teaching at each grade level. Section 4.4 of this chapter discusses the results of the focus group sessions. The final section (4.5) of this chapter is the conclusion.

4.2 Categorizing Standards into Big6 Stages

4.2.1 Introduction

This section describes the results of Phase One, sorting the standard statements from the AASL and the CCSS. A total of 690 standard statements were identified as stages of the Big6 model, as not Big6 stages, or as unable to tell if it was a Big6 stage. Of the 690 standard statements, 313 were from the AASL and 377 were from the Common Core.

4.2.2 Results of Sorting AASL Standard Statements into Big6 Stages

The AASL has four broad standards. These are subdivided into strands and then further subdivided into skills, dispositions, responsibilities, and self-assessment strategies. Each of these subdivisions have indicators with benchmarks representing what students should be able to do at grades 2, 5, 8, 10, and 12. The four AASL standards are 1) inquire, think critically and gain knowledge, 2) draw conclusions, make informed decisions, apply knowledge to new situations, and create new knowledge, 3) share knowledge and participation ethically and productively as members of our democratic society, and 4) pursue personal and aesthetic growth (American Association of School Librarians, 2009).

The final tally of AASL standard statements categorized into Big6 stages is shown in Table 4.1 while Table 4.2 summarizes the data.

Table 4.1 shows the number of standards in each Big6 category, using simple frequencies and percentages with the goal of detecting patterns. No test for statistical significance was performed on this data. For example, a Chi Squared test may have indicated if there were a significant difference between the reported frequencies and an evenly distributed model of the Big6 stages. However, there is no reason to expect an even distribution, or any particular pattern, in the stages of an information problem-solving model in a set of standard statements. The intent here was to determine what stages of the Big6 are present in the AASL to identify patterns and to determine which standard statements matched Big6 stages 2, 3, and 4 for further content analysis, and inclusion in the survey portion and of this research project.

Title	# of SS	1	2	3	4	5	6	Not Big6	No Consensus
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Title	# of SS	1	2	3	4	5	6	Not Big6	No Consensus
AASL Standard One	74	12	6	15	14	11	0	9	7
AASL Standard Two	62	2	0	1	8	32	8	3	8
AASL Standard Three	76	0	1	0	8	27	8	24	8
AASL Standard Four	101	0	13	5	14	17	0	29	23
Totals	313	14	20	21	44	87	16	65	46
# of SS = Number of Standard Statements									

Table 4.1 AASL Standard Statements matched to Big6 stages

Table 4.1 shows that all six stages of the Big6 were reflected in the standard statements in the four AASL standards. The total of AASL standard statements matched to Big6 stages was 202.

The range is approximately evenly spread across the four standards ranging from 14% to 19% of the total standard statements.

Standard statements that were categorized as Not Big6 were those the coders decided did not fit into a Big6 stage. Reasons a standard statement might be categorized in this way included both that the standard statement simply did not address a Big6 concept and that the standard statement included multiple and differing tasks resulting in the coder being unable to determine which Big6 stage was predominant. Three examples of standard statements that were categorized as Not Big6/Unable to tell are listed in Table 4.2 below.

AASL Standard	Indicator Statement	Grade	Standard Statement (Benchmark)
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AASL Standard	Indicator Statement	Grade	Standard Statement (Benchmark)
Three	Use information and technology ethically and responsibly.	Five	Observe Web safety procedures including safeguarding personal information.
Four	Seek information for personal learning in a variety of formats and genres.	Five	Explain why some authors and genres have become favorites.
Four	Seek information for personal learning in a variety of formats and genres.	Eight	Maintain personal reading lists.

Table 4.2 AASL Standards classified as Not Big6

Table 4.3 displays results of the coding by Big6 stage. The AASL standards statements have an emphasis on stage 5, (Synthesis), and stage 4, (Use of Information). Of the 202 of 313 standard statements that were placed into a Big6 stage, 87 (43%) were at Big6 Stage 5, another 44 (22%) were at Stage 4. These two stages make up 65% of the all the standard statements. The remaining four stages of the Big6, Stage 1 (Task Definition), Stage 2 (Information Seeking Strategies), Stage 3 (Location and Access), and Stage 6 (Evaluation) were each detected in 10% or fewer of the standard statements. These four stages of the Big6 made up just over one third (35%) of the AASL standard statements. Task definition, the most important phase of problem solving (J. D. Bransford et al., 2000; Willer, Marino, & Eisenberg, 2014) and Evaluation, the final stage of problem-solving, are the two least represented. Each was detected in less than 10% of the standard statements.

Big 6 Stage	Frequency	Percent
1 Task Definition	14	7%
2 Information Seeking Strategies	20	10%
3 Location & Access	21	10%
4 Use of Information	44	22%
5 Synthesis	87	43%
6 Evaluation	16	8%

Total	202	100%
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Table 4.3. Summary of Big6 Frequencies in AASL Standards

Table 4.4 shows the AASL standard statements sorted by frequency of Big6 stage from most to least frequent.

Big 6 Stage	Frequency	Percent
5 Synthesis	87	43%
4 Use of Information	44	22%
3 Location & Access	21	10%
2 Information Seeking Strategies	20	10%
6 Evaluation	16	8%
1 Task Definition	14	7%
Total	202	100%

Table 4.4 AASL Standard Statements by Frequency of Big6 Stage.

4.2.3 Results of Sorting the Common Core State Standards into Big6 Stages

The CCSS have two areas of standards – English/Language Arts and Mathematics.

English/Language Arts is broken into anchor standards and then into grade level standards for each anchor standard. The anchor standards themselves are grouped into categories. Additionally the standards are grouped into two grade bands, K-5 and 6-12. Table 4.5 lists the various categories of anchor standards in the left hand column.

The categories of the CCSS Mathematics standards are also listed in Table 4.5. Only 11 of the CCSS Mathematics standard statements were found to fit a Big6 stage. All 11 of these were in the Big6 stage 5, Synthesis, and thus were excluded from the survey.

This section reports on the number of CCSS standard statements in each Big6 category, using a simple tally system with the goal of detecting patterns, not statistical significance. As noted in the section on the AASL standard statements, the intent here was to determine patterns and to

identify CCSS statements that fit stages 2, 3, and 4 of the Big6 information problem-solving model for inclusion in the survey of NBCTs.

The final tally of CCSS standard statements categorized into Big6 stages is shown in Table 4.5 while Tables 4.6 and 4.7 summarize the data.

Title of Standard Category	Total	Big6 - 1	Big 6 - 2	Big 6 - 3	Big 6 - 4	Big 6 - 5	Big 6 - 6	Not Big6	No Consensus
ELA History/Soc Sci/Tech Writing	20	0	0	0	1	12	0	6	1
ELA History/Soc. St Reading Literature	10	0	0	0	1	3	0	2	4
ELA Information Text	30	0	0	1	7	10	0	4	8
ELA Language	70	0	0	3	5	2	0	50	10
ELA Literature	27	0	0	0	5	3	0	12	7
ELA Reading Standards Foundational Skills	17	0	0	0	4	0	0	13	0
ELA Science & Technical Reading Literacy	10	0	0	0	5	2	0	2	1
ELA Speaking & Listening	29	0	0	0	3	13	0	7	6
ELA Writing	61	0	0	0	2	30	0	23	6
Math Geometry	19	0	0	0	0	2	0	11	6
Math Measurement & Data	20	0	0	0	0	4	0	9	7
Math Number System 8th Grade	24	0	0	0	0	5	0	16	3
Math Numbers & Operations Fractions	13	0	0	0	0	0	0	7	6
Math Numbers & Operations in Base 10	20	0	0	0	0	0	0	16	4
Math Operations & Algebraic Thinking	7	0	0	0	0	0	0	5	2
Totals	377	0	0	4	33	86	0	183	71

Table 4.5. Common Core State Standards by Big6 Category

Table 4.5 shows that the CCSS has an emphasis on Big6 Stage 5 (Synthesis), and to a lesser degree Stage 4 (Use of Information). However, it is also apparent that no CCSS are related to Big6 Stages 1 (Task Definition), 2 (Information Seeking Strategies), or 6 (Evaluation). Of the 122 standards statements that were placed into a Big6 stage out of 377, 86 were at Big6 Stage 5 (Synthesis), another 33 were at Stage 4 (Use of Information), and 4 were at Stage 3 (Location and Access). There were no CCSS standards statements that were categorized into the remaining Big6 stages.

Big 6 Stage	Frequency	Percent
1 Task Definition	0	0%
2 Information Seeking Strategies	0	0%
3 Location & Access	4	1%
4 Use of Information	33	9%
5 Synthesis	86	23%
6 Evaluation	0	0%
Not Big6	183	49%
No Consensus	71	19%
Total	377	100%

Table 4.6. Summary of Big6 Frequencies in CCSS Standard Statements

Table 4.7 shows the same information as Table 4.6 sorted by frequency of occurrence from high to low.

Big 6 Stage	Frequency	Percent
Not Big6	183	49%
5 Synthesis	86	23%
No Consensus	71	19%
4 Use of Information	33	9%
3 Location & Access	4	1%
1 Task Definition	0	0%
2 Information Seeking Strategies	0	0%
6 Evaluation	0	0%
Total	377	100%

Table 4.7. Summary of Big6 Frequencies in CCSS Standard Statements

Tables 4.6 and 4.7 clearly show the CCSS emphasis on Big6 stage 5, Synthesis with 23% of the standard statements being categorized as this Big6 stage. Big6 stages 1, 2, and 6 have no representation in the CCSS standard statements, while Big6 3, Location and Access appears only four times.

The CCSS standard statements have a much higher incidence of standard statements identified as not Big6 when compared to the AASL standard statements. This is most likely due to the fact the AASL standards were written for Teacher/Librarians and thus are aimed more specifically at information literacy skills. The CCSS standard statements that were reviewed included all the standard statements at Grades 2, 5, and 8 in English/Language Arts and Mathematics and were not necessarily intended as information literacy standards.

4.3 Content Analysis of Standard Statements from the AASL and CCSS

4.3.1 Introduction

The standard statements from both the AASL and CCSS were reviewed for clarity and the number of tasks involved in each standard statement. The same coders (with one addition) that reviewed with the standard statements for coding to Big6 stages were asked to code the standard statements on these two categories. Coders were asked to count the number of tasks in each standard statement and also to rate each standard statement for clarity on a three-point scale. The clarity scale is described below in Table 4.8. One coder coded all standard statements. Three other coders each scored approximately one-third of the standard statements. This resulted in each standard statements being coded by two coders allowing for the calculation of an inter-rater reliability rating. Krippendorff's Alpha (KALPHA) (Hayes & Krippendorff, 2007) was used to establish an inter-rater reliability, see table 4.13 for details. All coders coded for both the number of tasks and the clarity of the standard statements.

The clarity scale was deliberately kept simple and was similar to that used in Hebbleler and Taylor’s (2012) study of Connecticut kindergarten and preschool standards. The purpose in coding for clarity was to identify to what extent this was an issue with the standard statements and to identify particular standard statements that were unclear. According to Kendall (2001, p. 12), “Because the benchmark should communicate clearly what students should know and be able to do, the language must be more concrete and precise.”

Scale	Description
3	Clear and easy to understand
2	A little bit confusing or awkward
1	Overly complex, wording is confusing, or easily confuses the reader

Table 4.8 Clarity Scale used by Coders

There was no scale for counting the tasks in the standard statements. Coders were given examples of the standard statement with the number of tasks identified. Coders then reviewed a subset of the standard statements on a spreadsheet and counted the number of tasks in each standards statement.

4.3.2 Issues with clarity of writing

A total of 122 standards were rated for clarity using the scale in Table 4.8. Table 4.9 shows the results.

Type of Standard Statement	Number of Standard Statements	Rating = 3		Rating = 2		Rating = 1	
		Frequency	Percent	Frequency	Percent	Frequency	Percent
AASL	85	33	38.8%	40	47.1%	12	14.1%
Common Core	37	17	45.9%	9	24.3%	11	29.7%
Total	122	50	41.0%	49	40.2%	23	18.9%

Table 4.9 Frequency and Percentage of Standard Statements Clarity ratings.

Ideally all standard statements would have received a rating of “3”, “Clear and easy to understand.” Fifty of the total standard statements reviewed did receive this rating. However, 23

standard statements, or 18.9% received a rating of 1, “Overly complex, wording is confusing, or easily confuses the reader.” Of these standard statements rated at a “1”, 11 were CCSS and 12 were AASL. This equates to 29.7% of the CCSS standard statements being rated at a “1” and 14.1% of the AASL receiving a “1” rating.

4.3.3 Issues with Multiple Tasks in One Standard Statement

A total 122 standard statements were rated for the number of tasks each standard statement contained. Table 4.10 contains the frequency counts for number of tasks found in the standard statements.

Number of Tasks in Standard Statement	CCSS		AASL		Total CCSS and AASL	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
18	0	0%	1	1.2%	1	
16	3	8.1%	0	0.0%	3	2.5%
12	4	10.8%	1	1.2%	5	4.2%
10	1	2.7%	2	2.4%	3	2.5%
9	0	0.0%	1	1.2%	1	0.8%
8	2	5.4%	0	0.0%	2	1.7%
7	1	2.7%	0	0.0%	1	0.8%
6	2	5.4%	5	6.0%	7	5.8%
5	2	5.4%	2	2.4%	4	3.3%
4	6	16.2%	11	13.1%	17	14.1%
3	3	8.1%	7	8.3%	10	8.3%
2	11	29.7%	36	42.9%	47	38.8%
1	2	5.4%	19	22.6%	21	17.3%
Total	37	100%	85	100%	122	100.0%

Table 4.10 Frequency of Number of Tasks Coded in Standard Statements

Table 4.10 shows all the frequency counts of tasks coded in standards statements from the CCSS and the AASL and the totals. Grouping the number of tasks into group of two provides a clearer picture and is shown in Table 4.11 below.

Number of Tasks in a Standard Statement	Frequency in CCSS	Percent of total CCSS	Frequency in AASL	Percent of total AASL	Frequency Combined Total	Percent of Combined Total
> 10	7	19%	1	1%	8	7%
9 to 10	1	3%	3	4%	4	3%
7 to 8	3	8%	0	0%	3	2%
5 to 6	4	11%	7	8%	11	9%
3 to 4	9	24%	18	21%	27	22%
1 to 2	13	35%	55	65%	68	56%
Total	37	100%	84	100%	121	100%

Table 4.11 Frequency of Tasks Coded in Standard Statements by groups of two

Table 4.11 shows that the CCSS standard statements tendency to have a higher number of tasks than the AASL standard statements with 19% of the CCSS standard statements having more than 10 tasks compared to 1% of the AASL standard statements. At the lower end, 84% of the AASL standard statements (73/84) had one to four tasks in each standard statement, compare to only 59% (22/37) of the CCSS.

Table 4.12 shows the average task count per standard statement and breaks the data down by raters and by type of standard statement.

Mean Task Count Rating per Standard Statements	Rater 1	Raters 2, 3, 4
Mean of items (AASL) 1-43 (Rater 1 vs. 2)	3.00	3.00
Mean of items (AASL) 44-85 (Rater 1 vs. 3)	2.79	2.84
AASL mean tasks per Standard Statement	2.89	2.92
Combined mean all AASL standard statements; all raters;	2.91	
CCSS (all items) mean (Rater 1 vs. 4)	5.43	5.62
Combined mean score all CCSS standard statements; both raters	5.53	
Total Mean score tasks per standard statement; all standard statements	3.66	3.74
Combined mean, all raters all standard statements (AASL + CCSS)	3.70	

Table 4.12 Mean Task Counts of Standard Statements.

As noted above, Kendall (2001) argues that standards must be “concrete and precise.” The focus groups of NBCTs indicated that the standard statements (from both the CCSS and the AASL) were difficult to place at the grade level intended by the standard statements’ authors was the number of tasks involved in the standard statements. The CCSS standard statements had a mean score of 5.53 tasks per item. The AASL standard statements had a mean score of 2.91 tasks per item. Both set of standard statements would be clearer and more precise if the standard statements were written with fewer tasks in each statement.

4.3.4 Inter-Rater Reliability Ratings for Clarity Ratings and Task Coding

Krippendorff’s alpha (KALPHA) (Hallgren, 2012; Hayes & Krippendorff, 2007) was used to calculate an inter-rater reliability rating for both the clarity analysis and the task counting analysis of the standard statements.

Paired Judges	KALPHA for Clarity Rating	KALPHA for Task Count
Judge 1 & 2	1.000	.9056
Judge 1 & 3	.6877	.9209
Judge 1 & 4	.7282	.9656
Average of Ratings	.8053	.9307

Table 4.13 KALPHA Inter-rater reliability ratings for Clarity and Task Counting

Krippendorff (2004) argues against a standard scale for ranking inter-rater reliability ratings. He suggests analyzing the ratings based on the importance of the data (e.g. life threatening situations require a much higher inter-rater reliability than non-life threatening situations). Krippendorff also discourages averaging inter-rater reliability, suggesting that the lowest score should be used for judging how useful the inter-rater reliability ratings actually are. In this case, the lowest scores are .6877 for the clarity rating and .9056 for the task count. These are scores that the researcher believes are acceptable for rating standards statements in an exploratory project.

4.3.5 Matching Content Analysis Findings to Survey Results

These scores from the clarity ratings and the task count indexing were correlated with each standard statements number of correct matches from the survey of NBCTs. The correlation coefficient for the clarity ratings, calculating using Spearman's coefficient, was 0.123, indicating little correlation between the two variables. Spearman's coefficient was selected because the clarity rating is ordinal level data (Hinton, 2004; Hinton, McMurray, & Charlotte, 2014). The Pearson's R correlation coefficient for the task count index was .142 ($r = .142$, $N = 113$, $p > 0.05$) thus indicating little to no correlation between the times a standard statement was matched to the intended grade level and the number of tasks the standard statement included. Pearson's correlation was used for this calculation because both sets of data are ratio level data (Hinton, 2004; Hinton, McMurray, & Charlotte, 2014).

The content analysis of the standard statements, both the Task Count Index and the Clarity ratings failed to shed any statistical light on the portion of the survey in which participants matched the standard statement to the intended grade level. However, both these analyses provide other insights into the standards. The clarity ratings show the sheer number of standard statements that the raters found to be less than clear. The task count index shows the average number of tasks per standard statement is 3.70. If all standard statements are to be clear and easily understood, the number of standard statements that were found to be less than clear and the number of tasks each standard statement requires are indicators of areas needing change.

4.3.6 Dale-Chall Reading Level Test of the Standard Statements

One further method of judging the clarity of the standard statements was used. The Dale-Chall reading formula was applied to all the standard statements via the use of a web-based calculator, ReadabilityFormulas.com (Scott, 2014). The Dale-Chall reading formula is meant for blocks of

text with the minimum number of words between 100 (Chall et al., 1996) and 200 (Scott, 2014), not short sentences, thus not all of the standard statements returned a Dale-Chall score.

Combining the standard statements and analyzing them as a group resulted in a score of 8.6, grades 11-12 for the Common Core standard statements and a score of 9.2, grades 13-15 for the AASL standard statements. The grade levels should be well within the reading capability of NBCTs and thus does not provide evidence that there is an issue with the clarity of the standards. If the standard statements are to be comprehensible to parents and students though, these reading levels are may be too high.

4.4 Survey of National Board Certified Teachers

The survey sent to the NBCTs in Washington was constructed from the results of the content analysis described in section 4.2. The standards that were categorized as Big6 stages 2, 3, and 4 were used to create the survey instrument. This resulted in a total of 115 standard statements being used in part one of the survey (85 AASL and 30 CCSS). In part two of the survey 121 standard statements were used. The additional standard statements resulted from duplication in a few of the CCSS standard statements, i.e. the same standard statement was repeated at different grade levels. Part one of the survey used these duplicated standards just once, asking the participants to place the standard statement at the earliest intended grade level.

4.4.1 Description of participants based on demographic data

Table 4.14 shows the numbers of National Board Certified Teachers in Washington as of November 2013 and the numbers of each NBCT certificate area that completed the survey.

Area of Certification	Number in Washington state (Nov. 2013)	% of Total	Number of Survey Participants	% of Total Survey Participants
	151			

English Language Arts – Early Adolescence	459	6.3%	12	12.4%
Exceptional Needs Specialist – Early Childhood Young Adult	480	6.6%	10	10.3%
Generalist – Early Adolescence	20	0.3%	1	1.0%
Generalist – Early Childhood	581	8.0%	8	8.2%
Generalist – Middle Childhood	1076	14.8%	23	23.7%
Mathematics - Early Adolescence	395	5.4%	4	4.1%
Science – Early Adolescence	339	4.7%	3	3.1%
Social Studies/History – Early Adolescence	156	2.1%	7	7.2%
Literacy: Reading Language Arts/Early Adolescence Young Adult	921	12.7%	5	5.2%
Library Media / Early Childhood Through Young Adulthood	136	1.9%	10	10.3%
Other	2697	37.1%	6	6.2%
No response	Not applicable	Not applicable	7	7.2%
Total	7260	100.0%	96	100.0%

Table 4.14. State of Washington National Board Certified Teachers Compared to Survey Participants

Among survey respondents the certificate areas that matched the statewide number of NBCTs were Generalist – Early Adolescence, statewide 0.3%, survey participants 1%, Generalist – Early Adolescence, statewide 8%, survey participants 8.2%, Mathematics – Early Adolescence, statewide 5.4%, survey participants 4.1%, and Science Early Adolescence, statewide 4.7%, survey participants 3.1%.

Figure 4.1 provides a visual representation of the types of National Board certificate areas of the survey participants compared to the total percentage for each certificate type in the state of Washington.

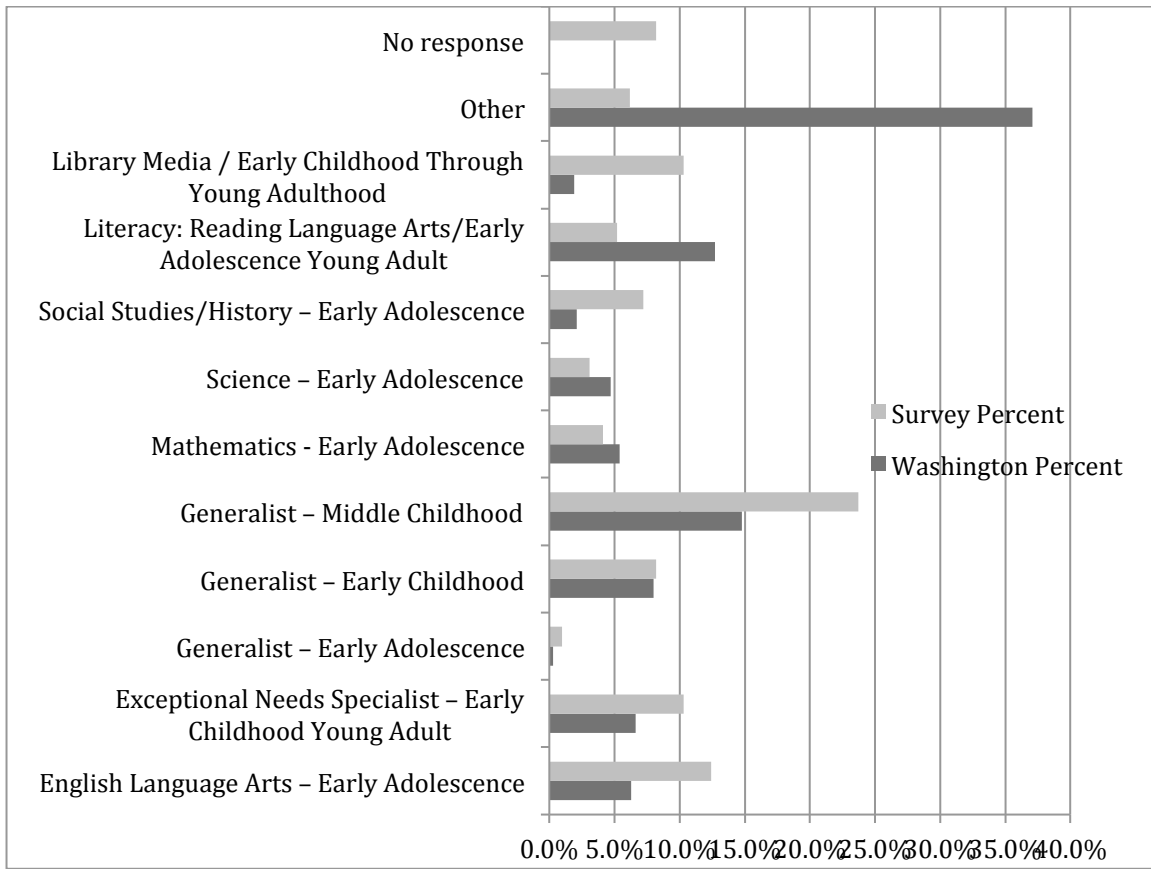


Figure 4.1 Survey Participants’ Area of National Board Certification compared to Washington state areas of National Board certification

The area of greatest difference in NBCT certificate areas and the survey respondents was the “Other” category. Statewide, other certificate areas make up 37.1% of NBCTs, in the survey there were only six (6.2%) of respondents who were in this certificate area. All of six of these described their certificate area as “Literacy: Reading Language Arts/Early to Middle Childhood.” This small number of “others” compared to the statewide number is not unexpected because the survey link was originally targeted at only the 10 certificate areas. The NBCT areas that were targeted made up 86.4% of the total participants in the survey. There were two other areas that should be noted are Exceptional Needs Specialist – Early Childhood Young Adult and Library Media/Early Childhood Through Young Adult. The Exceptional Needs Specialist certificate area makes up only 6.6% of NBCTs in Washington, but this certificate area made up 10.3% of survey

participants. NBCTs with a Library Media certificate make up only 1.9% of Washington NBCTs but they made up 10.3% of the survey participants. This last fact is not surprising since Library Media specialists generally see information literacy as their area of specialization. One of the Library Media specialists in the first focus group commented that she was particularly interested in the research project due to the crosswalk between the AASL and CCSS standard statements

Tables 4.15 and 4.16 show survey respondents by type of geographic location and size of school.

Type of Area	Number of Respondents	Percentage
Urban	18	19%
Suburban	46	48%
Small Town or Rural	25	26%
No response	7	7%
Total	96	100%

Table 4.15 Respondents by type of geographic location

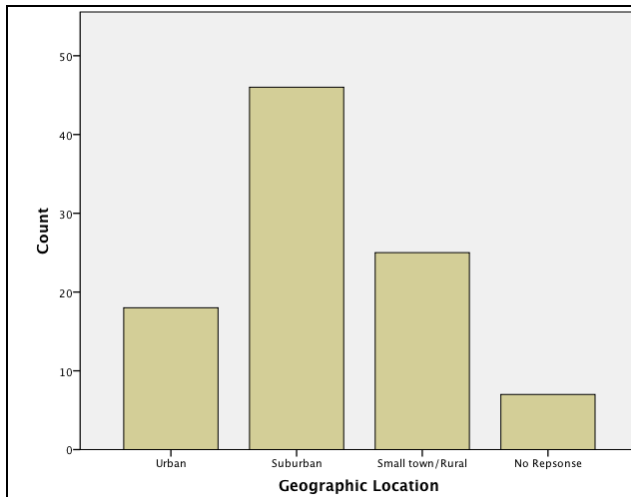


Figure 4.2 Histogram of Geographic Location of NBCT Participants.

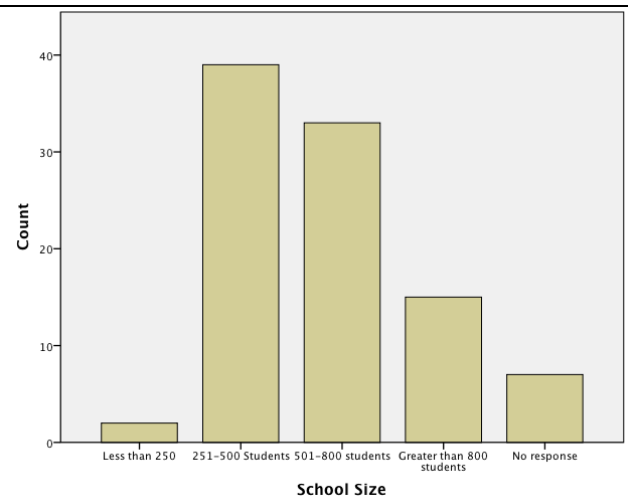


Figure 4.3 Histogram Showing NBCTs by Size of School

Geographically the 74% of participants who completed the survey were from either suburban or small town/rural areas. A small number, seven, or 7.3% did not give a response to the question.

Figure 4.2 shows a histogram of the geographic location of participants.

Size of school	Number of Respondents	Percentage
250 or fewer	2	2%
251-500	39	41%
501-800	33	34%
Larger than 800	15	16%
No response	7	7%
Total	96	100%

Table 4.16 Respondents by size of school

Table 4.16 and Figure 4.3 show data on the size of the school the participants teach at. Three quarters of the participants were from schools ranging in size from 251 to 800 students.

4.4.2 Matching standard statements to intended grade level

The first section of the survey asked the survey participants to match the standard statements to the earliest appropriate grade level. The survey software was set to present the standard statements to each of the survey participants in random order.

4.4.2.1 Grade level means and Confidence Intervals

Table 4.17 shows the mean percentage of standard statements matched to the intended grade level for all standard statements, by all participants along with a 95% confidence interval (the mean plus or minus two times the standard error). As the survey presented the participants with three choices it is clear that the grade eights standards were matched at a percentage that was only equal to random chance (33%).

Grade Level	N	Mean	Standard Error	95% Confidence Interval	
				Lower	Upper
Two	34	67%	1.6%	70.2%	63.8%
Five	37	49%	1.4%	51.8%	46.2%
Eight	44	29%	1.5%	32.0%	26.6%

Table 4.17 Mean Matched of Standard Statements by Grade Level with 95% Confidence Interval

4.4.2.2 Matching standard statements by Grade Level

Table 4.18 shows the survey results organized by grade level with sub grouping by type of standard statement. Table 4.18 clearly indicates the decreasing agreement of the NBCTs with the grade level assigned by the authors of the standards as grade level increases across both the AASL and CCSS standard statements.

Grade Level	Total number of Standard Statements	Percent Matched to Intended Grade Level
Grade 2 AASL	26	65%
Grade 2 Common Core	8	72%
Total	34	67%
Grade 5 AASL	31	48%
Grade 5 Common Core	6	56%
Total	37	49%
Grade 8 AASL	28	25%
Grade 8 Common Core	16	37%
Total	44	29%
Total of all Standard Statements	115	47%

Table 4.18 Standard Statements Matched Correctly by Grade Level of Standard Statement

Across all areas the CCSS standard statements were matched to their intended grade level at a higher rate than the AASL standard statements.

4.4.2.3 Paired T – tests on AASL vs. Common Core at Grades 2, 5, and 8

Table 4.19 shows the results of paired T-Tests comparing the means of NBCTs correctly matching the various standard statements to the intended grade levels from AASL Grade 2 and CCSS Grade 2, AASL Grade 5 and CCSS Grade 5, and AASL Grade 8 and CCSS Grade 8.

	Paired Differences	t	df	Sig.
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	Mean	Std. Deviation	Std. Error Mean	95% C.I. Lower	95% C.I. Upper			tailed)
Pair 1 AASL Gr2 –CCSS Gr2	-7.97%	21.83%	2.22%	-12.40%	-3.55%	-3.577	95	.05
Pair 2 AASL Gr5 –CCSS Gr5	-8.08%	23.92%	2.44%	-12.93%	-3.23%	-3.310	95	.05
Pair 3 AASL Gr8 –CCSS Gr8	-12.70%	18.45%	1.88%	-16.44%	-8.97%	-6.746	95	.05

Table 4.19 Paired T – Tests Comparing AASL and CCSS means by Grade Level

These results indicate, with significance at the .05 level, that the participants were more likely to match the CCSS standard statements to the grade level intended by the CCSS standards writers than to match the AASL standard statements to the grade level intended by the AASL standards writers. This was true across all three grade level bands.

4.4.2.4 Matching standard statements by Authoring Organization – AASL vs. CCSS

Table 4.20 contains the same data as Table 4.21 but it is organized by the originator of the standard statements and then by grade level. This table clearly shows that as grade level increases the ability of expert teachers to match the standard statements to grade level intended by the originator of the standard statement decreases. The AASL standards start at a 65% match rate at second grade, decrease to 48% at Fifth grade and drop further to 25% at Eighth grade. The CCSS standard statements follow the same pattern starting high at 72% in second grade, decreasing to 56% at Fifth grade and ending at 37% in Eighth grade.

Standard Type	Total number of Standard Statements	Percent Matched to Intended Grade Level
AASL		
Grade 2	26	65%
Grade 5	31	48%
Grade 8	28	25%
Total	85	45%

Standard Type	Total number of Standard Statements	Percent Matched to Intended Grade Level
Common Core		
Grade 2	8	72%
Grade 5	6	56%
Grade 8	16	37%
Total	30	51%
Total of all Standard Statements		
	115	47%

Table 4.20 Standard Statements Matched to Intended Grade Level by Authoring Organization

Figure 4.4 below graphs the data from Tables 4.20 and 4.21. This visual representation of the data again shows the clear pattern of decrease between grade levels and that the NBCTs were better able to match the standard statements from the CCSS than from the AASL.

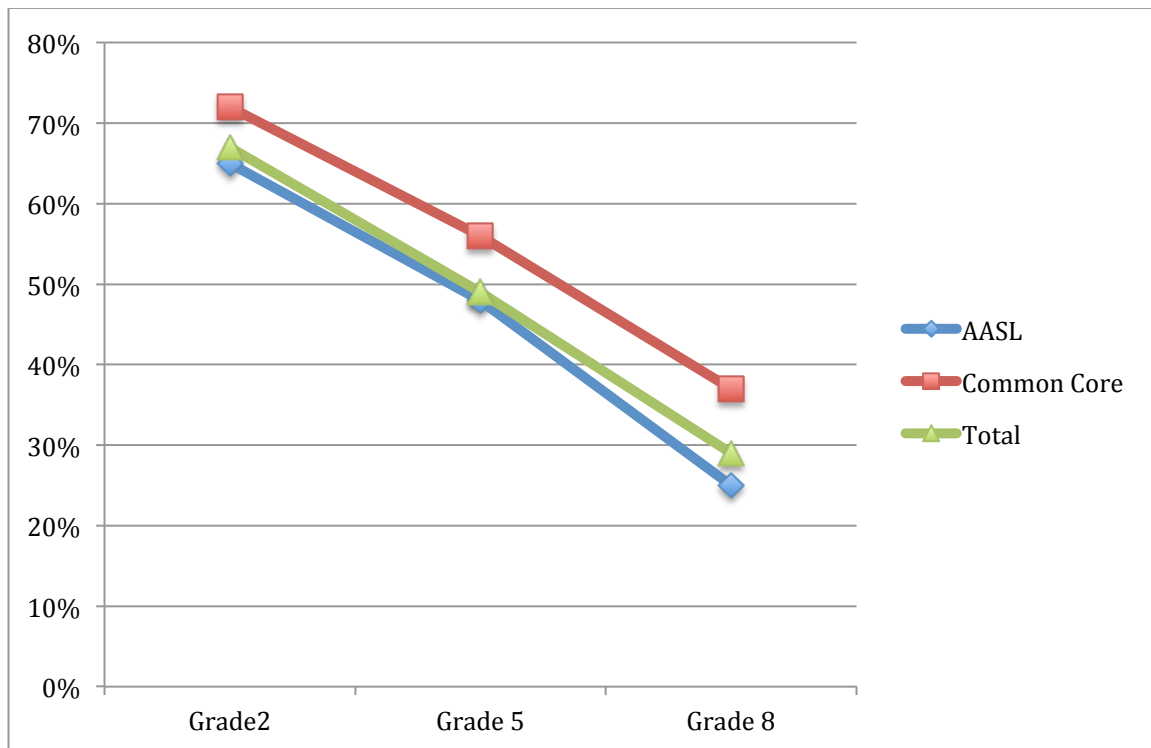


Figure 4.4 Graph of Percentage Matched to Intended Grade Level

4.4.2.5 Standard Statements Matched and Mismatched by Grade Level

The following table includes both the CCSS and AASL standards showing the statements that were correctly matched and the grade level that the mismatched standard statements were matched too.

Standards Statements Written for Grade 2		
	Percent	Raw Numbers
Identified as Grade 2	66.8%	2181/3264
Identified as Grade 5	28.1%	918/3264
Identified as Grade 8	04.5%	146/3264
Left blank in survey	0.6%	19/3264
Standards Statements Written for Grade 5		
	Percent	Raw Numbers
Identified as Grade 2	37.5%	1333/3552
Identified as Grade 5	49.0%	1739/3552
Identified as Grade 8	13.0%	463/3552
Left blank in survey	0.5%	17/3552
Standards Statements Written for Grade 8		
	Percent	Raw Numbers
Identified as Grade 2	23.9%	1008/4224
Identified as Grade 5	46.1%	1947/4224
Identified as Grade 8	29.3%	1237/4224
Left blank in survey	0.8%	32/4224

Table 4.21 Standard Statements Matched and Mismatched by Grade Level

Participants matched Second grade standard statements as belonging to Second grade 66.8% of the time and to Fifth grade 28.1% of the time. Only 4.5% of the Second grade standards were matched to Eighth grade. Participants matched Fifth grade standards to Fifth grade 49% of the time, while mismatching them to Second grade at 37.5% of the time more frequently than mismatching them to Eighth grade at 13%. Eighth grade standard statements were only correctly matched to Eighth grade 29.3% of the time while they were mismatched to Fifth grade 46.1% of

the time and to Second grade 23.9% of the time. Eighth grade standard statements were the only set that were more frequently mismatched to a different grade level than matched to the grade level intended by the authors of the standard statements.

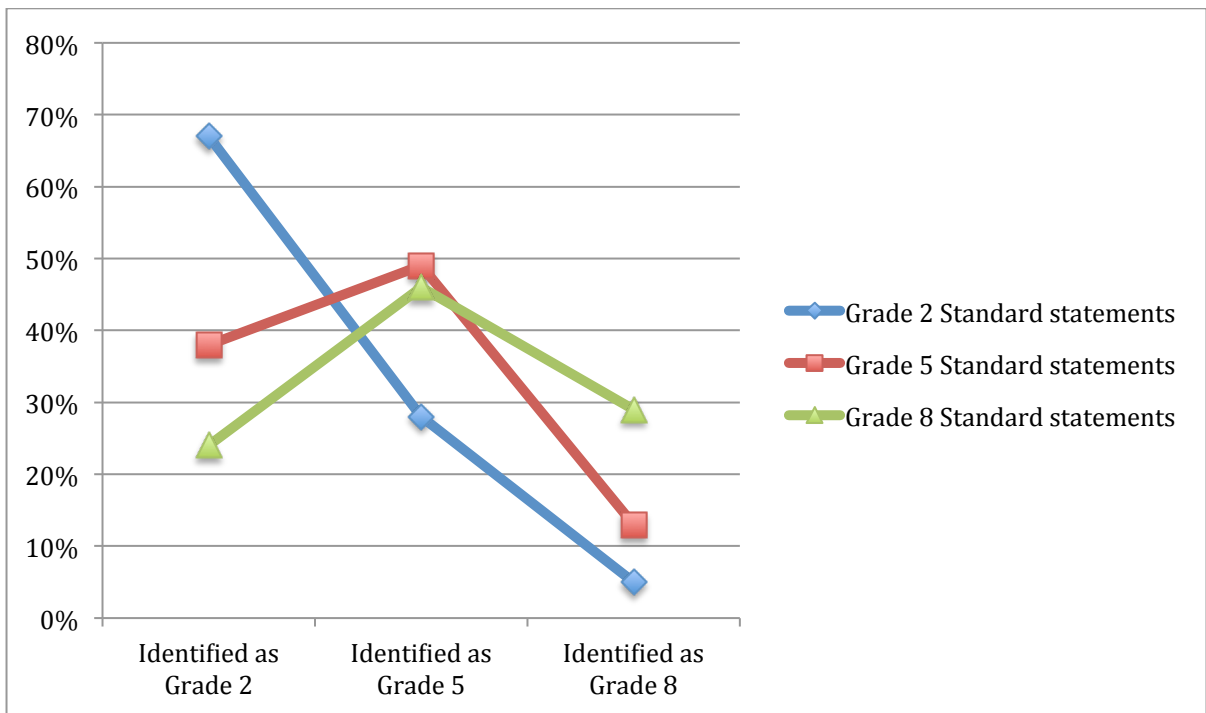


Figure 4.5 Standard Statements matched and mismatched by Grade Level.

Figure 4.5 provides a graphic representation of the data in Table 4.21. The Second grade standard statements show a pattern that one would expect, where grade level standards are most likely to be matched to the intended grade level and followed by increasingly fewer mismatches the further away from the intended grade level.

Fifth grade is equally far apart (two school years) from both Second and Eighth grades. This would indicate that the number of mismatches would be equivalent. This expected pattern does not fit the Fifth grade standard statements as a much higher percentage of mismatches went towards Second grade rather than Eighth grade.

The Eighth grade standards were the most difficult to match to the intended grade level, to such a degree that more of the standard statements that were intended for Eighth being matched to Fifth grade than to the actual intended Eighth grade level.

The following table shows standard statements by teacher grader level and standard grade level.

Grade Level of Teacher	N (teachers)	Second Grade Standards	Fifth Grade Standards	Eighth Grade Standards
2	34	69.7%	46.3%	29.1%
5	25	72.7%	49.5%	26.0%
8	37	60.2%	51.1%	31.2%

Table 4.22 Examining standards by Teacher grader level and standard grade level.

Table 4.22 shows that teacher who self identified as either teaching 5th grade or having 5th grade as the grade level closest to their level of expertise were most likely to match the standard statements to their intended grade levels at second grade, but they came in second at their own grade level, and last at Eighth grade. Second grade teachers were better than Eighth grade teachers at matching second grade standards but this group had the least agreement in matching to the intended grade level at Grades 5 and 8. The teachers who self identified at Eighth grade were the least likely to match the second grade standard statements to their intended grade level but were most likely to match both the Fifth and Eighth grade standards statements. Figure 4.6 contains a line chart of these findings.

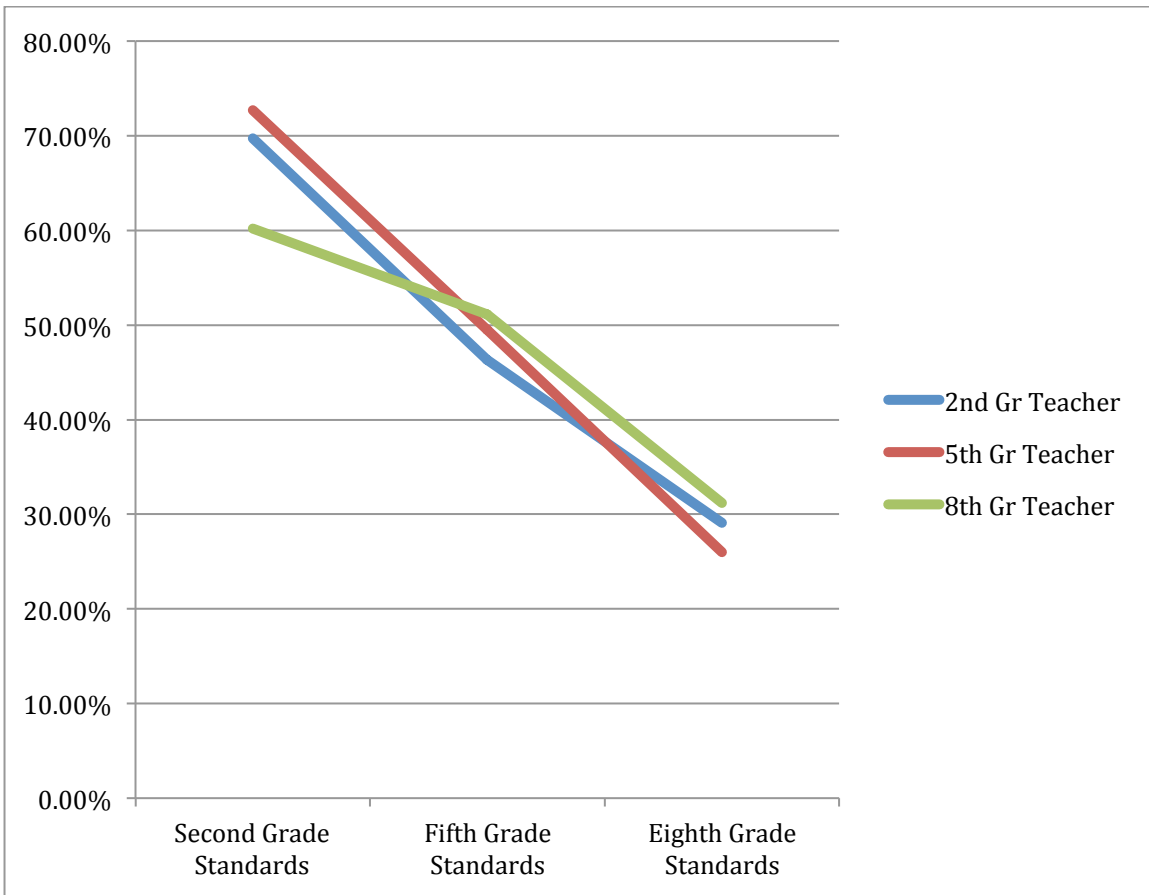


Figure 4.6 Matching Standard Statements by Teacher and Standard Statement Grade Level

Table 4.23 breaks the matching of the standards down by grade level of teacher, grade level of standard and the type of standard and indicates the percentage of standard statements correctly matched to the grade level intended by the standard statements' authors

Grade Level of Teacher	N of (teachers)	Type of Standard	N of Standards	Second Grade Standards % Matched	N of Standards	Fifth Grade Standards % Matched	N of Standards	Eighth Grade Standards % Matched
All	96	ALL	34	66.8	37	49.0	44	29.3
All	96	AASL	26	64.9	31	47.6	28	24.7
All	96	CCSS	8	72.9	6	55.7	16	37.4

Grade Level of Teacher	N of (teachers)	Type of Standard	N of Standards	Second Grade Standards % Matched	N of Standards	Fifth Grade Standards % Matched	N of Standards	Eighth Grade Standards % Matched
2 nd	34	All	34	69.7	37	46.3	44	29.1
2 nd	34	AASL	26	66.4%	31	44.5%	28	34.1%
2 nd	34	CCSS	8	80.5%	6	55.4%	16	20.2%
5 th	34	All	34	72.7%	37	49.5%	44	26.0%
5 th	25	AASL	26	72.3%	31	46.6%	28	18.6%
5 th	25	CCSS	8	74.0%	6	64.7%	16	39.0%
8 th	37	All	34	60.2%	37	51.1%	44	31.2%
8 th	37	AASL	26	58.6%	31	51.3%	28	26.3%
8 th	37	CCSS	8	65.2%	6	50.0%	16	39.6%

Table 4.23 Percent Matched of Standard Statements by Grade Level and Type

Table 4.24 shows a summary of all standards without regard to grade level as they were matched to the grade level intended by the authors of the standard statements.

Type of Standard	N of Standards	% Matched
All Standards	115	46.7%
AASL	85	45.4%
CCSS	30	50.5%

Table 4.24. All Teachers and all Grade Levels of Standard Statements

4.4.2.6 Rank order of Standard Statements Divided by Quartiles

Ranking all the standards statements from most frequently matched to the intended grade level to least frequently matched shows a clear difference between standard statements intended for Second grade and standard statements intended for Eighth grade. Table 4.24 shows a quartile ranking of all the standard statements after they were ranked in order by percentage of most frequently matched to least frequently matched. The data in this table is based on the assumption that standard statements would be matched incorrectly at equal frequencies across grade levels.

Thus the total number of correctly matched standards statements should be proportionate across all three grade levels.

Percentile Rankings	Grade 2		Grade 5		Grade 8	
	Observed Value	Expected Value if evenly distributed	Observed Value	Expected Value if evenly distributed	Observed Value	Expected Value if evenly distributed
76 – 100%	20	8.4	3	9.2	5	10.9
51 – 75%	4	8.4	18	9.2	7	10.9
26 – 50%	8	8.4	14	9.2	7	10.9
0 – 25%	2	8.4	2	9.2	25	10.9
N of standard statements	34	n/a	37	n/a	44	n/a

Table 4.24 Distribution of standard statements by grade level and quartile.

Table 4.24 clearly shows the difference between the grade levels of the standard statements, but especially between second grade and eighth grade. Table 4.24 shows that 20 of the 34 second grade standard statements were in the top quartile of the correctly matched standards statements. It also shows that 25 of the 44 eighth grade standard statements were in the bottom quartile. A chi-square test indicates that the difference between the observed values and expected values is significant at the 0.05 level (Chi squared = 68.2, df = 6, $p < 0.05$).

4.4.3 NBCTs’ Ratings of Standard Statements as Important to Teach and Developmentally Appropriate

The second part of the survey asked the participants to rank each standard statement as “Important to Teach” and as “Developmentally Appropriate to Teach” at the intended grade level. NBCT’s selected the grade level of the standard statements (2, 5, or 8) based on their own evaluation of which grade level was closest to their level of expertise.

This section discusses the standard statements from both the AASL and CCSS and how the survey participants ranked the standard statements for their importance to teach at the particular grade level and for the standard statements developmental appropriateness for the grade level. The top ten and bottom ten results are reviewed at each of the three grade levels in the study.

The “Important to Teach” and “Developmentally Appropriate to Teach” were highly correlated at each grade level. The final section at each grade level contains a scatter plot and a correlation calculation for the two variables.

4.4.3.1 Standard Statements included in the Important to Teach and Developmentally Appropriate Section of Survey

A total of 121 standard statements were included in this section of the survey. This number differs from the number of standards (115) statements in the section of the survey where the participants matched the standards to the grade level intended by the originators of the standards statements. This difference is due to the duplication of some CCSS standard statements at multiple grade levels. For the matching portion of the survey, standards were only included once at the earliest intended grade level. Table 4.25 shows the number of standard statements included in section two of the survey.

Grade Level	Number of AASL	AASL %	Number of CCSS	CCSS %	Total
2	26	74%	9	26%	35
5	31	78%	9	23%	40
8	28	61%	18	39%	46
Total	85	70%	36	30%	121

Table 4.25 Number of Standard Statements by type included in Important to Teach and Developmentally Appropriate Section of Survey

4.4.3.2 Second Grade Standard Statements Rated as Important to Teach and Developmentally Appropriate to Teach

Participants were asked to rate 35 Second grade standard statements for “Important to Teach” on a scale of Strongly Disagree – Disagree – Agree – Strongly Agree. These statements were then coded as 1 for Strongly Disagree, 2 for Disagree, 3 for Agree, and 4 for Strongly Agree. The 35 standard statements consisted of 26 (74%) from the AASL and 9 (26%) from the CCSS. Twenty-seven of these grade 2 standard statements had an average score of 3.03 or high for “Importance to Teach.” Only seven of the standard statements were scored below 3.0 and none were less than 2.0.

Standard Statements were also given a similar rating for the “Developmentally Appropriate to Teach” at second grade. All of the top ten standard statements had a rating of 3.7 or higher. The bottom ten scores in this category ranged from a low of 2.59 to 3.15. A total of seven of these standard statements received a mean score below 3.0. Nine of the ten standard statements in this list were from the AASL, while only one was from the CCSS.

4.4.3.3 Relationship between Important to Teach and Developmentally Appropriate to Teach at Second Grade.

Figure 4.7 shows a scatter plot comparing the mean scores of the Second grade standard statements for “Developmentally Appropriate to Teach” and “Important to Teach.” It is clear from the scatter plot that the scores for these two variables move together.

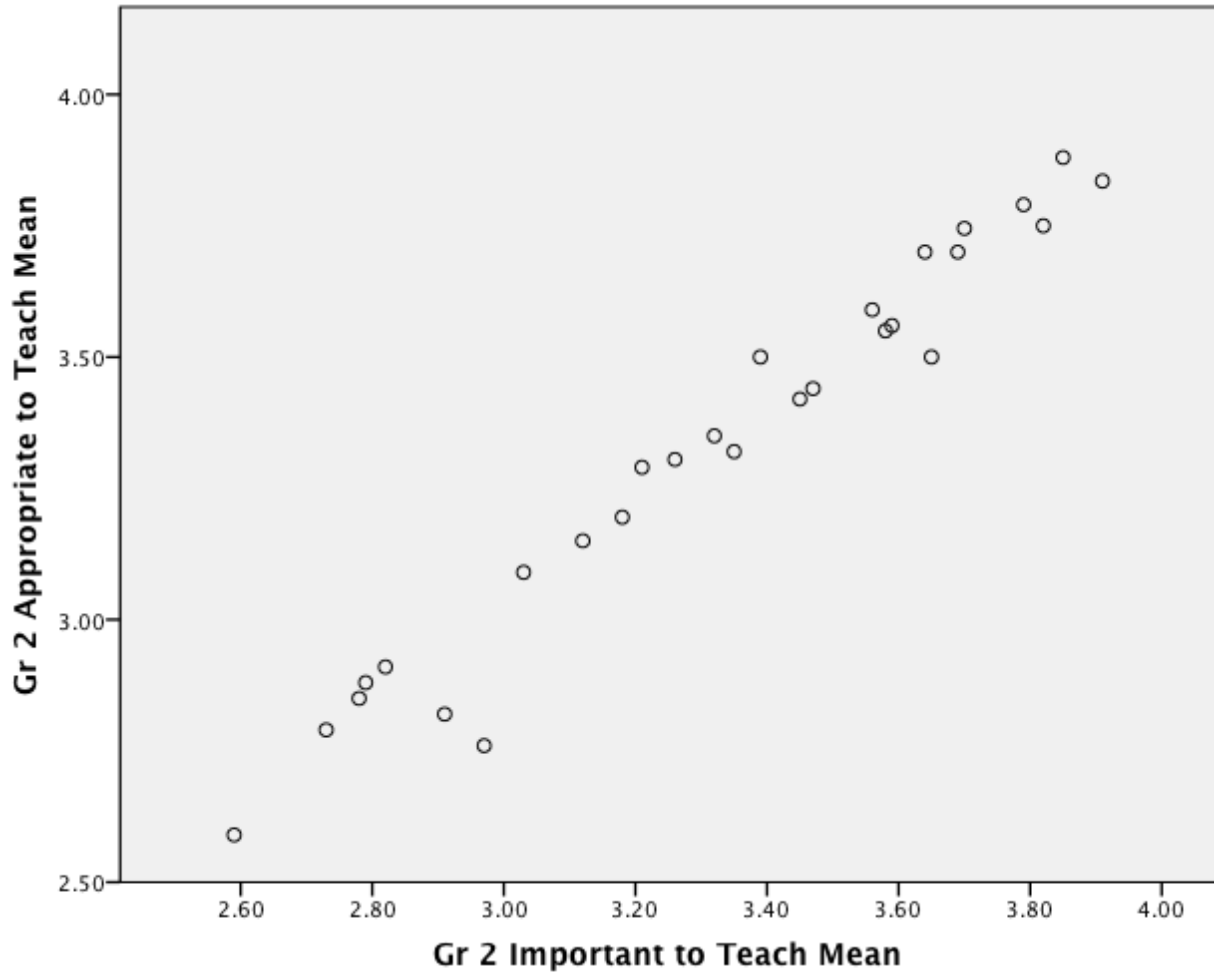


Figure 4.7 Scatterplot of Mean scores for Grade 2 Importance to Teach and Developmentally Appropriate to Teach.

A Pearson Correlation was calculated for the relationship between “Important to Teach” and “Developmentally Appropriate to Teach” to teach for the Second grade standards. The results of this calculation are shown in Table 4.26.

		Gr 2 Appropriate to Teach Mean	Gr 2 Important to Teach Mean
Gr 2 Appropriate to Teach Mean	Pearson Correlation	1	.980**
	Sig. (2-tailed)		.000
	N	35	35

Gr 2 Important to Teach Mean	Pearson Correlation	.980**	1
	Sig. (2-tailed)	.000	
	N	35	35

** . Correlation is significant at the 0.05 level (2-tailed).

Table 4.26 Correlation between Second Grade Appropriate to Teach and Important to Teach.

The Pearson correlation is .980 and is significant at the 0.05 level.

4.4.3.4 Fifth Grade Standard Statements Rated as Important to Teach and Developmentally Appropriate to Teach

Participants were asked to rate the Fifth grade standard statements for both “Important to the Teach” and “Developmentally Appropriate to Teach” on a scale of Strongly Disagree – Disagree – Agree – Strongly Agree. These statements were then coded as 1 for Strongly Disagree, 2 for Disagree, 3 for Agree, and 4 for Strongly Agree. There were a total of 40 Grade 5 standard statements that were rated on the “Important to Teach” variable. All 40 were ranked at 3.13 or higher. There were no standards below 3.0. The mean scores for the Grade 5 standard statements being ranked on “Developmentally Appropriate to teach ranged from a high of 3.71 to a low of 3.09. Only seven of the standard statements had a survey respondent select “Strongly Disagree” as a rating. These were seven different standard statements, thus 33 of the 40 standard statements received nothing lower than a “Disagree” rating. The highest number of marks for the category “Disagree” was five (out of 24).

4.4.3.5 Relationship between Important to Teach and Developmentally Appropriate to Teach at Fifth Grade

Figure 4.8 shows a scatter plot comparing the mean scores of the Fifth grade standard statements for “Developmentally Appropriate to Teach” and “Important to Teach.” It is clear from the

scatter plot that the scores for these two variables move together, although not as linearly as in the Grade 2 scatterplot.

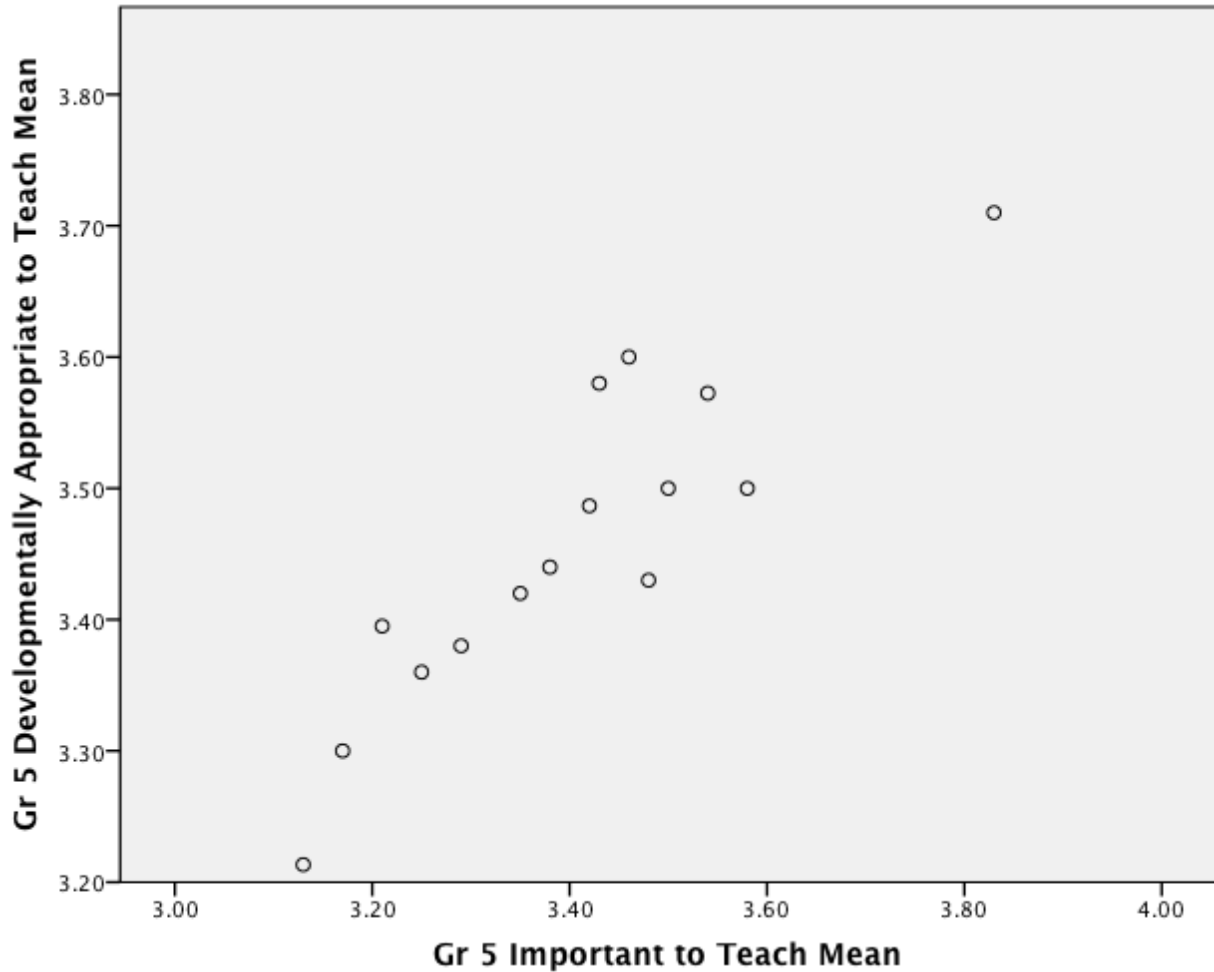


Figure 4.8 Scatterplot of Mean scores for Grade 5 Importance to Teach and Developmentally Appropriate to Teach.

A Pearson R was calculated for the Grade 5 “Important to Teach” and “Developmentally Appropriate to Teach” variables. A correlation coefficient of .779 resulted. Table 4.27 shows this calculation.

		Important to Teach Mean	Developmentally Appropriate to Teach Mean
Important to Teach Mean	Pearson Correlation	1	.779**
	Sig. (2-tailed)		.000
	N	40	40
Developmentally Appropriate to Teach Mean	Pearson Correlation	.779**	1
	Sig. (2-tailed)	.000	
	N	40	40

** . Correlation is significant at the 0.05 level (2-tailed).

Table 4.27 Correlation between Fifth Grade Appropriate to Teach and Important to Teach.

The Fifth grade standards are not as highly correlated as the Second grade standards, yet there is still a clear linear relationship.

4.4.3.6 Eighth Grade Standard Statements Rated as Important to Teach and Developmentally Appropriate to Teach

The total number of standard statements rated by participants was 46. The standard statements consisted of 28 from the AASL and 18 from the CCSS. The overall mean scores ranged from a high of 3.81 to a low of 2.97 for “Important to Teach,” indicating virtually all participants thought all the standards were important to teach at eighth grade. Six of the top ten standard statements were from the AASL and four were from the CCSS. The bottom 10 standard statements on “Important to Teach” for the Eighth grade had a mean score ranging from 3.23 to 2.97. Since 3.0 is equal to “Agree,” these scores indicate that virtually all of the survey participants who ranked the Eighth grade standard statements, agreed with importance of teaching the standard statements.

The overall mean scores on the “Developmentally Appropriate to Teach” measurement ranged from a high of 3.76 to a low of 3.13. The bottom ten scores range from a low of 3.13 to 3.33. Ten of the standard statements received no scores of either Strongly Disagree or Disagreed and there were only eight total scores of “strongly disagree” out of all 40 standard statements. Not a single standard statement had a mean score of less than 3.13, thus indicating a rating of “Agree” for all eighth grade standard statements as being developmentally appropriate. These findings sharply contrast with the findings in the matching part of the survey where the Eighth grade standards were matched at no better than random chance. This will be discussed more fully in Chapter Five.

4.4.3.7 Relationship between Important to Teach and Developmentally Appropriate to Teach at Eighth Grade.

Figure 4.9 shows a scatter plot comparing the mean scores of the Eighth grade standard statements for “Developmentally Appropriate to Teach” and “Important to Teach.” It is clear from the scatter plot that the scores for these two variables move together, although, like the Grade 5 means, they are not as aligned as the means of the Grade 2 standard statements.

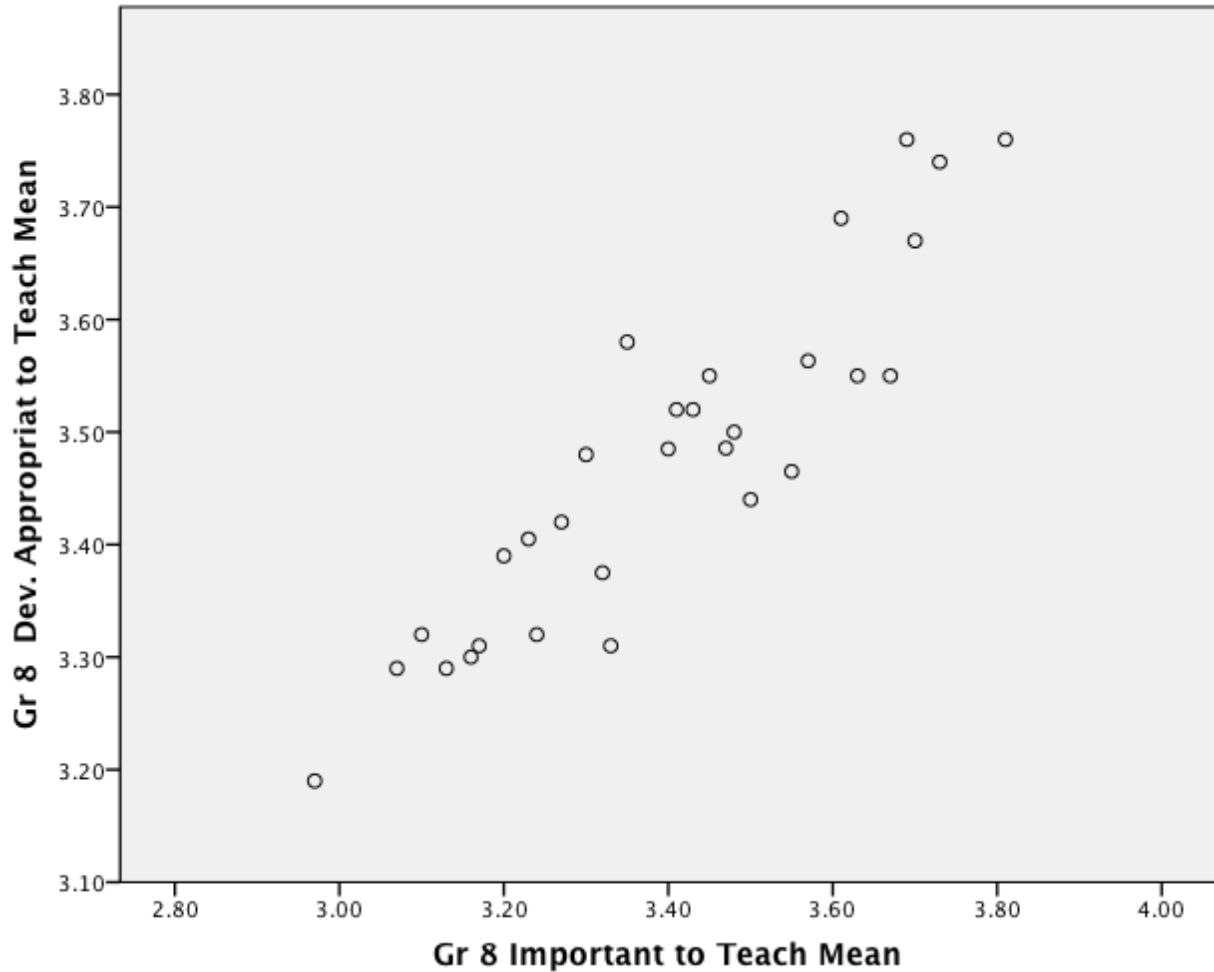


Figure 4.9 Scatterplot of Mean scores for Grade 8 Importance to Teach and Developmentally Appropriate to Teach.

Table 4.28 shows the Pearson correlation calculation for the means of the Developmentally Appropriate to Teach and Important to Teach at Grade 8. The coefficient between the two means is 0.816.

	Dev. Appropriate to Teach Mean	Important to Teach Mean
Dev. Appropriate to Teach Mean	1	.816**
Pearson Correlation		

	Sig. (2-tailed)		.000
	N	46	46
Important to Teach Mean	Pearson	.816**	1
	Correlation		
	Sig. (2-tailed)	.000	
	N	46	46

** . Correlation is significant at the 0.01 level (2-tailed).

Table 4.28 Correlation between Eighth Grade Appropriate to Teach and Important to Teach.

4.5 Focus Groups

Four focus groups were held following collection of the survey data with a goal of providing interpretation of and insight into the survey results. Twenty-one teachers participated in the focus groups. A broad range of schools was represented both in terms of size and geographic location. Teachers from schools in eastern Washington, (Kennewick and Riverside) western Washington (Renton, Kirkland, and Issaquah), the Olympic Peninsula (Chimacum), Seattle, and north to the Canadian border (Bellingham and Ferndale) were represented in the focus groups. Members of the focus groups were recruited from the survey participants, thus all members of the focus groups were National Board Certified Teachers. All four focus groups were conducted on-line using Adobe Connect through the Information School of the University of Washington. The first focus group was done using the visual and audio capabilities of Adobe Connect along with the sharing of documents. Focus groups two, three, and four were done with all participants communicating via text and with document sharing by the focus group facilitator. The change to text-based rather than audio/video was made due to participants' difficulties in manipulating the Adobe Connect interface. Not all participants were able to use the audio and or video. In order to not lose members of the focus group while the facilitator was trouble shooting audio/video difficulties for one or two members, the facilitator decided to use the text only mode. The audio

from the first group was transcribed for analysis; the content from the other three focus groups was in text format and thus did not need to be transcribed prior to analysis.

4.5.1 Makeup of the Focus Groups

The first Focus Group was held on January 27, 2014. Table 4.29 shows information about the participants

Members	Grade Taught	Teaching Notes	Location
Jan27-1	8	Language Arts	Kennewick
Jan27-2	Elementary	Librarian	Seattle
Jan27-3	2	-	Pullman
Jan27-4	4	-	-

Table 4.29 January 27, 2014 Focus Group Members

The second Focus Group was held on February 10, 2014. Table 4.30 shows information about the participants.

Members	Grade Taught	Teaching Notes	Location
Feb10-1	4/5	Combination grade	Renton
Feb10-2	6-8	Middle School Language Arts	Rochester
Feb10-3	4/5	Highly Capable	Federal Way
Feb10-4	Elementary	Librarian	Issaquah
Feb10-5	1, 2, 3	Special Education	-
Feb10-6	K-2	Special Education	Chimacum

Table 4.30 February 10, 2014 Focus Group Members

The third Focus Group was held on February 19, 2014. Table 4.31 shows information about the participants.

Members	Grade Taught	Teaching Notes	Location
Feb19-1	6-8	Science	Kirkland (Lake Washington S.D.)
Feb19-2	7	Earth Sciences	Issaquah

Feb19-3	3-4	Additionally, ELL for District	Riverside S. D., north of Spokane
Feb19-4	2	-	Ferndale
Feb19-5	2	-	Lake Washington

Table 4.31 February 19, 2014 Focus Group Members

The last Focus Group was held on May 5, 2014. Table 4.32 shows information about the participants

Members	Grade Taught	Teaching Notes	Location
May5-1	4/5	Combination grade	Kent
May5-2	5	International Baccalaureate School	Bellingham
May5-3	2	-	Seattle
May5-4	3	-	North Bend
May5-5	5	Literacy	Everett
May5-6	8	Science	Federal Way

Table 4.32 May 5, 2014 Focus Group Members

4.5.2 Focus Group Findings

Focus group transcripts were analyzed and coded by the researcher. The purpose of the focus groups was to serve an explanatory role for the findings from the survey of National Board Certified Teachers.

One goal of the focus groups was to develop an explanation of why certain standards were matched to the grade level intended by the authors of the standards at a high rate and why teachers were unable to match other standard statements to their intended grade level. There were several facets to the focus groups' responses when this question was posed. The primary answer was that standard statements that dealt with foundational skills (related descriptors included "basic" and "concrete skills") were placed at second grade. Standards that dealt with more complex skills were often thought to belong at eighth grade. However, many of the eighth grade standard statements were too vague or general for this pattern to work consistently, thus

the eighth grade standard statements were difficult to match to their intended grade level. The vague nature of some standard statements led some of the focus groups members to state that the skill described in the standard statement was a skill they taught at second, fifth, or eighth grade.

The focus groups provided input on standard statements rankings as developmentally appropriate or important to teach especially at second grade. The results of the survey indicated that, for both the fifth and eighth grade standard statements, all the standard statements had overall rankings at or above “2.97” (3 = Agree). This was true for both the developmentally appropriate and important to teach categories. However, there were second grade standards that had a mean score of less than three. The focus groups emphatically agreed that the standard statements concerning social networking skills were inappropriate for second graders. Some members of the focus group commented that parents would not approve of these skills even for fifth graders. Focus groups members generally thought that the technology skills asked of second graders were developmentally inappropriate. One focus group member commented that the use of technology in testing is driving some skills to a lower grade level. Another focus group member said, “I think about the fact that my second graders can’t learn to type until they know all of their letters.” It appeared to focus group members that certain skills are migrating to lower grades without thought as to whether or not the skills are developmentally appropriate at the lower grades.

A finding that was not directly related to the research questions, but that came up consistently in the focus groups, was that of equitable access to technology. The lack of equity has two sides to it, one is the lack of resources in the schools, especially in the lower grade levels, to implement the standard statements requiring technology. One focus group member said that the three computer labs in her school (1000 students) were tied up for “much of the year” for testing

puposes. The second side is the lack of technology in the homes of many students resulting in many students needing to be taught basic computer skills before they can be taught the standard statements' skills involving technology.

Lastly, one comment from a focus group participant that stood out as a means for elucidating this research project was, "However, shouldn't everyone be able to understand and "match" and make sense of the standards? Don't we want parents to understand these standards, too, so that they can further support their own child?"

4.6 Summary

This chapter has described the findings from all three phases of the research project. In the qualitative analysis phase (Phase One) of the research project the lack of specific stages of the Big6 information problem solving process (Task Definition (Stage 1), Information Seeking Strategies (Stage 2), and Evaluation (Stage 6)) in the Common Core Standards Statements indicate that the CCSS are lacking in important areas needed for a 21st century education. While all six stages of the Big6 were present in the AASL, the standard statements were mostly concentrated in Use of Information (Stage 4) and Synthesis (Stage 5), with both Task Definition and Evaluation being present in less than 10% of the standard statements.

Additionally, findings from the content analysis of the standard statements indicated that 14.1% of the AASL and 29.7% of the CCSS standard statements were rated as "Overly complex, wording is confusing, or easily confuses the reader." When looking at the number of tasks involved in each standard statement, the research project found that the CCSS averaged 5.53 tasks per standard statement and the AASL had a means score of 2.91 tasks per standard statement.

The Phase Two survey results indicated that expert experienced teachers as represented by NBCTs in the state of Washington could not consistently match randomized standard statement to within two grade levels of the grade level intended by the standard statements authors. At the eighth grade level, NBCTs matched the standard statements at a rate no better than random chance (Table 4.17). The power of the mixed method design allows for bringing to bear qualitative input to provide insight into the quantitative findings. In this case three findings from the qualitative area of research appear applicable. First the focus group input indicated that the second grade standards were easiest to place because they tended to deal with simpler tasks or concepts. When these simpler tasks/concepts were viewed they were placed at second grade (although the participants still matched 33% of the second grade standards to either fifth or eighth grades). When more complex standards were seen on the survey, focus group members reported that they thought, “my kids could do that with scaffolding” and so often identified the standard statement as being appropriate for a lower grade. Secondly, the task count index showed that the average standard statement had 3.7 separate tasks. This was another item the focus groups identified as leading to confusion when asked to match the standard statements to the intended grade level. Simply put, the high number of tasks contained by the standard statements caused teachers to question what was really intended and thus uncertainty as to what grade level to place it. Third, 59% of the standard statements were rated less than “clear and easy to understand.” When these three findings are combined, it is perhaps not surprising that the standards were not matched at a higher rate to the grade level intended. These findings offer emphasis for Kendall’s (2001) advice to the authors of standards statements – be clear, be precise.

When asked to rate standard statements at their own grade level for both developmental appropriateness and importance to teach, the NBCTs tended to agree with both the developmental appropriateness and the importance to teach of the standard statements. The exception was at second grade where seven standard statements averaged below a 3.0 (Agree) rating for both importance to teach and developmental appropriateness. The focus groups did not offer any insight here. Feedback from the focus groups on this portion of the survey centered around the second grade standards that scored poorly in this area. The consensus of the focus groups was that these items should not be at second grade. However, a possible explanation of this discrepancy arises from the focus group finding that teachers believe with appropriate scaffolding many of the items intended for higher grade levels can be taught to their students. Thus when looking at standards which they told were from their grade level, they were generally predisposed to agree with both the developmental appropriateness and the importance to teach. Teasing out this discrepancy, where knowing the grade level of a standard statement led to agreement with developmental appropriateness, while not knowing the intended grade level led to placement at different grades, is an item for future investigation.

The four focus groups provided explanatory input regarding the survey results. Focus groups indicated that the standard statements that referred to basic or foundational skills were the easiest to match to the intended grade level. One reason standard statements were not placed as intended by the authors of the standard statements was that the standard statements were vague or too general and thus were often seen as being able to be taught at any level in the curriculum.

5. Discussion and Implications

5.1 Introduction

This study sought to examine the developmental differences in information problem solving in school children as manifested in two sets of educational standards, those of the American Association of School Librarians (AASL) and those of the Common Core State Standards (CCSS). Standard statements from grades two, five, and eight were sorted into the stages of the Big6 information problem solving model. A content analysis reviewed these standard statements for clarity of writing and the number of tasks involved in each standard statement. The views of expert, experienced practitioners were sought to see to what extent they agreed with the developmental appropriateness and importance to teach of these standard statements. National Board Certified Teachers (NBCTs) in the state of Washington were chosen as representatives of expert, experienced practitioners in the field of education. The NBCTs completed a survey that asked them to assign randomly sorted standards statements to the grade level intended by the standard statements authors and in a separate section to indicate their level of agreement with the developmental appropriateness and important to teach of standard statements nearest to their grade level of expertise. Four focus groups, comprised of volunteers from the survey respondents, provided explanatory information regarding the survey results.

This chapter is structured around the research questions and discusses each question in light of the findings described in Chapter Four.

1. What developmental differences in information problem solving abilities are reflected in educational standard statements as they relate to youth at different ages?

- a. To what extent are the developmental differences in information problem solving abilities reflected in educational standard statement as they relate to youth at different ages consistent with the judgments of expert, experienced teachers?
 - b. To what degree do standards statements deal with a single concept?
 - c. To what extent does clarity of writing impact interpretation of standards statements?
2. What developmental differences in information problem solving abilities do expert practitioners identify as they relate to youth at different ages?
 - a. To what extent do expert practitioners agree with the grade level appropriateness of individual education standards concerning information literacy?
 - b. To what extent do expert practitioners view the importance of individual education standards concerning information literacy?
3. How do information problem solving abilities, at different developmental levels, as reflected in educational standards (both subject area and information literacy), match those identified by expert practitioners? What areas are aligned and where are the gaps?

All three phases of the study, the content analysis, the survey of NBCTs, and the results of the focus groups, provide data for addressing the three sets of questions. Overall, the study found that educators did not consistently agree with the developmental levels assigned to information problem solving standards identified by AASL or CCSS. Additional key findings include the following points.

- Standard statements are of uneven quality, often leading to confusion among teachers.
- Specific standard statements frequently include more than one task or item (overall mean = 3.7; AASL mean = 2.9; CCSS mean = 5.5) which was both confusing and made the standard statements difficult to analyze from a developmental perspective.
- Consensus among subjects as to grade level appropriateness is highest (67%) for standards designated for second grade but decreases for those targeted for fifth grade (49%). Eighth grade standards were not matched to the intended grade level at a rate any better than chance (29%).
- Standard statements as currently written are insufficient to prepare students for the needs of the 21st century as they inadequately cover the full information problem-solving process, especially task definition and evaluation.
- Teachers believe standard statements should be clearly written and easily understandable for non-educators, including parents and students.

5.2 RQ 1. What developmental differences in information problem solving abilities are reflected in educational standard statements as they relate to youth at different ages?

The analysis of the standard statements took multiple forms. First, all standard statements at grades two, five, and eight from the AASL and CCSS were analyzed to determine whether or not each standard statement fit into a stage of the Big6 information problem and if so what stage.

Second, the standard statements that fit into a Big6 stage were analyzed for the number of tasks each standard statement contained, the clarity of writing for each statement was rated and finally the readability of the standard statements were assessed using the Dale-Chall Readability

formula. Additional information on the NBCTs views of the developmental appropriateness was obtained from the survey results and from responses in the focus groups.

RQ 1 has three sub-questions that are discussed below and will be summarized in section 5.2.4

5.2.1 Research Question 1, Sub-question 1:

To what extent are the developmental differences in information problem solving abilities reflected in educational standard statements as they relate to youth at different ages consistent with the judgments of expert, experienced teachers?

All three phases of the research process provided insight into this question. The results of the survey indicate that there is inconsistency between the views of the educational establishment, as represented by the standard statements, and the views of expert, experienced teachers, as represented by NBCTs. The NBCTs were able to match grade two standard statements to the grade level intended by the authors of the standard statements only 67% of the time. In other words, expert, experienced teachers who have received National Board certification failed to agree with the intended grade level of second grade standards 33% of the time when the other two choices for grade levels were three grade levels (grade five) and six grade levels (grade eight) away. As the grade level increased to 5th grade the NBCTs matched only 49%, and at 8th grade, the standard statements were matched at no better than random chance, 29%. On this measure it appears that there is some agreement at grade two (but again, not for 1/3 of the standards analyzed), but agreement decreases as grade level, and supposedly cognitive difficulty, increases, until at eighth grade, it is difficult to say any agreement exists between expert, experienced teachers and the authors of educational standards.

National Board Certified Teachers are expert and experienced practitioners. They have the highest level of certification available to teachers in the state of Washington and in the nation. This is an important point to remember. It is not possible to say whether the standards are “incorrectly” designated by the AASL or CCSS authors or that the NBCTs are unable to identify the appropriate grade level for tasks contained in the standard statements. Both groups, the authors of the standard statements and the NBCTs, have their areas of expertise, neither group is necessarily wrong, but we do have evidence that at grades 2, 5, and 8 there is a great deal of disagreement.

However, when NBCTs were directly asked to rate the standard statements that were closest to the grade level they taught, they generally selected “Agree” to “Strongly Agree” for “Developmental Appropriateness” and “Importance to Teach.” These two findings are contradictory and point towards issues of clarity of writing in the standard statements and the context of the presentation of the standard statements. NBCTs had difficulty identifying the standard statements to within three or six grade levels (i.e. second to fifth, fifth to eighth, or second to eighth) when examined in random order, but when examined at grade level, only a few (seven) standard statements at second grade and only one at fifth and eighth grade had a mean rating of less than 3.0 “Agree.” Input from the focus groups indicated that both clarity of writing and being out of context⁶ were issues with sorting the standard statements into the appropriate grade level. The focus groups provided no feedback on what would be a wide enough grade level spread to be able to place the standard statements into the appropriate grade level. Additionally, as mentioned in Chapter 4, feedback from the focus groups indicated that teachers are disposed

⁶ Out of context to the Focus Group members meant that the standard statements were viewed individually and not as part of the entire continuum of standard statements at a particular grade level.

to think they can teach many items to their own students with appropriate scaffolding. Thus being told the grade level may have led teachers to think, “This is an item I could teach my students by differentiating instruction and providing the necessary scaffolding.”

The content analysis found that standard statements are not clearly articulated with regards to information literacy skills. A concept or specific skill in a standard statement at second grade is not necessarily continued at increasing levels of difficulty in the higher grades. This makes it difficult to examine one concept or skill from second grade to fifth grade to eighth grade and judge the level of increasing difficulty. As a result, it cannot be said that developmental differences in problem solving abilities are consistently reflected in standard statements.

Focus group comments supported this. One participant, a seventh grade teacher, commented, “It is interesting to me that at the elementary level, the CCSS seems SO rigorous, but at the 8th grade level seems still so basic.”

The content analysis found that the standard statements do not consistently articulate a clear series of increasingly challenging steps in information problem solving ability of students. NBCTs could not consistently place randomized standards at the intended grade level, yet considered standards at their own grade level to be appropriate to teach. Considering these inconsistencies, it must be reported that there appears to be limited agreement between expert, experienced teachers and the standard statements concerning developmental differences in information problem solving abilities when the teachers do not know the intended grade level. When it is clear to teachers what the grade level is they agreed with the developmental appropriateness of the standard statements. However, when NBCTs do not know the grade level in advance, when they are asked to place random standard statements standing alone into the

intended grade level, the teachers had quite different ideas about where the standard statements should be placed. These findings point to a need for further research. For instance, how would expert experienced teachers rate the developmental appropriateness of eighth grade standards if they were presented as either fifth grade standards or second grade standards? Would NBCTs be able to correctly sort standards that were separated by four or five grade levels instead of three?

5.2.2 Research Question 1, Sub-question 2:

To what degree do standard statements deal with a single concept?

Determining the number of tasks in each standard statement was the method used to operationalize this question. Multiple coders reviewed the standard statements and counted the tasks. The Common Core standard statements that were a part of the survey of NBCTs had a mean of 5.5 separate tasks per standard statement. The AASL standards had a mean of 2.9. The combined standard statements had a mean of 3.7 tasks per standard statement. Counting the number of tasks in each standard statement is only a rough approximation of the number of concepts involved in each standard statement. It was chosen because it was an objective way of determining the number of different activities involved in a standard statement.

Kendall argues there is no “grain size” of a benchmark that can be described in absolute terms. Benchmarks according to Kendall should, “be specific enough that readers are clear about the instruction and learning it should entail, but not so narrow as to prescribe the day-to-day curriculum nor so broad that the knowledge and skills it describes could be open to numerous equally valid interpretations” (2001, p. 3).

The CCSS’ average number of tasks appears to exceed Kendall’s statement while the fewer number of tasks in the AASL standard statements is more in keeping with this guideline. Focus

group feedback indicated that the issue of multiple tasks in the standard statements was a key factor in not being able to identify the intended grade level of a standard statement. The number of tasks involved led to confusion concerning what was the main activity the standard statement was asking students to do.

5.2.3 Research Question 1, Sub-question 3:

To what extent does clarity of writing impact interpretation of standard statements?

The writing of the standard statements was analyzed for clarity through three separate methods. First, the standard statements were analyzed for their reading level utilizing the New Dale-Chall reading formula. Second the standard statements were analyzed for the number of tasks each one contained. And, third the standard statements were given a clarity rating by the analysis team members.

The findings from the three methods provided information from different viewpoints. The Dale-Chall reading formula is meant for blocks of text not short sentences, thus not all of the standard statements returned a Dale-Chall score. Lumping the standard statements together and analyzing them in a group resulted in a score of 8.6, grades 11-12, for the Common Core standard statements and a score of 9.2, grades 13-15, for the AASL standard statements. The grade levels should be well within the reading capability of NBCTs and thus does not provide evidence that there is an issue with the clarity of the standards. If the standard statements are to be comprehensible to parents and students, these reading levels may be too high.

The second method of analyzing the standards for clarity was coding the statements for clarity. Each of the standard statements were coded by two different coders on a three-point scale for clarity (see Table 4.32). These scores were then correlated with each standard statements number

of correct matches from the survey of NBCTs. The correlation coefficient was, calculating using Spearman's coefficient, 0.123, indicating little correlation between the two variables.

However, while there is no statistical correlation between the results of the survey and the clarity and task count measures, there is a qualitative argument to be made based on the frequency counts of standard statements that were rated at less than clear and easily understood. All standard statements should be clear, well written and easily understandable (Kendall, 2001). As was pointed out in the focus groups, standard statements should be comprehensible to those who are not professional educators, especially parents and students. Table 4.9 (page 146) indicates issues with both sets of standard statement. The AASL has a total of 52 out of 85 (61%) standards rated at two or one, and 12, or 14%, were rated as a one. The CCSS has a slightly smaller percentage at two or one combined, 54% (20 out of 37), but has over double the AASL percentage (29%) ranked at one. Because there are a high number of standard statements that are ranked at less than, "clear and easy to understand," unclear writing can be said to have negatively impacted the standard statements.

In planning this study it was thought that the data related to answering this research question would come from the qualitative analysis of the standards. In retrospect it would have been an excellent question to ask on the survey. The question was raised in the focus groups and all the focus groups affirmed that the clarity of writing was an important component of the difficulty in interpreting the standard statements.

Issues having to do with the clarity of the standard statements were a key area of reasons for the lack of agreement on grade level placement that emerged from the focus groups discussions.

When asked what qualities of the standard statements made the standard statements the most

difficult to match to the intended grade level, focus group members indicated the following issues with the clarity of the standard statements, multiple tasks in one standard statement, the task in the standard statement was unclear, the standard statement itself was confusingly written, the standard statement could be applied to multiple grade levels, scaffolding could make the skill in the standard statement applicable to an earlier grade level, no skill level was indicated leading to confusion over whether the standard statement was meant to introduce a skill or to develop mastery, the standard statement was too general, and finally, the skill described was not specific to one grade level.

5.2.4 RQ 1 Summary

Limited agreement on matching standard statements to their intended grade level, multiple tasks in each standard statement, unclear writing, and inconsistencies in the task/s being required indicate that developmental differences in information problem solving skills are not clearly reflected in these two sets of standards statements. As a result educators are frequently confused concerning what the standard statements intend and what grade level the standard statements are intended.

5.3 RQ 2. What developmental differences in information problem solving abilities do expert practitioners identify as they relate to youth at different ages?

The research project examined this question in two ways. First, the question was addressed by the NBCTs participating in the survey who were asked to match the randomized standard statements to their intended grade level. Second, the question was directly addressed by asking the NBCTs to rate the standard statements at their grade level on both “importance to teach” and “developmental appropriateness” on a four point scale, “Strongly Disagree,” “Disagree,”

“Agree,” to “Strongly Agree.” The RQ 2 sub-questions will be addressed simultaneously as the results were similar. Section 5.3.3 will provide a summary response to RQ 2.

5.3.1 Research Question 2, Sub question 1:

To what extent do expert practitioners agree with the grade level appropriateness of individual education standards concerning information literacy?

5.3.2 Research Question 2, Sub question 2:

To what extent do expert practitioners view the importance of individual education standards concerning information literacy?

When asked to rate standards statements on a four point scale ranging from Strongly Disagree, Disagree, Agree, to Strongly Agree, teachers generally chose “Agree” to “Strongly Agree” for both the importance to teach and the developmental appropriateness of the individual standard statements from both sets of standards for both grades five and eight. Grade two results were more mixed with 7 of 34 or 20.5% of the standard statements receiving an average score of less than three (see the Appendices for full lists of rankings at each grade level). No standard statement had a majority of responses in the combined “Strongly Disagree” and “Disagree” categories, and only one had a plurality of responses in these two categories. The lowest scoring second grade standard statement was the same for both “developmentally appropriate to teach” and “important to teach.” This AASL standard statement was, “Use social networks and information tools to gather and share information. Experiment with online catalog and Web resources to locate information.” All four focus groups expressed concerns about second graders (or fifth graders) using social media, did not think it was developmentally appropriate, and thus was not important to teach.

At the same time, NBCTs matched these same standards to their intended grade levels at only 67% of the time for second grade, 49% of the time for fifth grade, and 29% for the time for eighth grade.

5.3.3 Research Question 2 Summary

These two portions of the survey show a disconnect between the NBCT's abilities to match the standard statements to the intended grade level and then looking at standard statements at their own grade level and consistently rating these same standards as important to teach and developmentally appropriate. Focus group comments indicated that being out of context was one issue with placing the standards at their intended grade level. Being out of context does not wholly explain the survey results as NBCTs were much more able, regardless of grade level, taught to place grade two standard statements at the intended grade level and much less able to place grade eight standard statements at the grade level intended by the authors of the standard statements. These contradictory findings indicate an area for further research that will be discussed more fully below. One of the basic assumptions in this research project is that standard statements should be written clearly enough that expert, experienced teachers (NBCTs) can tell the difference between standards that are aimed at grade levels three years apart. The inconsistent findings of the survey indicate that this assumption may be incorrect. However, the qualitative portion of the research indicated that many of the standard statements are unclearly written and contain multiple tasks which made the standard statements difficult to place at a grade level. These issues confound the findings and point to the standard statements as the source of the inconsistencies.

This research project has identified inconsistencies in both the NBCTs responses and the clarity of the standards statements. At this time it is not possible to say whether the inconsistencies in

the NBCTs' agreement with the developmental appropriateness of the standard statements are due to the standard statements lack of clarity and inappropriate grade level placement, or if this task of matching randomized standard statements is beyond the ability of expert experienced teachers. However, regardless of the NBCT's ability to place the standards at the intended grade level, this research does show that standard statements contain multiple issues that should be corrected if they are to clearly communicate to all stakeholders what students in grades two, five and eight should be capable of doing when addressing information literacy problems.

5.4 Research Question 3. How do information problem solving abilities, at different developmental levels, as reflected in educational standards (both subject area and information literacy), match those identified by expert practitioners? What areas are aligned and where are the gaps?

NBCTs had the greatest agreement with the standard statements at grade two when asked to match randomized standard statements, while they were only able to match eighth grade standard statements at a level equivalent only to random chance. Based on this one could say that the NBCTs had the greatest agreement with the placement of information problem solving abilities at second grade. However as pointed out above, the second grade standard statements also had the greatest number of standard statements that NBCTs disagreed with the developmental appropriateness when asked directly about each standard statement and NBCTs overwhelmingly marked grade five and grade eight standard statements as being appropriate to teach and developmentally appropriate.

These contradictory findings and the focus groups both indicate that viewing the standard statements out of context as one potential cause of the inconsistencies. However, if standard statements are going to follow a spiraling pattern of increasing difficulty, of the same tasks becoming increasingly more complex as students revisit the task at successive grade levels, then

standard statements should clearly express this increasing difficulty. And, if this increasing difficulty is clearly expressed, expert experienced teachers should be able to differentiate between standard statements three and six grade levels apart. Since this was not the case, we are led back to the finding of the content analysis and focus groups that the standard statements' number of tasks and clarity of writing were issues that led to confusion over the intent of the standard statements.

5.5 Additional Findings

This section describes findings from the research project that go beyond addressing the main research questions. All three phases of the research project provided findings that provided information that exceeded the research questions. This section describes those findings.

5.5.1 Strengths of the AASL and CCSS Standard Statements

The analysis of standard statements from the AASL and CCSS provided insights into the general strengths and weaknesses of both the CCSS and AASL standard statements beyond developmental appropriateness.

All six stages of the Big6 information problem solving process were represented in the AASL standard statements. The Big6 stage of Synthesis was well represent in both the CCSS and in the AASL standard statements.

5.5.2 Limitations of the AASL and CCSS Standard Statements

The three stages of Task Definition, Information Seeking Strategies and Evaluation were found to be missing from the CCSS and disproportionately limited in the AASL.

5.5.2.1 Inadequate Coverage of the Information Problem Solving Process

Cognitive Psychology defines problem-solving as having four basic elements: a goal, obstacles preventing one from achieving the goal, strategies for overcoming the obstacles, and an evaluation of the process, i.e., was the goal achieved (DeLoache et al., 1998). This definition of problem-solving can be mapped to the information problem-solving model. Equating the goal to the recognition that information is needed, the obstacles are the need to locate, evaluate, and use information, the strategies are the acts of locating, evaluating and using information and the final phase, evaluation, remains the same as in the Cognitive Psychology model, describing the evaluation of the process and the product. This research project, as noted earlier, has operationalized the information problem solving process through the application of the Big6 information problem-solving method. This research project's analysis of the standard statements from the CCSS and the AASL found the three stages, Task Definition, Information Seeking Strategies, and Evaluation were completely missing in the CCSS. These same stages were underrepresented in the AASL standard statements. As a result the standard statements from both the AASL and CSS may be inadequate for preparing students for a 21st century education/world.

5.5.2.2 Lack of Task Definition

Two of the four steps as defined by Cognitive Psychology in problem solving are identifying the problem and evaluating success of solution and the process. According to Eisenberg & Berkowitz (Eisenberg & Berkowitz, 1990): "Most people spend too little time on task definition. The tendency is to push ahead even though they have only a general or vague understanding of what it is they are seeking to accomplish. By spending time considering the information problem and then articulating a clear understanding of (a) the information problem and (b) specific information needs related to that problem, people can move much more efficiently toward

solutions” (p. 6). Skill at the initial stage of the information problem-solving process is crucial to success, and that difficulty at this stage typically leads to inefficient and ineffective information behaviors in later stages of seeking, search, and use.

5.5.2.3 Lack of Evaluation

There is little attention paid to the culminating stage of the entire process – Evaluation. This is a key stage in which students decide whether or not the problem has been successfully solved and how successful they were in information problem-solving as a whole as well as in accomplishing each individual stage of the process. This differs from the concept of evaluation of information. “Evaluating information” is part of *every* stage of the information problem-solving process: determining the nature and scope of information as part of task definition, assessing various sources in information seeking strategies and also in location and access, considering accuracy, credibility, usefulness, and relevance in use of information, choosing and presenting information in synthesis, and evaluating information as part of assessing the product and the process.

5.5.3 Summary of Limitations of AASL and CCSS Standard Statements

The Partnership for 21st Century Skills (2009) argues that information literacy should be explicit in educational policy documents in order to prepare students for the future. The CCSS wholly lack three of the six stages of the Big6 information problem solving process, and both of the key stages of task definition and evaluation are underrepresented in the AASL standard statements. Thus both these policy documents may be inadequate for preparing students for the 21st century. Additionally it is recommended that any set of standard statements should explicitly address all stages of the information problem solving process.

5.5.4 Additional Findings from Focus Groups of National Board Certified Teachers

Four focus groups of NBCTs were convened. This section discusses the insights gained from the discussions with these expert, experienced practitioners.

5.5.4.1 Equity issues

Teachers in the focus groups expressed concerns that both sets of the standards lead to issues dealing with equitable access to technology. Many schools do not have the computer resources necessary for all their students to have the access these teachers see as necessary to develop competency in the skills demanded by the standards. Concern was expressed about the necessity of third graders doing keyboarding as part of an assessment.

5.5.4.2 The Need to Think About Standards as a Continuum

Many teachers expressed the idea that the standard statements describing tasks for older children (8th grade) were tasks that the students in their classrooms (2nd grade/3rd grade) could accomplish with the appropriate guidance. Some of these standard statements teachers simply thought of as misplaced, but other standard statements were viewed as a continuum in which mastery would be reached at higher grades and the standards would be introduced in earlier grades. This suggests that the organizations constructing standard statements may want to consider removing grade level benchmarks/indicators and publish the standards as a continuum with increasing difficulty and mastery expected at the conclusion of the continuum.

5.6 Project Limitations

This research study was limited to two sets of standards, the CCSS and the AASL. While these are important educational policy documents, the CCSS setting English/Language Arts and Mathematical standards for 43 states and the AASL setting information literacy standards for

Teacher/Librarians and schools, there are other important sets of standards that were not addressed. Other content area organizations, such as the National Council for the Social Studies (NCSS), the International Society for Technical Education (ISTE), the National Council of Teachers of English (NCTE) and the have written standard statements that remain to be examined for their coverage of the information problem solving process. Additionally this study was limited to grades two, five, and eight. These grades were chosen because these are the grades at which the AASL sets benchmarks and with the assumption that the separation in grade levels was great enough that expert, experienced practitioners, such as NBCTs, would be able to discern the difference between standard statements at a high level. The high school benchmarks were not examined in either the AASL or the CCSS. The information problem solving process may be more fully developed in those grade levels.

Only teachers who are National Board certified in the state of Washington were asked to complete the survey and to participate in the focus groups. Thus this study is unable to generalize beyond that group of teachers or beyond the state of Washington.

The survey response rate was also a limitation of this research. A total of 96 completed surveys were submitted. The population of NBCTs in the desired certification areas was 3774. This is a response rate of 2.5%. However, as the survey took approximation 40-50 minutes to complete, the results represent over 70 hours of input from NBCTs.

A significant limitation in trying to assess the standard statements as a method of demonstrating a coherent pattern of increasing cognitive difficulty as grade levels increased was that standard statements were not able to be consistently matched to the Big6 across grade levels. This made it

impossible to determine if all stages of the information problem solving tasks had incremental steps in becoming more challenging as grade level increased.

5.7 Future Work

Standard statements were presented out of context in the matching portion of the survey and the focus groups indicated this was a cause of difficulty in matching the standard statements to their intended grade levels. Future research could try to account for this by showing teachers all the standard statement in a given strand in random order, and then asking them to sort those into the intended grade level order.

Teachers responses tended to range from “Agree” to “Strongly Agree” in the survey portion asking them whether standards at their own grade level were “Developmentally Appropriate” and “Important to Teach.” Yet at the same time they did no better than random chance at identifying eighth grade standard statements when those standard statements were presented in random order and mixed with second and fifth grade standard statements. Future research could include a controlled experiment with teachers in order to more fully examine this phenomena.

The lack of consistency between NBCTs and the standard statements also points to the need for research in classrooms with children of differing ages/grade levels in order to seek out differences in children’s information problem solving abilities through collecting empirical evidence. This evidence would also provide data that would go towards constructing an empirically based developmental theory of information problem solving

5.8 Contributions

This research project makes contributions in the following areas: theory, methodology, and pedagogy.

5.8.1 Theoretical contributions

This research, through identifying areas of alignment and also areas where gaps exist between expert practitioners' judgments and educational standards, demonstrates the need for the establishment of a developmental theory of information problem solving. There is currently no developmental theory of information problem solving skills. Such a theory could be used both to inform practice and to guide the authorship of education standard statements that establish the curriculum for information problem solving in schools. A developmental theory of information problem solving would help to align the knowledge of both the authors of standard statements and that of the practitioners who implement these standard statements..

As mentioned above in section 5.7, this project points to the need for more empirical data to be collected on children's' abilities to solve information problems across differing ages. The differences found between the authors of the standard statements and the capability of NBCTs to place those standard statements at the intended grade level, indicates a need for more in-depth study of how children's' abilities to solve information problems changes as they mature.

5.8.2 Methodological contributions

A second area is a methodological contribution. Focus groups have been used as a source of data for a variety of topics in information science, but not for determining appropriate developmental levels of educational standards for information literacy. The focus groups in this research utilized NBCTs, as opposed to Library Media Specialists or Technology Educators. This is similar to research done by Gullikson (2006) in higher education but not previously done in information problem solving at these grade levels.

Using NBCTs to sort random standard statements is an additional methodological contribution. NBCTs have been used in other research studies but this appears to be one of the first in a study on information literacy standards. Additionally, although there is anecdotal evidence of sorting random standard statements as a workshop activity to familiarize teachers with standard statements, this appears to be a novel way of gathering evidence about the match between expert, experienced teachers' view of the appropriate grade level of the standard statements versus that of the grade level intended by the authors of the standard statements.

5.8.3 Pedagogical contributions

Third, the research indicates areas where the views of expert, experienced teachers tend to agree that the grade levels of standard statements are appropriate, providing evidence validating some of the information literacy standard statements. This provides support for instructional practices based on current standard statements where there was agreement between the authors of the standard statements and the NBCTs. The research also reveals inconsistencies between the views of expert, experienced teachers and the authors of the standard statements, indicating areas for further research.

5.9 Conclusions and Recommendations

There is considerable disagreement by expert educators concerning the concerning appropriate children's developmental levels designated in the the standard statements from the AASL and the CCSS related to information problem solving. NBCTs failed to consistently match the standards to the intended grade level. NBCTs lacked agreement at all levels and at grade eight matching was equivalent to random chance. This raises the question of whether this inconsistency in designated developmental levels is a due to problems with the standards or with the teachers. When asked to directly judge standards designated for their grade levels, teachers

generally agree that the standard statements are developmentally appropriate. The NBCTs rated 80% of the Second grade standard statements at “Agree” or “Strongly Agree” for developmental appropriateness. Only one standard from Eighth grade scored less than 3.0, “Agree” and at 2.97 this would round up to a score of 3.0 and be seen as a rating of “Agree,” and no standard statements from Fifth grade received a mean score of less than “Agree.” This discrepancy may also be a factor of the research design, i.e., the way in which teachers were presented with the standards and asked to judge. That is, when the expert teachers were not given any indication of developmental designation of standards statements, there was inconsistency and disagreement with the designations. When the expert teachers were asked a more narrow task—to judge developmental appropriateness for specific standard statements designated for their grade levels, they agreed 80% of the time at Second grade and nearly 100% of the time at Fifth and Eighth grades.

This research project does not provide an answer to whether the discrepancy between NBCTs sorting random standard statements and the more narrow task of judging developmental appropriateness at the NBCTs own grade level. There are several potential reasons for this. First the research design, in which NBCTs were told the standards were from a particular grade level. This may have predisposed them to agree with that assessment. Second, when examining the standard statements in random order, the lack of context may have made it too difficult to accurately place the standards. And third, the issues surrounding clarity and the number of tasks may have also been too large an obstacle to overcome in attempting to match the standard statements to their intended grade level.

The quantitative portion of this research leaves questions that require further research to resolve. However the qualitative portion of this mixed method research process provides information

supplementing the quantitative results. The content analysis and focus groups findings indicate that the standard statements studied in this research project have several limitations. These limitations are independent of the findings that discrepancies in the NBCTs' ratings of the developmental appropriateness of the standard statements. The standard statements:

- Inadequately cover the full information problem-solving process.
- Frequently are not clearly written and thus may be difficult for all stakeholders to understand.
- Contain multiple tasks resulting in confusion over the primary task and meaning adding to the confusion caused by unclear writing.

In sum, the standards statements as written are likely to be insufficient to prepare students for the needs of the 21st century.

This work points to the need 1) for the entire information problem-solving process to be explicitly included in national policy documents such as the CCSS and the AASL standards, so that the component skills of information literacy can be consistently reflected in and taught from standards statements for each grade level in increasing complexity; and 2) for greater collaboration between the writers of standards statements and classroom teachers with the aim of creating standard statements that are comprehensible to all stakeholders, including parents and students.

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Appendix 1 Survey Questions

Target Success: Common Core & AASL Standards

1 This is a survey on information literacy standards from the Common Core State Standards and the American Association of School Librarians. Thank you for your input. If you include your contact information, I will include you in the drawing for the gift cards that are an incentive for those completing the survey. Contact information is completely voluntary. I anticipate this survey will take 30 - 45 minutes to complete. I realize this is a lot of time to ask, but I think getting National Board Certified Teachers input on an aspect of the Common Core State Standards is quite important. You may stop the survey at any time and continue later. The survey software automatically saves your answers. However for this function to work properly you need to resume the survey using the same computer and browser.

2 University of Washington Participant Information The following principal investigator from the University of Washington is evaluating the developmental appropriateness and importance of educational standards related to Information Problem Solving created by the Common Core State Standards (CCSS) and the American Association of School Librarians (AASL). David B. Willer, PhD Candidate, Information School, University of Washington, dbwiller@uw.edu (360) 708-6850. The purpose of this information sheet is to give you the information you will need to help you decide whether or not to be in the study. Please read it carefully. Please ask direct questions to the researcher listed above about the purpose of the research, what the researcher would ask you to do, the possible risks and benefits, your rights as a volunteer, and anything else about the research or this sheet that is not clear. You are completely free to decide whether to be in this study or not. This process is called "informed consent."

3 University of Washington Participant Information (continued)

PURPOSE AND BENEFITS The primary purpose of this study is to evaluate the grade level appropriateness of educational standards related to Information Problem Solving from the CCSS and the AASL from the perspective of expert, experienced teachers. Information Problem Solving has been defined as the process of identifying and locating, evaluating, and using information necessary to solve a problem. One way of looking at Information Problem Solving is to think of the process students go through when they conduct a research project. A second purpose of this study is to evaluate the importance of individual standards based on the views of expert, experienced teachers. The anticipated benefits of this study include understanding what developmental differences can be identified in information literacy abilities of children of different ages. This research will, by identifying areas of alignment and areas where gaps exist between expert practitioners' judgments and educational standards, begin to make a contribution towards the establishment of a developmental theory of information problem solving. Identifying areas of agreement indicates where there are good indicators of the skills students are capable of at a particular grade level. Identifying areas of disagreement provides an opportunity for further research to delve into what capabilities are at this point. There is currently no developmental theory of information problem solving skills, and this research will inform a discussion on what a theory might look like.

PROCEDURES This survey asks you to rate the developmental level and importance of standard statements associated with information problem solving from both the CCSS and the AASL. Since standards statements are written for individual grade levels, an assumption behind this survey is that if standards statements are clear and well written, expert, experienced teachers will be able to identify the appropriate grade level within one to two grade levels. The survey consists of three parts. In the part A of this survey you are presented standards statements from grades 2, 5, and 8. These standards have been sorted randomly. Your task is to choose the earliest appropriate grade level that you believe the standards statement is developmentally appropriate to teach. You are also asked to provide a ranking of your confidence in your grade level rating. In part B of the survey, you are asked to pick the most appropriate grade level band (2, 5, or 8) to your own level of teaching and rate the standards statements from that grade level band for 1) developmental appropriateness for teaching at that grade level; and (2) importance of teaching at that grade level for each standards statement. In part C, you are asked for some demographic data to help us categorize responses to the survey. In this part you may provide your name and an email address if you wish to be included in a drawing for a \$50 gift certificate for participating in the survey. There will be one \$50 gift certificate for every 100 respondents (up to a total of 10 gift certificates). You will also be asked if you would be willing to participate in a follow up focus group. These focus groups will provide additional feedback on the results of the survey. Agreeing to participate in a focus group will also require providing your name and contact information. The researcher anticipates being able to compensate each of the focus groups members with a \$25 - \$50 gift certificate depending upon the number of participants. I anticipate this survey will take 30 - 45 minutes to complete. You may stop the survey at any time and continue later. The survey software automatically saves your answers. However for this function to work properly you need to resume the survey using the same computer and browser.

4 University of Washington Participant Information (continued) RISKS, STRESS, OR DISCOMFORT I do not anticipate any risks or discomfort to you from being in this study. It is possible you may feel uncomfortable answering questions about educational standards. You may refuse to answer any question that you are not comfortable answering. Summarized data collected during the study, and anonymized excerpts from the survey instruments, may be published in research reports or presentations. You may refuse to participate or withdraw from the study at any time. You may choose to skip any question or task assigned during the study. If you have a study-related emergency or problem, please contact me by using the information at the top of this form.

BENEFITS You may not directly benefit from taking part in this study. Your participation could lead to improved educational standards relating to information problem solving. If you choose to include your name and contact information you could receive a gift certificate, the final value to be determined by the number of participants, but no less than \$25. You may choose to withdraw from the survey at any time and still be eligible for the gift certificate drawing.

OTHER INFORMATION Data collected for this study will be kept confidential and only the researcher will have access to it. You may refuse to participate or withdraw from this study at any time without penalty or loss of benefits to which you are otherwise entitled.

5 Section A. Please choose the earliest appropriate grade level that you believe the standards statement is developmentally appropriate to teach. Then provide a ranking of your confidence in your grade level rating. The items are in the form of: Standard Category. Standards statement.

	Grade Level			Confidence Level			Comment Box
	2nd Gr	5th Gr	8th Gr	Low	Medium	High	Comments
Craft and Structure. Determine the meaning of words and phrases as they are used in a text, including figurative language such as metaphors and similes.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Key Ideas and Details. Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Key Ideas and Details. Determine a theme of a story, drama, or poem from details in the text, including how characters in a story or drama respond to challenges or how the speaker in a poem reflects upon a topic; summarize the	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

<p>text.</p> <p>Key Ideas and Details. Cite the textual evidence that most strongly supports an analysis of what the text says explicitly as well as inferences drawn from the text.</p>	○	○	○	○	○	○	
<p>Craft and Structure. Analyze in detail the structure of a specific paragraph in a text, including the role of particular sentences in developing and refining a key concept.</p>	○	○	○	○	○	○	
<p>Craft and Structure. Determine an author's point of view or purpose in a text and analyze how the author acknowledges and responds to conflicting evidence or viewpoints.</p>	○	○	○	○	○	○	
<p>Key Ideas and Details. Ask and answer such questions as who, what, where, when,</p>	○	○	○	○	○	○	

<p>why, and how to demonstrate understanding of key details in a text.</p> <p>Key Ideas and Details. Identify the main topic of a multiparagraph text as well as the focus of specific paragraphs within the text.</p> <p>Key Ideas and Details. Cite the textual evidence that most strongly supports an analysis of what the text says explicitly as well as inferences drawn from the text.</p>	○	○	○	○	○	○	
	○	○	○	○	○	○	

6 Section A. Please choose the earliest appropriate grade level that you believe the standards statement is developmentally appropriate to teach. Then provide a ranking of your confidence in your grade level rating. The items are in the form of: Standard Category. Standards statement.

	Grade Level			Confidence Level			Comments
	2nd Gr	5th Gr	8th Gr	Low	Medium	High	Comments
Foundational Skills; Phonics and Word Recognition. Read on-level text with purpose and understanding.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Foundational Skills; Phonics and Word Recognition. Use context to confirm or self-correct word recognition and understanding, rereading as necessary.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Research to Build and Present Knowledge. Draw evidence from literary or informational texts to support analysis, reflection, and research.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Comprehension and Collaboration. Ask for clarification and further explanation as needed about the topics and texts under discussion.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

<p>Comprehension and Collaboration. Ask and answer questions about what a speaker says in order to clarify comprehension, gather additional information, or deepen understanding of a topic or issue.</p>	○	○	○	○	○	○	
<p>Comprehension and Collaboration. Delineate a speaker's argument and specific claims, evaluating the soundness of the reasoning and relevance and sufficiency of the evidence and identifying when irrelevant evidence is introduced.</p>	○	○	○	○	○	○	
<p>Vocabulary Acquisition and Use. Use glossaries and beginning dictionaries, both print and digital, to determine or clarify the meaning of words and phrases.</p>	○	○	○	○	○	○	
<p>Vocabulary Acquisition and</p>	○	○	○	○	○	○	

<p>Use. Consult general and specialized reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning or its part of speech.</p> <p>Vocabulary Acquisition and Use. Use sentence-level context as a clue to the meaning of a word or phrase.</p>	○	○	○	○	○	○	
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7 Section A. Please choose the earliest appropriate grade level that you believe the standards statement is developmentally appropriate to teach. Then provide a ranking of your confidence in your grade level rating. The items are in the form of: Standard Category. Standards statement.

	Grade Level			Confidence Level			Comments
	2nd Gr	5th Gr	8th Gr	Low	Medium	High	Comments
Vocabulary Acquisition and Use. Use context (e.g., cause/effect relationships and comparisons in text) as a clue to the meaning of a word or phrase.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Vocabulary Acquisition and Use. Consult reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation and determine or clarify the precise meaning of key words and phrases.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Vocabulary Acquisition and Use. Use context (e.g., the overall meaning of a sentence or paragraph; a	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

<p>word's position or function in a sentence) as a clue to the meaning of a word or phrase.</p> <p>Vocabulary Acquisition and Use. Use the relationship between particular words to better understand each of the words.</p> <p>Vocabulary Acquisition and Use. Distinguish among the connotations (associations) of words with similar denotations (definitions) (e.g., bullheaded, willful, firm, persistent, resolute).</p> <p>Craft and Structure. Identify aspects of a text that reveal an author's point of view or purpose (e.g., loaded language, inclusion or</p>	○	○	○	○	○	○	
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<p>avoidance of particular facts).</p> <p>Key Ideas and Details. Cite specific textual evidence to support analysis of science and technical texts.</p> <p>Key Ideas and Details. Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.</p> <p>Craft and Structure. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.</p>	○	○	○	○	○	○	
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<p>Craft and Structure. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.</p>	○	○	○	○	○	○	
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8 Section A. Please choose the earliest appropriate grade level that you believe the standards statement is developmentally appropriate to teach. Then provide a ranking of your confidence in your grade level rating. The items are in the form of: Standard Category. Standards statement.

	Grade Level			Confidence Level			Comments
	2nd Gr	5th Gr	8th Gr	Low	Medium	High	Comments
Integration of Knowledge and Ideas. Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Research to Build and Present Knowledge. Draw evidence from informational texts to support analysis, reflection, and research.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Use prior and background knowledge as context for new learning. Identify and use appropriate sources to acquire background information.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Find, evaluate, and select appropriate sources to answer questions. Distinguish between fiction and nonfiction books.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Find, evaluate, and select appropriate sources to answer questions. Select and use appropriate sources, including picture dictionaries, beginning	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

<p>encyclopedias, magazines, maps, and globes, to answer questions.</p> <p>Find, evaluate, and select appropriate sources to answer questions. Select and use appropriate sources, including specialized reference sources and databases, to answer questions.</p> <p>Find, evaluate, and select appropriate sources to answer questions. Evaluate sources based on criteria such as copyright date, authority of author or publisher, comprehensiveness, readability, and alignment with research needs.</p> <p>Find, evaluate, and select appropriate sources to answer questions. Select a variety of credible sources in different formats relevant to research needs.</p> <p>Find, evaluate, and select appropriate sources to answer questions.</p> <p>Understand the basic organizational structure of books.</p> <p>Find, evaluate, and select appropriate sources to answer questions.</p> <p>Understand that the library has an</p>	○	○	○	○	○	○	
	○	○	○	○	○	○	
	○	○	○	○	○	○	
	○	○	○	○	○	○	
	○	○	○	○	○	○	

organizational scheme.							
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9 Section A. Please choose the earliest appropriate grade level that you believe the standards statement is developmentally appropriate to teach. Then provide a ranking of your confidence in your grade level rating. The items are in the form of: Standard Category. Standards statement.

	Grade Level			Confidence Level			Comments
	2nd Gr	5th Gr	8th Gr	Low	Medium	High	Comments
Find, evaluate, and select appropriate sources to answer questions. Understand the library's organizational scheme and what main topics are included in each section.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Find, evaluate, and select appropriate sources to answer questions. Use multiple resources, including print, electronic, and human, to locate information.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Find, evaluate, and select appropriate sources to answer questions. Use the organizational structure of a book (for example, table of contents, index, chapter	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

locate materials. Demonstrate mastery of technology tools for accessing information and pursuing inquiry. Use online encyclopedias and magazine databases with guidance.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Demonstrate mastery of technology tools for accessing information and pursuing inquiry. Search an online catalog to locate materials.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Demonstrate mastery of technology tools for accessing information and pursuing inquiry. Use selected websites and periodical databases to find appropriate information.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Demonstrate mastery of technology tools for accessing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

information and pursuing inquiry. Use selected search engines to find appropriate information.							
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10 Section A. Please choose the earliest appropriate grade level that you believe the standards statement is developmentally appropriate to teach. Then provide a ranking of your confidence in your grade level rating. The items are in the form of: Standard Category. Standards statement.

	Grade Level			Confidence Level			Comments
	2nd Gr	5th Gr	8th Gr	Low	Medium	High	Comments
Demonstrate mastery of technology tools for accessing information and pursuing inquiry. Use technology resources such as online encyclopedias, online databases, and Web subject directories to locate information.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Demonstrate mastery of technology tools for accessing information and pursuing inquiry. Implement keyword search strategies.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Demonstrate mastery of technology tools for accessing information and pursuing inquiry. Use a variety of search engines to do advanced searching.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

<p>Use prior and background knowledge as context for new learning.</p> <p>Observe and analyze an experience, demonstration, or source that introduces a topic, problem, or question to gather background information.</p> <p>Evaluate information found in selected sources on the basis of accuracy, validity, appropriateness for needs, importance, and social and cultural context.</p> <p>Recognize and use facts that answer specific questions.</p> <p>Evaluate information found in selected sources on the basis of accuracy, validity, appropriateness for needs, importance, and social and cultural context.</p> <p>Interpret information represented in pictures, illustrations,</p>	○	○	○	○	○	○	
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<p>and simple charts.</p> <p>Evaluate information found in selected sources on the basis of accuracy, validity, appropriateness for needs, importance, and social and cultural context.</p> <p>Skim/scan to locate information that is appropriate to age and ability level.</p> <p>Evaluate information found in selected sources on the basis of accuracy, validity, appropriateness for needs, importance, and social and cultural context.</p> <p>Identify facts and details that support main ideas.</p> <p>Evaluate information found in selected sources on the basis of accuracy, validity, appropriateness for needs, importance, and social and</p>	○	○	○	○	○	○	
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<p>cultural context. Evaluate facts for accuracy.</p> <p>Evaluate information found in selected sources on the basis of accuracy, validity, appropriateness for needs, importance, and social and cultural context.</p> <p>Distinguish between fact and opinion.</p>	○	○	○	○	○	○	
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11 Section A. Please choose the earliest appropriate grade level that you believe the standards statement is developmentally appropriate to teach. Then provide a ranking of your confidence in your grade level rating. The items are in the form of: Standard Category. Standards statement.

	Grade Level			Confidence Level			Comments
	2nd Gr	5th Gr	8th Gr	Low	Medium	High	Comments
Evaluate information found in selected sources on the basis of accuracy, validity, appropriateness for needs, importance, and social and cultural context.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Interpret information taken from maps, graphs, charts, and other visuals.							
Evaluate information found in selected sources on the basis of accuracy, validity, appropriateness for needs, importance, and social and cultural context.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Select information to answer questions or solve a problem.							
Evaluate information found in selected sources on the basis of accuracy, validity,	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

<p>appropriateness for needs, importance, and social and cultural context. Recognize that information has a social or cultural context based in currency, accuracy, authority, and point of view.</p> <p>Evaluate information found in selected sources on the basis of accuracy, validity, appropriateness for needs, importance, and social and cultural context. Evaluate and select information based on usefulness, currency, accuracy, authority, and point of view.</p> <p>Read, view, and listen for information presented in any format (e.g. textual, visual, media, digital) in order to make inferences and gather meaning. Write, draw, or verbalize the main idea and</p>	○	○	○	○	○	○	
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<p>supporting details.</p> <p>Read, view, and listen for information presented in any format (e.g. textual, visual, media, digital) in order to make inferences and gather meaning. Use both facts and opinions responsibly by identifying and verifying them.</p> <p>Demonstrate mastery of technology tools for accessing information and pursuing inquiry. Use software or online tools to record and organize information.</p> <p>Continue an inquiry-based research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to construct new understandings, draw conclusions,</p>	○	○	○	○	○	○	
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<p>and create new knowledge. Find similar big ideas in more than one source.</p> <p>Continue an inquiry-based research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to construct new understandings, draw conclusions, and create new knowledge.</p>	○	○	○	○	○	○	
<p>Find facts to answer questions in more than one source.</p> <p>Continue an inquiry-based research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to construct new understandings, draw conclusions, and create new knowledge.</p>	○	○	○	○	○	○	

Identify supporting details.							
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12 Section A. Please choose the earliest appropriate grade level that you believe the standards statement is developmentally appropriate to teach. Then provide a ranking of your confidence in your grade level rating. The items are in the form of: Standard Category. Standards statement.

	Grade Level			Confidence Level			Comments
	2nd Gr	5th Gr	8th Gr	Low	Medium	High	Comments
Continue an inquiry-based research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to construct new understandings, draw conclusions, and create new knowledge. Use different clues (placement in text, signal words, focal point of illustration) to determine important ideas in illustrations and text.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Continue an inquiry-based research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

<p>construct new understandings, draw conclusions, and create new knowledge. Identify facts and details that support main ideas.</p> <p>Continue an inquiry-based research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to construct new understandings, draw conclusions, and create new knowledge. Identify main ideas and find supporting examples, definitions, and details.</p> <p>Continue an inquiry-based research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to construct new</p>	○	○	○	○	○	○	
	○	○	○	○	○	○	

<p>understandings, draw conclusions, and create new knowledge. Analyze different points of view discovered in different sources.</p> <p>Continue an inquiry-based research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to construct new understandings, draw conclusions, and create new knowledge. Interpret information and ideas by defining, classifying, and inferring from information in text.</p> <p>Collaborate with others to exchange ideas, develop new understandings, make decisions, and solve problems. Share information and ideas with</p>	○	○	○	○	○	○	
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<p>others by discussion and listening.</p> <p>Connect learning to community issues. Seek information from different sources to get balanced points of view.</p> <p>Conclude and inquiry-based research process by sharing new understandings and reflecting on the learning. Use information appropriate to task and audience.</p> <p>Participate and collaborate as members of a social and intellectual network of learners.</p> <p>Participate in discussions and listen well.</p> <p>Participate and collaborate as members of a social and intellectual network of learners. Ask questions of others in a group to elicit their information and opinions.</p> <p>Participate and</p>	○	○	○	○	○	○	
	○	○	○	○	○	○	
	○	○	○	○	○	○	
	○	○	○	○	○	○	
	○	○	○	○	○	○	

collaborate as members of a social and intellectual network of learners. Accurately describe or summarize ideas of others.							
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13 Section A. Please choose the earliest appropriate grade level that you believe the standards statement is developmentally appropriate to teach. Then provide a ranking of your confidence in your grade level rating. The items are in the form of: Standard Category. Standards statement.

	Grade Level			Confidence Level			Comments
	2nd Gr	5th Gr	8th Gr	Low	Medium	High	Comments
Connect learning to community issues. Gather ideas and information from different points of view.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Use information and technology ethically and responsibly. Rephrase rather than copy whole sentences.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Use information and technology ethically and responsibly. Demonstrate understanding of plagiarism by paraphrasing information or noting direct quotes.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Use information and technology ethically and responsibly. Avoid plagiarism by rephrasing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

<p>information in their own words.</p> <p>Read, view, and listen for pleasure and personal growth.</p> <p>Request and choose materials related to personal interests.</p> <p>Read, view, and listen for pleasure and personal growth. Read, view, and listen to a variety of fiction and nonfiction for enjoyment and information.</p> <p>Seek information for personal learning in a variety of formats and genres.</p> <p>Routinely select picture, fiction, and information books; try some books in other genre (poetry, fairy tales).</p> <p>Seek information for personal learning in a variety of</p>	○	○	○	○	○	○	
	○	○	○	○	○	○	
	○	○	○	○	○	○	
	○	○	○	○	○	○	

14 Section A. Please choose the earliest appropriate grade level that you believe the standards statement is developmentally appropriate to teach. Then provide a ranking of your confidence in your grade level rating. The items are in the form of: Standard Category. Standards statement.

	Grade Level			Confidence Level			Comments
	2nd Gr	5th Gr	8th Gr	Low	Medium	High	Comments
Seek information for personal learning in a variety of formats and genres. Select books from favorite authors and genres; try new genres when suggested.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Seek information for personal learning in a variety of formats and genres. Select information in various formats based on a theme, topic, and connection to classroom learning or personal interest.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Seek information for personal learning in a variety of formats and genres. Independently select appropriate print, nonprint, and electronic materials on an	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

<p>individual level.</p> <p>Seek information for personal learning in a variety of formats and genres. Explore new genres that fulfill interests and reading level (graphic novels, magazines, online magazines, e-books).</p> <p>Seek information for personal learning in a variety of formats and genres. Select resources for classroom learning and for personal exploration.</p> <p>Seek information for personal learning in a variety of formats and genres. Select resources on topics of interest at both a comfortable reading level and at higher levels of comprehension.</p> <p>Seek information for personal learning in a</p>	○	○	○	○	○	○	
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15 Section A. Please choose the earliest appropriate grade level that you believe the standards statement is developmentally appropriate to teach. Then provide a ranking of your confidence in your grade level rating. The items are in the form of: Standard Category. Standards statement.

	Grade Level			Confidence Level			Comments
	2nd Gr	5th Gr	8th Gr	Low	Medium	High	Comments
Use social networks and information tools to gather and share information. Experiment with online catalog and Web resources to locate information.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Use social networks and information tools to gather and share information. Use basic strategies (author, title, subject) to locate information using the library's online catalog.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Use social networks and information tools to gather and share information. Use advanced strategies (Boolean searches) to locate information about personal-interest topics	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

<p>to find out about self and the surrounding world.</p>							
<p>Read widely and fluently to make connections with self, the world, and previous reading. Draw conclusions about main idea of a story.</p>	○	○	○	○	○	○	
<p>Read widely and fluently to make connections with self, the world, and previous reading. Use evidence from the text to discuss the author's purpose.</p>	○	○	○	○	○	○	
<p>Read widely and fluently to make connections with self, the world, and previous reading. Read widely to explore new ideas.</p>	○	○	○	○	○	○	
<p>Read widely and fluently to make connections with self, the world, and previous reading.</p>	○	○	○	○	○	○	

Recognize features of various genres and use different reading strategies for understanding.							
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16 Section A. Please choose the earliest appropriate grade level that you believe the standards statement is developmentally appropriate to teach. Then provide a ranking of your confidence in your grade level rating. The items are in the form of: Standard Category. Standards statement.

	Grade Level			Confidence Level			Comments
	2nd Gr	5th Gr	8th Gr	Low	Medium	High	Comments
Read widely and fluently to make connections with self, the world, and previous reading. Read with purpose to investigate new ideas beyond the required curriculum.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Respond to literature and creative expressions of ideas in various formats and genres. Use illustrations, context, graphics, and layout to extract meaning from different formats.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Connect ideas to own interests and previous knowledge and experience.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

<p>Understand literal meaning and identify the main points reflected in a work.</p>							
<p>Organize personal knowledge in away that can be called upon easily. Take notes using graphic organizer provided by teacher or school librarian.</p>	○	○	○	○	○	○	
<p>Organize personal knowledge in away that can be called upon easily.</p>	○	○	○	○	○	○	
<p>Draw pictures of main ideas.</p>							
<p>Organize personal knowledge in away that can be called upon easily. Use two-column approach to note-taking to capture personal connections to information.</p>	○	○	○	○	○	○	
<p>Organize</p>	○	○	○	○	○	○	

personal knowledge in away that can be called upon easily. Develop visual pictures of the main ideas and design concept maps, webs, or graphics to capture the ideas.							
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17 Section A. Please choose the earliest appropriate grade level that you believe the standards statement is developmentally appropriate to teach. Then provide a ranking of your confidence in your grade level rating. The items are in the form of: Standard Category. Standards statement.

	Grade Level			Confidence Level			Comments
	2nd Gr	5th Gr	8th Gr	Low	Medium	High	Comments
Connect learning to community issues. Gather ideas and information from different points of view.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Use information and technology ethically and responsibly. Rephrase rather than copy whole sentences.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Use information and technology ethically and responsibly. Demonstrate understanding of plagiarism by paraphrasing information or noting direct quotes.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Use information and technology ethically and responsibly. Avoid plagiarism by rephrasing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

<p>information in their own words.</p> <p>Read, view, and listen for pleasure and personal growth.</p> <p>Request and choose materials related to personal interests.</p> <p>Read, view, and listen for pleasure and personal growth. Read, view, and listen to a variety of fiction and nonfiction for enjoyment and information.</p> <p>Seek information for personal learning in a variety of formats and genres.</p> <p>Routinely select picture, fiction, and information books; try some books in other genre (poetry, fairy tales).</p> <p>Seek information for personal learning in a variety of</p>	○	○	○	○	○	○	
	○	○	○	○	○	○	
	○	○	○	○	○	○	
	○	○	○	○	○	○	

<p>formats and genres. Select information in various formats and genres based on suggestions from teacher or school librarian and on personal interests.</p> <p>Seek information for personal learning in a variety of formats and genres. Select some books at the appropriate reading level, other books to be read aloud, and other more challenging books of particular interest for browsing and entertainment.</p> <p>Seek information for personal learning in a variety of formats and genres. Explain personal criteria for selecting a particular resource.</p>	<p>○</p> <p>○</p>	<p>○</p> <p>○</p>	<p>○</p> <p>○</p>	<p>○</p> <p>○</p>	<p>○</p> <p>○</p>	<p>○</p> <p>○</p>	
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18 Please choose the grade level which most closely approximates what you teach, or your expertise level.

- Grade 2
- Grade 5
- Grade 8

19 Section B.2.1. Please rate each Second Grade standards statement for its developmental appropriateness at Second Grade. Then please rate each standards statement for its importance in being taught at Second Grade. The scale for both items goes Strongly Disagree (SD) - Disagree (D) - Agree (A) - Strongly Agree (SA). The items are in the form of: Standard Category. Standards statement.

	Developmentally Appropriate for 2nd Grade				Important to teach at 2nd grade				Comments
	SD	D	A	SA	SD	D	A	SA	
Craft and Structure. Determine the meaning of words and phrases in a text relevant to a grade 2 topic or subject area.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Key Ideas and Details. Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Key Ideas and Details. Identify the main topic of a multiparagraph text as well as the focus of specific paragraphs within the text.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Foundational Skills; Fluency. Read on-level text with purpose and understanding.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Foundational Skills; Fluency. Use context to	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

confirm or self-correct word recognition and understanding, rereading as necessary.									
Comprehension and Collaboration. Ask for clarification and further explanation as needed about the topics and texts under discussion.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Comprehension and Collaboration. Ask and answer questions about what a speaker says in order to clarify comprehension, gather additional information, or deepen understanding of a topic or issue.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Vocabulary Acquisition and Use. Use glossaries and beginning dictionaries, both print and digital, to determine or clarify the meaning of words and phrases.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Vocabulary Acquisition and	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

Use. Use sentence-level context as a clue to the meaning of a word or phrase.									
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20 Section B.2.2. Please rate each Second Grade standards statement for its developmental appropriateness at Second Grade. Then please rate each standards statement for its importance in being taught at Second Grade. The scale for both items goes Strongly Disagree (SD) - Disagree (D) - Agree (A) - Strongly Agree (SA). The items are in the form of: Standard Category. Standards statement.

	Developmentally Appropriate for 2nd Grade				Important to teach at 2nd grade				Comments
	SD	D	A	SA	SD	D	A	SA	
Find, evaluate, and select appropriate sources to answer questions. Distinguish between fiction and nonfiction books.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Find, evaluate, and select appropriate sources to answer questions. Select and use appropriate sources, including picture dictionaries, beginning encyclopedias, magazines, maps, and globes, to answer questions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Find, evaluate, and select appropriate sources to answer questions. Understand the basic organizational structure of books.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

<p>Find, evaluate, and select appropriate sources to answer questions.</p>	○	○	○	○	○	○	○	○	
<p>Understand that the library has an organizational scheme.</p>									
<p>Demonstrate mastery of technology tools for accessing information and pursuing inquiry.</p>	○	○	○	○	○	○	○	○	
<p>Recognize the purpose of the online catalog to locate materials.</p>									
<p>Demonstrate mastery of technology tools for accessing information and pursuing inquiry. Use online encyclopedias and magazine databases with guidance.</p>	○	○	○	○	○	○	○	○	
<p>Evaluate information found in selected sources on the basis of accuracy, validity, appropriateness for needs, importance, and social and</p>	○	○	○	○	○	○	○	○	

<p>cultural context. Recognize and use facts that answer specific questions.</p> <p>Evaluate information found in selected sources on the basis of accuracy, validity, appropriateness for needs, importance, and social and cultural context.</p> <p>Interpret information represented in pictures, illustrations, and simple charts.</p> <p>Read, view, and listen for information presented in any format (e.g. textual, visual, media, digital) in order to make inferences and gather meaning. Write, draw, or verbalize the main idea and supporting details.</p>	○	○	○	○	○	○	○	○	
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21 Section B.2.3. Please rate each Second Grade standards statement for its developmental appropriateness at Second Grade. Then please rate each standards statement for its importance in being taught at Second Grade. The scale for both items goes Strongly Disagree (SD) - Disagree (D) - Agree (A) - Strongly Agree (SA). The items are in the form of: Standard Category. Standards statement.

	Developmentally Appropriate for 2nd Grade				Important to teach at 2nd grade				Comments
	SD	D	A	SA	SD	D	A	SA	
Continue an inquiry-based research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to construct new understandings, draw conclusions, and create new knowledge. Find facts to answer questions in more than one source.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Continue an inquiry-based research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to construct new understandings, draw	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

<p>conclusions, and create new knowledge. Identify supporting details.</p> <p>Collaborate with others to exchange ideas, develop new understandings, make decisions, and solve problems. Share information and ideas with others by discussion and listening.</p> <p>Participate and collaborate as members of a social and intellectual network of learners. Participate in discussions and listen well.</p> <p>Use information and technology ethically and responsibly. Rephrase rather than copy whole sentences.</p> <p>Read, view, and listen for pleasure and personal growth. Request and choose materials related to personal</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
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<p>interests.</p> <p>Read, view, and listen for pleasure and personal growth. Read, view, and listen to a variety of fiction and nonfiction for enjoyment and information.</p> <p>Seek information for personal learning in a variety of formats and genres.</p> <p>Routinely select picture, fiction, and information books; try some books in other genre (poetry, fairy tales).</p> <p>Seek information for personal learning in a variety of formats and genres. Select information in various formats and genres based on suggestions from teacher or school librarian and on personal interests.</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
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22 Section B.2.4. Please rate each Second Grade standards statement for its developmental appropriateness at Second Grade. Then please rate each standards statement for its importance in being taught at Second Grade. The scale for both items goes Strongly

Disagree (SD) - Disagree (D) - Agree (A) - Strongly Agree (SA). The items are in the form of: Standard Category. Standards statement.

	Developmentally Appropriate for 2nd Grade				Important to teach at 2nd grade				Comments
	SD	D	A	SA	SD	D	A	SA	Comments
Seek information for personal learning in a variety of formats and genres. Select some books at the appropriate reading level, other books to be read aloud, and other more challenging books of particular interest for browsing and entertainment.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Seek information for personal learning in a variety of formats and genres. Explain personal criteria for selecting a particular resource.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Use social networks and information tools to gather and share information. Locate information for personal	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

<p>interests and school assignments in print.</p>									
<p>Use social networks and information tools to gather and share information. Experiment with online catalog and Web resources to locate information.</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
<p>Read widely and fluently to make connections with self, the world, and previous reading. Read widely from multicultural texts in various genres to find out about self and the surrounding world.</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
<p>Read widely and fluently to make connections with self, the world, and previous reading. Draw conclusions about main idea of a story.</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
<p>Organize personal knowledge in away that can</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

<p>be called upon easily. Take notes using graphic organizer provided by teacher or school librarian.</p> <p>Organize personal knowledge in away that can be called upon easily. Draw pictures of main ideas.</p>	○	○	○	○	○	○	○	○	
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23 [Click here to go to Part C, the demographic data section of the survey.](#) Do not answer the questions on the Fifth or Eighth grade standards.

○ [Part C - Demographic Data](#)

24 Section B.5.1. Please rate each Fifth Grade standards statement for its developmental appropriateness at Fifth Grade. Then please rate each standards statement for its importance in being taught at Fifth Grade. The scale for both items goes Strongly Disagree (SD) - Disagree (D) - Agree (A) - Strongly Agree (SA). The items are in the form of: Standard Category. Standards statement.

	Developmentally Appropriate for 5th Grade				Important to teach at 5th grade				Comments
	SD	D	A	SA	SD	D	A	SA	
Craft and Structure. Determine the meaning of words and phrases as they are used in a text, including figurative language such as metaphors and similes.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Key Ideas and Details. Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Key Ideas and Details. Determine a theme of a story, drama, or poem from details in the text, including how characters in a story or drama respond to challenges or how the speaker in a	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

<p>poem reflects upon a topic; summarize the text.</p> <p>Craft and Structure. Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.</p> <p>Foundational Skills; Phonics and Word Recognition. Read on-level text with purpose and understanding.</p> <p>Foundational Skills; Phonics and Word Recognition. Use context to confirm or self-correct word recognition and understanding, rereading as necessary.</p> <p>Research to Build and Present Knowledge. Draw evidence from literary or informational texts to support</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
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analysis, reflection, and research.									
Vocabulary Acquisition and Use. Use context (e.g., cause/effect relationships and comparisons in text) as a clue to the meaning of a word or phrase.	○	○	○	○	○	○	○	○	
Vocabulary Acquisition and Use. Consult reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation and determine or clarify the precise meaning of key words and phrases.	○	○	○	○	○	○	○	○	
Use prior and background knowledge as context for new learning. Identify and use appropriate sources to acquire background information.	○	○	○	○	○	○	○	○	

25 Section B.5.2. Please rate each Fifth Grade standards statement for its developmental appropriateness at Fifth Grade. Then please rate each standards statement for its importance in being taught at Fifth Grade. The scale for both items goes Strongly Disagree (SD) - Disagree (D) - Agree (A) - Strongly Agree (SA). The items are in the form of: Standard Category. Standards statement.

	Developmentally Appropriate for 5th Grade				Important to teach at 5th grade				Comments
	SD	D	A	SA	SD	D	A	SA	
Find, evaluate, and select appropriate sources to answer questions. Select and use appropriate sources, including specialized reference sources and databases, to answer questions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Find, evaluate, and select appropriate sources to answer questions. Understand the library's organizational scheme and what main topics are included in each section.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Find, evaluate, and select appropriate sources to answer questions. Use multiple resources, including print, electronic, and	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

<p>human, to locate information.</p> <p>Find, evaluate, and select appropriate sources to answer questions. Use the organizational structure of a book (for example, table of contents, index, chapter headings) to locate information to answer questions.</p> <p>Demonstrate mastery of technology tools for accessing information and pursuing inquiry. Search an online catalog to locate materials.</p> <p>Demonstrate mastery of technology tools for accessing information and pursuing inquiry. Use selected websites and periodical databases to find appropriate information.</p> <p>Demonstrate</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
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<p>mastery of technology tools for accessing information and pursuing inquiry. Use selected search engines to find appropriate information.</p> <p>Evaluate information found in selected sources on the basis of accuracy, validity, appropriateness for needs, importance, and social and cultural context.</p>									
<p>Skim/scan to locate information that is appropriate to age and ability level.</p>	○	○	○	○	○	○	○	○	
<p>Evaluate information found in selected sources on the basis of accuracy, validity, appropriateness for needs, importance, and social and cultural context.</p>	○	○	○	○	○	○	○	○	
<p>Identify facts and details that support main ideas.</p> <p>Evaluate information</p>	○	○	○	○	○	○	○	○	

found in selected sources on the basis of accuracy, validity, appropriateness for needs, importance, and social and cultural context. Evaluate facts for accuracy.									
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26 Section B.5.3. Please rate each Fifth Grade standards statement for its developmental appropriateness at Fifth Grade. Then please rate each standards statement for its importance in being taught at Fifth Grade. The scale for both items goes Strongly Disagree (SD) - Disagree (D) - Agree (A) - Strongly Agree (SA). The items are in the form of: Standard Category. Standards statement.

	Developmentally Appropriate for 5th Grade				Important to teach at 5th grade				Comments
	SD	D	A	SA	SD	D	A	SA	
Evaluate information found in selected sources on the basis of accuracy, validity, appropriateness for needs, importance, and social and cultural context. Distinguish between fact and opinion.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Evaluate information found in selected sources on the basis of accuracy, validity, appropriateness for needs, importance, and social and cultural context.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Interpret information taken from maps, graphs, charts, and other visuals.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Evaluate information found in selected sources on the basis of accuracy, validity,	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

<p>appropriateness for needs, importance, and social and cultural context. Select information to answer questions or solve a problem.</p>									
<p>Demonstrate mastery of technology tools for accessing information and pursuing inquiry. Use software or online tools to record and organize information.</p>	○	○	○	○	○	○	○	○	
<p>Continue an inquiry-based research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to construct new understandings, draw conclusions, and create new knowledge. Find similar big ideas in more than one source.</p>	○	○	○	○	○	○	○	○	
<p>Continue an inquiry-based</p>	○	○	○	○	○	○	○	○	

<p>research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to construct new understandings, draw conclusions, and create new knowledge. Use different clues (placement in text, signal words, focal point of illustration) to determine important ideas in illustrations and text.</p> <p>Continue an inquiry-based research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to construct new understandings, draw conclusions, and create new knowledge. Identify facts and details that support main</p>	○	○	○	○	○	○	○	○	
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<p>ideas.</p> <p>Conclude and inquiry-based research process by sharing new understandings and reflecting on the learning. Use information appropriate to task and audience.</p> <p>Connect learning to community issues. Gather ideas and information from different points of view.</p> <p>Use information and technology ethically and responsibly. Demonstrate understanding of plagiarism by paraphrasing information or noting direct quotes.</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
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27 Section B.5.4. Please rate each Fifth Grade standards statement for its developmental appropriateness at Fifth Grade. Then please rate each standards statement for its importance in being taught at Fifth Grade. The scale for both items goes Strongly Disagree (SD) - Disagree (D) - Agree (A) - Strongly Agree (SA). The items are in the form of: Standard Category. Standards statement.

	Developmentally Appropriate for 5th Grade				Important to teach at 5th grade				Comments
	SD	D	A	SA	SD	D	A	SA	
Seek information for personal learning in a variety of formats and genres. Select books from favorite authors and genres; try new genres when suggested.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Seek information for personal learning in a variety of formats and genres. Select information in various formats based on a theme, topic, and connection to classroom learning or personal interest.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Seek information for personal learning in a variety of formats and genres. Independently select	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

<p>appropriate print, nonprint, and electronic materials on an individual level.</p> <p>Use social networks and information tools to gather and share information.</p> <p>Use basic strategies (author, title, subject) to locate information using the library's online catalog.</p> <p>Read, view, and listen for pleasure and personal growth. Read, listen to, and view a range of resources for a variety of purposes; to live the experience of a character, to answer questions, to find out about something new, to explore personal interests.</p> <p>Read widely and fluently to make connections with self, the</p>	○	○	○	○	○	○	○	○	
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<p>world, and previous reading. Use evidence from the text to discuss the author's purpose.</p> <p>Read widely and fluently to make connections with self, the world, and previous reading. Read widely to explore new ideas.</p> <p>Read widely and fluently to make connections with self, the world, and previous reading. Recognize features of various genres and use different reading strategies for understanding.</p> <p>Connect ideas to own interests and previous knowledge and experience. Understand literal meaning and identify the main points reflected in a</p>	○	○	○	○	○	○	○	○	
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<p>work.</p> <p>Organize personal knowledge in away that can be called upon easily. Use two-column approach to note-taking to capture personal connections to information.</p>	○	○	○	○	○	○	○	○	
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28 Click here to go to Part C Demographic Data. Do not answer the questions on the Eighth grade standards.

○ Click here to continue on to Part C Demographic Data

29 Section B.8.1. Please rate each Eighth Grade standards statement for its developmental appropriateness at Eighth Grade. Then please rate each standards statement for its importance in being taught at Eighth Grade. The scale for both items goes Strongly Disagree (SD) - Disagree (D) - Agree (A) - Strongly Agree (SA). The items are in the form of: Standard Category. Standards statement.

	Developmentally Appropriate for 8th Grade				Important to teach at 8th grade				Comments
	SD	D	A	SA	SD	D	A	SA	
Key Ideas and Details. Cite the textual evidence that most strongly supports an analysis of what the text says explicitly as well as inferences drawn from the text.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Key Ideas and Details. Analyze how particular lines of dialogue or incidents in a story or drama propel the action, reveal aspects of a character, or provoke a decision.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Craft and Structure. Analyze in detail the structure of a specific paragraph in a text, including the role of particular sentences in developing and refining a key concept.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

<p>Craft and Structure. Determine an author's point of view or purpose in a text and analyze how the author acknowledges and responds to conflicting evidence or viewpoints.</p>	○	○	○	○	○	○	○	○	
<p>Key Ideas and Details. Cite the textual evidence that most strongly supports an analysis of what the text says explicitly as well as inferences drawn from the text.</p>	○	○	○	○	○	○	○	○	
<p>Research to Build and Present Knowledge. Draw evidence from literary or informational texts to support analysis, reflection, and research.</p>	○	○	○	○	○	○	○	○	
<p>Comprehension and Collaboration. Delineate a speaker's argument and specific claims, evaluating the soundness of the reasoning</p>	○	○	○	○	○	○	○	○	

<p>and relevance and sufficiency of the evidence and identifying when irrelevant evidence is introduced.</p>									
<p>Vocabulary Acquisition and Use. Consult general and specialized reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning or its part of speech.</p>	○	○	○	○	○	○	○	○	
<p>Vocabulary Acquisition and Use. Use context (e.g., the overall meaning of a sentence or paragraph; a word's position or function in a sentence) as a clue to the meaning of a word or phrase.</p>	○	○	○	○	○	○	○	○	
<p>Vocabulary Acquisition and Use. Use the relationship between</p>	○	○	○	○	○	○	○	○	

particular words to better understand each of the words.									
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30 Section B.8.2. Please rate each Eighth Grade standards statement for its developmental appropriateness at Eighth Grade. Then please rate each standards statement for its importance in being taught at Eighth Grade. The scale for both items goes Strongly Disagree (SD) - Disagree (D) - Agree (A) - Strongly Agree (SA). The items are in the form of: Standard Category. Standards statement.

	Developmentally Appropriate for 8th Grade				Important to teach at 8th grade				Comments
	SD	D	A	SA	SD	D	A	SA	
Vocabulary Acquisition and Use. Distinguish among the connotations (associations) of words with similar denotations (definitions) (e.g., bullheaded, willful, firm, persistent, resolute).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Craft and Structure. Identify aspects of a text that reveal an author's point of view or purpose (e.g., loaded language, inclusion or avoidance of particular facts).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Key Ideas and Details. Cite specific textual evidence to support analysis of science and technical texts.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Key Ideas and Details. Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Craft and Structure. Determine the meaning of	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

<p>symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.</p> <p>Craft and Structure. Analyze the author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.</p> <p>Integration of Knowledge and Ideas. Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.</p> <p>Research to Build and Present Knowledge. Draw evidence from informational texts to support analysis, reflection, and research.</p> <p>Find, evaluate, and select appropriate sources to answer questions. Evaluate sources based on criteria such as copyright date, authority of author or publisher, comprehensiveness, readability, and</p>									
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

alignment with research needs.									
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31 Section B.8.3. Please rate each Eighth Grade standards statement for its developmental appropriateness at Eighth Grade. Then please rate each standards statement for its importance in being taught at Eighth Grade. The scale for both items goes Strongly Disagree (SD) - Disagree (D) - Agree (A) - Strongly Agree (SA). The items are in the form of: Standard Category. Standards statement.

	Developmentally Appropriate for 8th Grade				Important to teach at 8th grade				Comments
	SD	D	A	SA	SD	D	A	SA	
Find, evaluate, and select appropriate sources to answer questions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Select a variety of credible sources in different formats relevant to research needs.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Find, evaluate, and select appropriate sources to answer questions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Recognize the organization and use of special sections in the library (for example, reference, reserve books, paperbacks).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Find, evaluate, and select appropriate sources to answer questions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Locate appropriate nonfiction resources by using the libraries	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

<p>classification scheme.</p> <p>Demonstrate mastery of technology tools for accessing information and pursuing inquiry. Use technology resources such as online encyclopedias, online databases, and Web subject directories to locate information.</p> <p>Demonstrate mastery of technology tools for accessing information and pursuing inquiry. Implement keyword search strategies.</p> <p>Demonstrate mastery of technology tools for accessing information and pursuing inquiry. Use a variety of search engines to do advanced searching.</p> <p>Use prior and background knowledge as context for new learning.</p>	○	○	○	○	○	○	○	○	
--	---	---	---	---	---	---	---	---	--

<p>Observe and analyze an experience, demonstration, or source that introduces a topic, problem, or question to gather background information.</p> <p>Evaluate information found in selected sources on the basis of accuracy, validity, appropriateness for needs, importance, and social and cultural context. Recognize that information has a social or cultural context based in currency, accuracy, authority, and point of view.</p> <p>Evaluate information found in selected sources on the basis of accuracy, validity, appropriateness for needs, importance, and social and cultural context. Evaluate and select information based on usefulness,</p>	○	○	○	○	○	○	○	○	
--	---	---	---	---	---	---	---	---	--

currency, accuracy, authority, and point of view.									
--	--	--	--	--	--	--	--	--	--

32 Section B.8.4. Please rate each Eighth Grade standards statement for its developmental appropriateness at Eighth Grade. Then please rate each standards statement for its importance in being taught at Eighth Grade. The scale for both items goes Strongly Disagree (SD) - Disagree (D) - Agree (A) - Strongly Agree (SA). The items are in the form of: Standard Category. Standards statement.

	Developmentally Appropriate for 8th Grade				Important to teach at 8th grade				Comments
	SD	D	A	SA	SD	D	A	SA	
<p>Read, view, and listen for information presented in any format (e.g. textual, visual, media, digital) in order to make inferences and gather meaning. Use both facts and opinions responsibly by identifying and verifying them.</p> <p>Continue an inquiry-based research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to construct new understandings, draw conclusions, and create new knowledge. Identify main ideas and find supporting examples, definitions, and</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Comments
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

<p>details.</p> <p>Continue an inquiry-based research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to construct new understandings, draw conclusions, and create new knowledge.</p> <p>Analyze different points of view discovered in different sources.</p> <p>Continue an inquiry-based research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to construct new understandings, draw conclusions, and create new knowledge.</p> <p>Interpret information and ideas by defining,</p>	○	○	○	○	○	○	○	○	
--	---	---	---	---	---	---	---	---	--

<p>classifying, and inferring from information in text.</p> <p>Connect learning to community issues. Seek information from different sources to get balanced points of view.</p> <p>Participate and collaborate as members of a social and intellectual network of learners. Ask questions of others in a group to elicit their information and opinions.</p> <p>Participate and collaborate as members of a social and intellectual network of learners. Accurately describe or summarize ideas of others.</p> <p>Use information and technology ethically and responsibly.</p> <p>Avoid plagiarism by rephrasing information in their own words.</p> <p>Seek</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
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information for personal learning in a variety of formats and genres. Explore new genres that fulfill interests and reading level (graphic novels, magazines, online magazines, e-books).									
---	--	--	--	--	--	--	--	--	--

33 Section B.8.5. Please rate each Eighth Grade standards statement for its developmental appropriateness at Eighth Grade. Then please rate each standards statement for its importance in being taught at Eighth Grade. The scale for both items goes Strongly Disagree (SD) - Disagree (D) - Agree (A) - Strongly Agree (SA). The items are in the form of: Standard Category. Standards statement.

	Developmentally Appropriate for 8th Grade				Important to teach at 8th grade				Comments
	SD	D	A	SA	SD	D	A	SA	
Seek information for personal learning in a variety of formats and genres. Select resources for classroom learning and for personal exploration.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Seek information for personal learning in a variety of formats and genres. Select resources on topics of interest at both a comfortable reading level and at higher levels of comprehension.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Seek information for personal learning in a variety of formats and genres. Select print, nonprint, and electronic materials based on personal interests and knowledge of	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

<p>authors.</p> <p>Read, view, and listen for pleasure and personal growth. Independently locate and select information for personal, hobby, or vocational interests.</p> <p>Use social networks and information tools to gather and share information. Use advanced strategies (Boolean searches) to locate information about personal-interest topics in the library's online catalog.</p> <p>Read, view, and listen for pleasure and personal growth. Read, listen to, and view an increasingly wide range of genres and formats for recreation and information.</p> <p>Read widely and fluently to make connections with self, the</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
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<p>world, and previous reading. Read with purpose to investigate new ideas beyond the required curriculum.</p> <p>Respond to literature and creative expressions of ideas in various formats and genres. Use illustrations, context, graphics, and layout to extract meaning from different formats.</p> <p>Organize personal knowledge in away that can be called upon easily. Develop visual pictures of the main ideas and design concept maps, webs, or graphics to capture the ideas.</p>	○	○	○	○	○	○	○	○	
	○	○	○	○	○	○	○	○	

34 Continue on to Part C Demographic Data.

35 What is the predominant grade level you teach?

- Kindergarten
- First Grade
- Second Grade
- Third Grade
- Fourth Grade
- Fifth Grade
- Sixth Grade
- Seventh Grade
- Eighth Grade
- High School

36 What is your National Board Certification Area?

- English Language Arts – Early Adolescence
- Exceptional Needs Specialist – Early Childhood Young Adult
- Generalist – Early Adolescence
- Generalist – Early Childhood
- Generalist – Middle Childhood
- Mathematics - Early Adolescence
- Science – Early Adolescence
- Social Studies/History – Early Adolescence
- Literacy: Reading Language Arts/Early Adolescence Young Adult
- Library Media / Early Childhood Through Young Adulthood
- Other (fill in comment box) _____

37 Which of the following do you consider the location of your school to be:

- Located in an urban area
- Located in suburban area
- Located in a small town or rural area

38 What is the approximate size of the school where you teach?

- 250 or fewer students
- 251 to 500 students
- 501 - 800 students
- Greater than 800 students

39 Do you predominantly teach one subject?

- Yes
- No

40 If you answered yes to the previous question, what subject do you teach?

41 Would you be willing to be part of a follow up focus group helping to interpret the results of this survey?

Yes

No

42 Would you like to be entered into a drawing for a gift certificate as a reward for participating in the survey?

Yes

No

43 If you answered "yes" to being in a focus group, or being entered in to a drawing, please provide your contact information.

44 Name (First and Last)

45 Email address:

46 Phone Number (Area) xxx - xxxx

47 Click here to go to the end of the Survey

End

Appendix 2 Institutional Review Board Approval

Approval letter from the University of Washington Institutional Review Board on following page.

Date: August 21, 2013

PI: Mr. David Willer, PhC
Information School

CC: Cortney Leach, Research Development Manager
Information School

RE: HSD study #45742
"Targeting success: An evaluation of information literacy standards"

Dear Mr. Willer:

The University of Washington Human Subjects Division (HSD) has determined that your research qualifies for exempt status in accordance with the federal regulations under 45 CFR 46.101/ 21 CFR 56.104. Details of this determination are as follows:

Exempt category determination: **Category 2**

Determination period: **8/21/2013 - 8/20/2018**

Although research that qualifies for exempt status is not governed by federal requirements for research involving human subjects, investigators still have a responsibility to protect the rights and welfare of their subjects, and are expected to conduct their research in accordance with the ethical principles of *Justice, Beneficence* and *Respect for Persons*, as described in the Belmont Report, as well as with state and local institutional policy.

Determination Period: An exempt determination is valid for five years from the date of the determination, as long as the nature of the research activity remains the same. If there is any substantive change to the activity that has determined to be exempt, one that alters the overall design, procedures, or risk/benefit ratio to subjects, the exempt determination will no longer be valid. Exempt determinations expire automatically at the end of the five-year period. If you complete your project before the end of the determination period, it is not necessary to make a formal request that your study be closed. Should you need to continue your research activity beyond the five-year determination period, you will need to submit a new *Exempt Status Request* form for review and determination *prior to implementation*.

Revisions: Only modifications that are deemed "minor" are allowable, in other words, modifications that do not change the nature of the research and therefore do not affect the validity of the exempt determination. **Please refer to the Guidance document for more information about what are considered minor changes.** If changes that are considered to be "substantive" occur to the research, that is, changes that alter the nature of the research and therefore affect the validity of the exempt determination, a new *Exempt Status Request* must be submitted to HSD for review and determination *prior to implementation*.

Problems: If issues should arise during the conduct of the research, such as unanticipated problems, adverse events or any problem that may increase the risk to the human subjects and change the category of review, notify HSD promptly. Any complaints from subjects pertaining to the risk and benefits of the research must be reported to HSD.

Please use the HSD study number listed above on any forms submitted which relate to this research, or on any correspondence with the HSD office.

Good luck in your research. If we can be of further assistance, please contact us at (206) 543-0098 or via email at hsdinfo@uw.edu. Thank you for your cooperation.

Sincerely,

Heather Rieck
Human Subjects Review Coordinator
(206) 616-5576
hriek@uw.edu

Appendix 3 Information and cognitive development studies reviewed

Author	Age Code					Big6 #						Research Based	
	0	1	2	3	4	5	1	2	3	4	5		6
Baumgarten (2003)	1	1		1				1	1				No
Bilal (2005)				1			1	1	1	1			No
Bucher (2000)				1			1	1	1	1	1		No
Budd (2008)						1							No
Callison (2001)			1										No
Callison (2002)			1	1			1	1	1	1	1		No
Cooper, L.Z. (2005)	1												No
Dresang (2005)				1	1		1	1	1				No
Dresang and Koh (2009)				1	1		1	1	1				No
Eastin (2008)				1	1			1	1				No
Gatten (2004)						1	1	1	1	1	1		No
Gelderblom & Kotze (2008)				1									No
Greenfield & Yan (2006)			1	1	1								No
Heider (2009)	1	1											No
Jackson (2007)						1	1	1	1	1	1		No
Jackson (2008a)						1							No
Johnson (2008)						1							No
Keene & Colvin (2010)						1	1	1	1	1	1		No
Kuhlthau (1981)		1	1	1			1	1	1				No
Kuhlthau (1987)		1	1	1	1		1	1	1	1	1		No
Kuhlthau (1988)		1	1	1	1		1	1	1	1	1		No
Lazonder & Rouet (2008)			1	1			1	1	1		1		No
Orme (2008)						1	1	1	1				No
Yan & Fischer (2004)			1	1	1			1	1				No
Jochmann-Mannak, Huibers & Sanders (2008)			1	1			1	1	1		?		No
Bilal (2000)				1				1	1				Yes
Bilal (2001)				1				1	1				Yes
Bilal (2002)				1			1	1	1				Yes
Bilal and Kirby (2002)				1	1			1	1				Yes
Brown (2001)			1	1			1	1	1	1	1		Yes
Burnett & Wilkinson (2005)				1			1	1	1				Yes
Chung & Neuman (2007)						1	1	1	1	1			Yes
Collen (2008)			1				1	1	1	1	1		Yes
Cooper, L. (2002)		1					1	1	1				Yes

	Age Code					Big6 #							
de Vries, van der Meij, & Lazonder (2008)			1			1	1	1	1			Yes	
Fidel et al. (1999)					1	1	1	1				Yes	
Kuhlthau (1988)					1	1	1	1	1	1		Yes	
Kuhlthau (1994)					1	1	1	1	1	1		Yes	
Kuhlthau (2004)		1	1	1		1	1	1	1	1		Yes	
Kuiper, Volman, & Terwel (2008)			1			1	1	1				Yes	
Lazonder, Biemans, & Woperis (2000)					1		1					Yes	
Lundh & Limberg (2008)				1		1	1	1				Yes	
Madden, Ford, Miller, & Levy (2006)				1	1	1	1					Yes	
Pritchard and Cartwright (2004)				1		1	1	1	1			Yes	
Rouet & Coutelet (2008)				1	1	1	1	1				Yes	
Schachter, Chung, & Dorr (1998)			1	1		1	1	1				Yes	
Spink, Danby, Mallan, & Butler (2010)		1				1	1	1				Yes	
Wolf, Brush, & Saye (2003)				1		1	1	1	1	1		Yes	
Heinstrom (2006)				1	1	1						Yes	
Lathan & Gross (2008)									1			Yes	
Pors (2008)					1	1	1					Yes	
Shenton (2008)					1	1	1					Yes	
Tu, Shih, & Tsai (2008)				1		1	1	1				Yes	
Bowler (2010)					1	1	1	1	1	1		Yes	
Raes, Schellens, De Wever, Vanderhoven (2012)					1	1	1	1	1			Yes	
Foss, Druin, Brewer, Lo, Sanchez, & Golub (2012)		1	1	1		1				?		Yes	
O'Neil, Purvis & Azzopardi (2011)			1	1	1	1						Yes	
Kammerer & Bohnacker (2012)			1			1				1		Yes	
Kovalik, Yutzey & Piazza (2012)					1	1	1	1	1			Yes	
Takahira, Ando, & Sakamoto (2007)				1		1	1	1				Yes	
Moore & St. George (1991)				1		1	1	1				Yes	
Moore (1995)				1		1	1	1				Yes	
Total	3	1	19	36	2	9	38	53	57	46	22	18	
Total for research based	0	5	10	21	1	2	22	34	38	30	12	8	
Total non research based	3	5	9	15	8	7	16	19	19	16	10	10	

Age Codes

0 = Preschool

1 = Grades K-2

2 = Grades 3-5

3 = Grades 6-8

4 = Grades 9-12

5 = College/University

Appendix 4 Interview Format for Focus Groups

Intro

1. Welcome

2. Human Subjects Informed Consent explanation and forms	
Explain form	Share document – UW consent form

3. \$25 Gift cards as compensation – different email address let me know

4. Goal of focus group – *explanatory*, not consensus, disagreement is fine, even good

. Questions from participants about the process

6. Audio Recording Procedures – will be recorded via AdobeConnect

7. Overview of my research	
a. Interested in Information Literacy at different age levels – one way of looking at it is to see what do we already expect of children via Educational standards. b. Do teachers agree with what the standards	Share document – Big6/Little 12

<p>say – can they place the standards at the correct grade level?</p> <p>c. What do teachers believe is developmentally appropriate</p>	
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8. *Group Introductions* – go around – Name, where you teach, grade level and or subject

Questions Grade Level Appropriateness of Standards

<p>1. What makes these [top five standards statements most frequently correctly placed] standards statements easier to place at an appropriate grade level?</p> <p>Repeat with Common Core And AASL</p>	<p>Share All_Top 20</p> <p>Share CC Top 10</p> <p>Share AASL Top 10</p>
<p>a. To what extent was being clearly written a factor? Explain.</p>	
<p>b. Why are 2nd grade easier to place?</p>	
<p>2. What makes these [bottom 5 (first) standards statements most frequently misplaced] standards statements more difficult to place at</p>	<p>Share All_bottom 20</p> <p>Share CC Bottom 10</p>

an appropriate grade level? Repeat with CC & AASL	Share AASL Bottom 10
a. To what extent was being not clearly written a factor? Explain.	
b. To what extent was being out of context a factor? Explain	
c. Why are 8 th grade more difficult to place?	Share All_bottom 20

Questions Grade Level Appropriateness of Standards

1. What makes these [the top 5] standards statements developmentally appropriate for this grade level?	Start with second grade Fifth grade Eighth grade
2. What makes these [the bottom 5] standards statements developmentally inappropriate for this grade level?	Start with second grade Fifth grade Eighth grade

Questions Importance of standards statements being taught at a particular grade level

<p>1. What makes these 5 [to 10?] standards statements the most important to be taught at this grade level (2nd, 5th, 8th grades)?</p>	<p>Start with second grade</p> <p>Fifth grade</p> <p>Eighth grade</p>
<p>2. What makes these 5 [to 10?] standards statements the least important to be taught at this grade level (2nd, 5th, 8th grades)?</p>	<p>Start with second grade</p> <p>Fifth grade</p> <p>Eighth grade</p>

What motivated you to complete the entire survey?

Conclusion

Thank you

Questions contact me

UW iSchool - my advisor is Prof. Mike Eisenberg

UW Human Subjects Division

Appendix 5 Results of NBCT ratings: Developmentally Appropriate and Important to Teach, Grade 2

Second Grade Developmentally Appropriate

Participants were asked to rate the 2nd grade standards for developmental appropriateness on a scale of Strongly Disagree – Disagree – Agree – Strongly Agree. The table shows the results ranked from high (strongly agree) to low (strongly disagree).

Tot is the total number of responses for each item. Standards statement identification (SS ID) is an identifier for each statement. CC = Common Core and AASL = American Association of School Librarians. The last number is the grade level; in this table all are 2nd grade.

SS ID	Standards Statement	SD	D	A	SA	Tot	Mean
AASL.4.1b.G2	Read, view, and listen for pleasure and personal growth. Read, view, and listen to a variety of fiction and nonfiction for enjoyment and information.	0	0	4	29	33	3.88
AASL.1.2a.G2	Find, evaluate, and select appropriate sources to answer questions. Distinguish between fiction and nonfiction books.	0	0	5	28	33	3.85
CC.ELA.RFS.F.4.G2 a	Foundational Skills; Fluency. Read on-level text with purpose and understanding.	0	0	6	28	34	3.82
CC.ELA.IT.KID.1.G 2	Key Ideas and Details. Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text.	0	0	7	27	34	3.79
AASL.3.3a.G2	Participate and collaborate as members of a social and intellectual network of learners. Participate in discussions and listen well.	0	0	7	26	33	3.79
AASL.1.2c.G2	Find, evaluate, and select appropriate sources to answer questions. Understand the basic organizational structure of books.	0	0	8	25	33	3.76

AASL.4.2a.G2	Seek information for personal learning in a variety of formats and genres. Routinely select picture, fiction, and information books; try some books in other genre (poetry, fairy tales).	0	0	8	25	33	3.76
AASL.4.1a.G2	Read, view, and listen for pleasure and personal growth. Request and choose materials related to personal interests.	0	0	9	24	33	3.73
CC.ELA.LS.VAU.4.G2b	Vocabulary Acquisition and Use. Use sentence-level context as a clue to the meaning of a word or phrase.	0	0	10	24	34	3.71
AASL.2.2a.G2	Collaborate with others to exchange ideas, develop new understandings, make decisions, and solve problems. Share information and ideas with others by discussion and listening.	0	1	8	24	33	3.70
AASL.1.5a.G2	Evaluate information found in selected sources on the basis of accuracy, validity, appropriateness for needs, importance, and social and cultural context. Recognize and use facts that answer specific questions.	0	1	10	22	33	3.64
AASL.4.7b.G2	Organize personal knowledge in away that can be called upon easily. Draw pictures of main ideas.	0	2	10	22	34	3.59
AASL.1.6a.G2	Read, view, and listen for information presented in any format (e. g. textual, visual, media, digital) in order to make inferences and gather meaning. Write, draw, or verbalize the main idea and supporting details.	0	0	14	19	33	3.58
CC.ELA.IT.CS.1.G2	Craft and Structure. Determine the meaning of words and phrases in a text relevant to a grade 2 topic or subject area.	0	0	15	19	34	3.56
AASL.1.5b.G2	Evaluate information found in selected sources on the basis of accuracy, validity, appropriateness for needs, importance, and social and cultural context. Interpret information represented in pictures, illustrations, and simple charts.	0	1	14	18	33	3.52
CC.ELA.RFS.F.4.G2b	Foundational Skills; Fluency. Use context to confirm or self-correct word recognition and understanding, rereading as necessary.	0	2	13	19	34	3.50
AASL.1.2d.G2	Find, evaluate, and select appropriate sources to answer questions. Understand that the library has an organizational scheme.	0	0	16	16	32	3.50
AASL.4.4b.G2	Read widely and fluently to make connections with self, the world, and previous reading. Draw conclusions about main idea of a story.	0	2	15	17	34	3.44

AASL.2.1b.G2	Continue an inquiry-based research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to construct new understandings, draw conclusions, and create new knowledge. Identify supporting details.	0	2	15	16	33	3.42
AASL.4.2c.G2	Seek information for personal learning in a variety of formats and genres. Select some books at the appropriate reading level, other books to be read aloud, and other more challenging books of particular interest for browsing and entertainment.	0	1	20	13	34	3.35
CC.ELA.SL.CC.3.G2	Comprehension and Collaboration. Ask and answer questions about what a speaker says in order to clarify comprehension, gather additional information, or deepen understanding of a topic or issue.	0	2	19	13	34	3.32
CC.ELA.LS.VAU.4.G2a	Vocabulary Acquisition and Use. Use glossaries and beginning dictionaries, both print and digital, to determine or clarify the meaning of words and phrases.	0	2	19	13	34	3.32
CC.ELA.SL.CC.1.G2	Comprehension and Collaboration. Ask for clarification and further explanation as needed about the topics and texts under discussion.	0	3	18	13	34	3.29
AASL.4.7a.G2	Organize personal knowledge in away that can be called upon easily. Take notes using graphic organizer provided by teacher or school librarian.	0	1	22	11	34	3.29
AASL.4.2b.G2	Seek information for personal learning in a variety of formats and genres. Select information in various formats and genres based on suggestions from teacher or school librarian and on personal interests.	0	3	18	12	33	3.27
AASL.4.4a.G2	Read widely and fluently to make connections with self, the world, and previous reading. Read widely from multicultural texts in various genres to find out about self and the surrounding world.	0	6	17	11	34	3.15
AASL.1.2b.G2	Find, evaluate, and select appropriate sources to answer questions. Select and use appropriate sources, including picture dictionaries, beginning encyclopedias, magazines, maps, and globes, to answer questions.	0	5	19	9	33	3.12

AASL.4.3a.G2	Use social networks and information tools to gather and share information. Locate information for personal interests and school assignments in print.	0	5	21	8	34	3.09
AASL.4.2d.G2	Seek information for personal learning in a variety of formats and genres. Explain personal criteria for selecting a particular resource.	1	10	14	9	34	2.91
AASL.1.3a.G2	Demonstrate mastery of technology tools for accessing information and pursuing inquiry. Recognize the purpose of the online catalog to locate materials.	2	6	18	6	32	2.88
AASL.1.3b.G2	Demonstrate mastery of technology tools for accessing information and pursuing inquiry. Use online encyclopedias and magazine databases with guidance.	0	9	20	4	33	2.85
CC.ELA.IT.KID.2.G 2	Key Ideas and Details. Identify the main topic of a multiparagraph text as well as the focus of specific paragraphs within the text.	1	9	19	5	34	2.82
AASL.2.1a.G2	Continue an inquiry-based research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to construct new understandings, draw conclusions, and create new knowledge. Find facts to answer questions in more than one source.	1	12	13	7	33	2.79
AASL.3.5a.G2	Use information and technology ethically and responsibly. Rephrase rather than copy whole sentences.	3	8	16	6	33	2.76
AASL.4.3b.G2	Use social networks and information tools to gather and share information. Experiment with online catalog and Web resources to locate information.	3	11	17	3	34	2.59

Second Grade Important to Teach

Participants were asked to rate the 2nd grade standards for importance to teach on a scale of Strongly Disagree – Disagree – Agree – Strongly Agree. The table shows the results ranked from high (strongly agree) to low (strongly disagree).

Tot R is the total number of responses for each item. Standards statement identification (SS ID) is an identifier for each statement. CC = Common Core and AASL = American Association of School Librarians. The last number is the grade level; in this table all are 2nd grade.

SS ID	Standards Statement	SD	D	A	SA	Tot	Mean
AASL.4.1b.G2	Read, view, and listen for pleasure and personal growth. Read, view, and listen to a variety of fiction and nonfiction for enjoyment and information.	0	0	4	29	33	3.88
AASL.1.2a.G2	Find, evaluate, and select appropriate sources to answer questions. Distinguish between fiction and nonfiction books.	0	0	5	28	33	3.85
CC.ELA.RFS.F.4.G2a	Foundational Skills; Fluency. Read on-level text with purpose and understanding.	0	0	6	28	34	3.82
CC.ELA.IT.KI D.1.G2	Key Ideas and Details. Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text.	0	0	7	27	34	3.79
AASL.3.3a.G2	Participate and collaborate as members of a social and intellectual network of learners. Participate in discussions and listen well.	0	0	7	26	33	3.79
AASL.1.2c.G2	Find, evaluate, and select appropriate sources to answer questions. Understand the basic organizational structure of books.	0	0	8	25	33	3.76
AASL.4.2a.G2	Seek information for personal learning in a variety of formats and genres. Routinely select picture, fiction, and information books; try some books in other genre (poetry, fairy tales).	0	0	8	25	33	3.76
AASL.4.1a.G2	Read, view, and listen for pleasure and personal growth. Request and choose materials related to personal interests.	0	0	9	24	33	3.73
CC.ELA.LS.VA U.4.G2b	Vocabulary Acquisition and Use. Use sentence-level context as a clue to the meaning of a word or phrase.	0	0	10	24	34	3.71
AASL.2.2a.G2	Collaborate with others to exchange ideas, develop new understandings, make decisions, and solve problems. Share information and ideas with others by discussion and listening.	0	1	8	24	33	3.7
AASL.1.5a.G2	Evaluate information found in selected sources on the basis of accuracy, validity, appropriateness for needs, importance, and social and cultural context. Recognize and use facts that answer specific questions.	0	1	10	22	33	3.64
AASL.4.7b.G2	Organize personal knowledge in way that can be called upon easily. Draw pictures of main ideas.	0	2	10	22	34	3.59

SS ID	Standards Statement	SD	D	A	SA	T ot	Mean
AASL.1.6a.G2	Read, view, and listen for information presented in any format (e. g. textual, visual, media, digital) in order to make inferences and gather meaning. Write, draw, or verbalize the main idea and supporting details.	0	0	14	19	33	3.58
CC.ELA.IT.CS.1.G2	Craft and Structure. Determine the meaning of words and phrases in a text relevant to a grade 2 topic or subject area.	0	0	15	19	34	3.56
AASL.1.5b.G2	Evaluate information found in selected sources on the basis of accuracy, validity, appropriateness for needs, importance, and social and cultural context. Interpret information represented in pictures, illustrations, and simple charts.	0	1	14	18	33	3.52
CC.ELA.RFS.F.4.G2b	Foundational Skills; Fluency. Use context to confirm or self-correct word recognition and understanding, rereading as necessary.	0	2	13	19	34	3.50
AASL.1.2d.G2	Find, evaluate, and select appropriate sources to answer questions. Understand that the library has an organizational scheme.	0	0	16	16	32	3.50
AASL.4.4b.G2	Read widely and fluently to make connections with self, the world, and previous reading. Draw conclusions about main idea of a story.	0	2	15	17	34	3.44
AASL.2.1b.G2	Continue an inquiry-based research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to construct new understandings, draw conclusions, and create new knowledge. Identify supporting details.	0	2	15	16	33	3.42
AASL.4.2c.G2	Seek information for personal learning in a variety of formats and genres. Select some books at the appropriate reading level, other books to be read aloud, and other more challenging books of particular interest for browsing and entertainment.	0	1	20	13	34	3.35
CC.ELA.SL.CC.3.G2	Comprehension and Collaboration. Ask and answer questions about what a speaker says in order to clarify comprehension, gather additional information, or deepen understanding of a topic or issue.	0	2	19	13	34	3.32
CC.ELA.LS.VA.U.4.G2a	Vocabulary Acquisition and Use. Use glossaries and beginning dictionaries, both print and digital, to determine or clarify the meaning of words and phrases.	0	2	19	13	34	3.32
CC.ELA.SL.CC.1.G2	Comprehension and Collaboration. Ask for clarification and further explanation as needed about the topics and texts under discussion.	0	3	18	13	34	3.29
AASL.4.7a.G2	Organize personal knowledge in away that can be called upon easily. Take notes using graphic organizer provided by teacher or school librarian.	0	1	22	11	34	3.29

SS ID	Standards Statement	SD	D	A	SA	T ot	Mean
AASL.4.2b.G2	Seek information for personal learning in a variety of formats and genres. Select information in various formats and genres based on suggestions from teacher or school librarian and on personal interests.	0	3	18	12	33	3.27
AASL.4.4a.G2	Read widely and fluently to make connections with self, the world, and previous reading. Read widely from multicultural texts in various genres to find out about self and the surrounding world.	0	6	17	11	34	3.15
AASL.1.2b.G2	Find, evaluate, and select appropriate sources to answer questions. Select and use appropriate sources, including picture dictionaries, beginning encyclopedias, magazines, maps, and globes, to answer questions.	0	5	19	9	33	3.12
AASL.4.3a.G2	Use social networks and information tools to gather and share information. Locate information for personal interests and school assignments in print.	0	5	21	8	34	3.09
AASL.4.2d.G2	Seek information for personal learning in a variety of formats and genres. Explain personal criteria for selecting a particular resource.	1	10	14	9	34	2.91
AASL.1.3a.G2	Demonstrate mastery of technology tools for accessing information and pursuing inquiry. Recognize the purpose of the online catalog to locate materials.	2	6	18	6	32	2.88
AASL.1.3b.G2	Demonstrate mastery of technology tools for accessing information and pursuing inquiry. Use online encyclopedias and magazine databases with guidance.	0	9	20	4	33	2.85
CC.ELA.IT.KI D.2.G2	Key Ideas and Details. Identify the main topic of a multiparagraph text as well as the focus of specific paragraphs within the text.	1	9	19	5	34	2.82
AASL.2.1a.G2	Continue an inquiry-based research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to construct new understandings, draw conclusions, and create new knowledge. Find facts to answer questions in more than one source.	1	12	13	7	33	2.79
AASL.3.5a.G2	Use information and technology ethically and responsibly. Rephrase rather than copy whole sentences.	3	8	16	6	33	2.76
AASL.4.3b.G2	Use social networks and information tools to gather and share information. Experiment with online catalog and Web resources to locate information.	3	11	17	3	34	2.59

Appendix 6 Results of NBCT ratings: Developmental Appropriateness and Important to Teach Grade 5

Grade 5 Appropriate to Teach

Participants were asked to rate the 5th grade standards for developmental appropriateness on a scale of Strongly Disagree – Disagree – Agree – Strongly Agree. The table shows the results ranked from high (strongly agree) to low (strongly disagree).

Tot is the total number of responses for each item. Standards statement identification (SS ID) is an identifier for each statement. CC = Common Core and AASL = American Association of School Librarians. The last number is the grade level; in this table all are 5th grade.

SS ID	Standards Statement	SD	D	A	SA	Tot	Mean
CC.ELA.RFS.F.4.G5a	Foundational Skills; Phonics and Word Recognition. Read on-level text with purpose and understanding.	1	0	4	19	24	3.71
AASL.4.4b.G5	Read widely and fluently to make connections with self, the world, and previous reading. Read widely to explore new ideas.	0	0	7	17	24	3.71
AASL.1.5d.G5	Find, evaluate, and select appropriate sources to answer questions. Use the organizational structure of a book (for example, table of contents, index, chapter headings) to locate information to answer questions.	0	1	7	16	24	3.63
AASL.1.5e.G5	Evaluate information found in selected sources on the basis of accuracy, validity, appropriateness for needs, importance, and social and cultural context. Interpret information taken from maps, graphs, charts, and other visuals.	0	0	9	15	24	3.63
CC.ELA.L.CS.4.G5	Craft and Structure. Determine the meaning of words and phrases as they are used in a text, including figurative language such as metaphors and similes.	0	0	10	14	24	3.58
CC.ELA.IT.CS.1.G2	Craft and Structure. Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.	0	1	8	15	24	3.58
CC.ELA.RFS.F.4.G5b	Foundational Skills; Phonics and Word Recognition. Use context to confirm or self-correct word recognition and understanding, rereading as necessary.	1	0	7	16	24	3.58
AASL.2.1c.G5	Continue an inquiry-based research process by	0	1	8	15	24	3.58

	applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to construct new understandings, draw conclusions, and create new knowledge. Identify facts and details that support main ideas.						
AASL.1.3c.G5	Demonstrate mastery of technology tools for accessing information and pursuing inquiry. Use selected search engines to find appropriate information.	0	0	11	13	24	3.54
AASL.4.4c.G5	Read widely and fluently to make connections with self, the world, and previous reading. Recognize features of various genres and use different reading strategies for understanding.	0	0	11	13	24	3.54
AASL.1.2b.G5	Find, evaluate, and select appropriate sources to answer questions. Understand the library's organizational scheme and what main topics are included in each section.	0	2	8	14	24	3.50
AASL.1.2c.G5	Find, evaluate, and select appropriate sources to answer questions. Use multiple resources, including print, electronic, and human, to locate information.	0	0	12	12	24	3.50
AASL.1.5a.G5	Evaluate information found in selected sources on the basis of accuracy, validity, appropriateness for needs, importance, and social and cultural context. Skim/scan to locate information that is appropriate to age and ability level.	0	1	10	13	24	3.50
AASL.1.5d.G5	Evaluate information found in selected sources on the basis of accuracy, validity, appropriateness for needs, importance, and social and cultural context. Distinguish between fact and opinion.	0	3	6	15	24	3.50
AASL.4.2a.G5	Seek information for personal learning in a variety of formats and genres. Select books from favorite authors and genres; try new genres when suggested.	0	0	12	12	24	3.50
AASL.4.3a.G5	Use social networks and information tools to gather and share information. Use basic strategies (author, title, subject) to locate information using the library's online catalog.	0	1	10	13	24	3.50
AASL.4.4a.G5	Read widely and fluently to make connections with self, the world, and previous reading. Use evidence from the text to discuss the author's purpose.	0	2	8	14	24	3.50
CC.ELA.L.KID.1.G5	Key Ideas and Details. Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.	0	2	9	13	24	3.46
CC.ELA.W.RBPW.9.G5	Research to Build and Present Knowledge. Draw evidence from literary or informational texts to support analysis, reflection, and research.	0	0	13	11	24	3.46
AASL.1.5b.G5	Evaluate information found in selected sources on the basis of accuracy, validity, appropriateness for needs, importance, and social and cultural context. Identify facts and details that support main ideas.	0	2	9	13	24	3.46
AASL.1.5f.G5	Evaluate information found in selected sources on the basis of accuracy, validity, appropriateness for needs, importance, and social and cultural context. Select information to answer questions or solve a problem.	0	2	9	13	24	3.46

AASL.3.5a.G5	Use information and technology ethically and responsibly. Demonstrate understanding of plagiarism by paraphrasing information or noting direct quotes.	0	0	13	10	23	3.43
CC.ELA.LS.VAU.4.G5a	Vocabulary Acquisition and Use. Use context (e. g. , cause/effect relationships and comparisons in text) as a clue to the meaning of a word or phrase.	1	1	9	13	24	3.42
AASL.4.1a.G5	Read, view, and listen for pleasure and personal growth. Read, listen to, and view a range of resources for a variety of purposes; to live the experience of a character, to answer questions, to find out about something new, to explore personal interests.	1	0	11	12	24	3.42
CC.ELA.LS.VAU.4.G5b	Vocabulary Acquisition and Use. Consult reference materials (e. g. , dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation and determine or clarify the precise meaning of key words and phrases.	1	2	8	13	24	3.38
AASL.1.3a.G5	Demonstrate mastery of technology tools for accessing information and pursuing inquiry. Search an online catalog to locate materials.	1	0	12	11	24	3.38
AASL.1.5c.G5	Evaluate information found in selected sources on the basis of accuracy, validity, appropriateness for needs, importance, and social and cultural context. Evaluate facts for accuracy.	0	2	11	11	24	3.38
AASL.3.2a.G5	Conclude and inquiry-based research process by sharing new understandings and reflecting on the learning. Use information appropriate to task and audience.	0	2	11	11	24	3.38
AASL.4.2c.G5	Seek information for personal learning in a variety of formats and genres. Independently select appropriate print, nonprint, and electronic materials on an individual level.	0	0	15	9	24	3.38
AASL.4.6a.G5	Connect ideas to own interests and previous knowledge and experience. Understand literal meaning and identify the main points reflected in a work.	1	1	10	12	24	3.38
AASL.1.7a.G5	Demonstrate mastery of technology tools for accessing information and pursuing inquiry. Use software or online tools to record and organize information.	0	1	12	9	22	3.36
AASL.1.3b.G5	Demonstrate mastery of technology tools for accessing information and pursuing inquiry. Use selected websites and periodical databases to find appropriate information.	0	0	15	8	23	3.35
AASL.4.7a.G5	Organize personal knowledge in away that can be called upon easily. Use two-column approach to note-taking to capture personal connections to information.	0	1	14	8	23	3.30
CC.ELA.L.KID.2.G5	Key Ideas and Details. Determine a theme of a story, drama, or poem from details in the text, including how characters in a story or drama respond to challenges or how the speaker in a poem reflects upon a topic; summarize the text.	0	4	9	11	24	3.29
AASL.1.1.G5	Use prior and background knowledge as context for	0	3	11	10	24	3.29

	new learning. Identify and use appropriate sources to acquire background information.						
AASL.2.1b.G5	Continue an inquiry-based research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to construct new understandings, draw conclusions, and create new knowledge. Use different clues (placement in text, signal words, focal point of illustration) to determine important ideas in illustrations and text.	0	1	15	8	24	3.29
AASL.2.1a.G5	Continue an inquiry-based research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to construct new understandings, draw conclusions, and create new knowledge. Find similar big ideas in more than one source.	0	2	14	8	24	3.25
AASL.3.4a.G5	Connect learning to community issues. Gather ideas and information from different points of view.	0	3	12	9	24	3.25
AASL.4.2b.G5	Seek information for personal learning in a variety of formats and genres. Select information in various formats based on a theme, topic, and connection to classroom learning or personal interest.	0	2	14	8	24	3.25
AASL.1.2a.G5	Find, evaluate, and select appropriate sources to answer questions. Select and use appropriate sources, including specialized reference sources and databases, to answer questions.	0	5	11	7	23	3.09

Grade 5 Important to Teach

Participants were asked to rate the 5th grade standards for important to teach on a scale of Strongly Disagree – Disagree – Agree – Strongly Agree. The table shows the results ranked from high (strongly agree) to low (strongly disagree).

Tot is the total number of responses for each item. Standards statement identification (SS ID) is an identifier for each statement. CC = Common Core and AASL = American Association of School Librarians. The last number is the grade level; in this table all are 5th grade.

SS ID	Standards Statement	SD	D	A	SA	Tot	Mean
CC.ELA.RFS.F.4.G5a	Foundational Skills; Phonics and Word Recognition. Read on-level text with purpose and understanding.	0	0	4	19	23	3.83
AASL.1.2c.G5	Find, evaluate, and select appropriate sources to answer questions. Use multiple resources, including print, electronic, and human, to locate information.	0	0	10	14	24	3.58

CC.ELA.IT.CS.1.G2	Craft and Structure. Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.	0	1	9	14	24	3.54
AASL.1.5a.G5	Evaluate information found in selected sources on the basis of accuracy, validity, appropriateness for needs, importance, and social and cultural context. Skim/scan to locate information that is appropriate to age and ability level.	0	1	9	14	24	3.54
AASL.1.5e.G5	Evaluate information found in selected sources on the basis of accuracy, validity, appropriateness for needs, importance, and social and cultural context. Interpret information taken from maps, graphs, charts, and other visuals.	0	1	9	14	24	3.54
AASL.2.1c.G5	Continue an inquiry-based research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to construct new understandings, draw conclusions, and create new knowledge. Identify facts and details that support main ideas.	0	2	7	15	24	3.54
CC.ELA.L.CS.4.G5	Craft and Structure. Determine the meaning of words and phrases as they are used in a text, including figurative language such as metaphors and similes.	0	0	12	12	24	3.50
CC.ELA.LS.VAU.4.G5a	Vocabulary Acquisition and Use. Use context (e. g. , cause/effect relationships and comparisons in text) as a clue to the meaning of a word or phrase.	0	1	10	13	24	3.50
AASL.1.3c.G5	Demonstrate mastery of technology tools for accessing information and pursuing inquiry. Use selected search engines to find appropriate information.	0	0	12	12	24	3.50
AASL.1.5b.G5	Evaluate information found in selected sources on the basis of accuracy, validity, appropriateness for needs, importance, and social and cultural context. Identify facts and details that support main ideas.	0	1	10	13	24	3.50
AASL.3.5a.G5	Use information and technology ethically and responsibly. Demonstrate understanding of plagiarism by paraphrasing information or noting direct quotes.	0	0	12	11	23	3.48
CC.ELA.W.RBPW.9.G5	Research to Build and Present Knowledge. Draw evidence from literary or informational texts to support analysis, reflection, and research.	0	0	13	11	24	3.46
AASL.1.5d.G5	Find, evaluate, and select appropriate sources to answer questions. Use the organizational structure of a book (for example, table of contents, index, chapter headings) to locate information to answer questions.	1	1	8	14	24	3.46
AASL.4.4b.G5	Read widely and fluently to make connections with self, the world, and previous reading. Read widely to explore new ideas.	1	1	8	14	24	3.46
CC.ELA.RFS.F.4.G5b	Foundational Skills; Phonics and Word Recognition. Use context to confirm or self-correct word recognition and understanding, rereading as necessary.	1	1	8	13	23	3.43

AASL.1.5d.G5	Evaluate information found in selected sources on the basis of accuracy, validity, appropriateness for needs, importance, and social and cultural context. Distinguish between fact and opinion.	0	4	6	14	24	3.42
AASL.1.5f.G5	Evaluate information found in selected sources on the basis of accuracy, validity, appropriateness for needs, importance, and social and cultural context. Select information to answer questions or solve a problem.	0	2	10	12	24	3.42
AASL.4.4a.G5	Read widely and fluently to make connections with self, the world, and previous reading. Use evidence from the text to discuss the author's purpose.	0	2	10	12	24	3.42
CC.ELA.L.KID.1.G5	Key Ideas and Details. Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.	0	2	11	11	24	3.38
AASL.1.5c.G5	Evaluate information found in selected sources on the basis of accuracy, validity, appropriateness for needs, importance, and social and cultural context. Evaluate facts for accuracy.	0	2	11	11	24	3.38
AASL.4.4c.G5	Read widely and fluently to make connections with self, the world, and previous reading. Recognize features of various genres and use different reading strategies for understanding.	1	0	12	11	24	3.38
AASL.4.6a.G5	Connect ideas to own interests and previous knowledge and experience. Understand literal meaning and identify the main points reflected in a work.	1	1	10	12	24	3.38
AASL.4.1a.G5	Read, view, and listen for pleasure and personal growth. Read, listen to, and view a range of resources for a variety of purposes; to live the experience of a character, to answer questions, to find out about something new, to explore personal interests.	0	2	11	10	23	3.35
AASL.1.3a.G5	Demonstrate mastery of technology tools for accessing information and pursuing inquiry. Search an online catalog to locate materials.	1	1	12	10	24	3.29
AASL.4.2c.G5	Seek information for personal learning in a variety of formats and genres. Independently select appropriate print, nonprint, and electronic materials on an individual level.	0	3	11	10	24	3.29
CC.ELA.LS.VAU.4.G5b	Vocabulary Acquisition and Use. Consult reference materials (e. g. , dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation and determine or clarify the precise meaning of key words and phrases.	1	3	9	11	24	3.25
AASL.1.1.G5	Use prior and background knowledge as context for new learning. Identify and use appropriate sources to acquire background information.	0	3	12	9	24	3.25
AASL.1.7a.G5	Demonstrate mastery of technology tools for accessing information and pursuing inquiry. Use software or online tools to record and organize information.	0	3	12	9	24	3.25
AASL.3.2a.G5	Conclude and inquiry-based research process by sharing new understandings and reflecting on the learning. Use information appropriate to task and	0	2	14	8	24	3.25

	audience.						
AASL.3.4a.G5	Connect learning to community issues. Gather ideas and information from different points of view.	0	2	14	8	24	3.25
AASL.4.3a.G5	Use social networks and information tools to gather and share information. Use basic strategies (author, title, subject) to locate information using the library's online catalog.	0	5	8	11	24	3.25
CC.ELA.L.KID.2.G5	Key Ideas and Details. Determine a theme of a story, drama, or poem from details in the text, including how characters in a story or drama respond to challenges or how the speaker in a poem reflects upon a topic; summarize the text.	0	4	11	9	24	3.21
AASL.1.2b.G5	Find, evaluate, and select appropriate sources to answer questions. Understand the library's organizational scheme and what main topics are included in each section.	0	6	7	11	24	3.21
AASL.2.1b.G5	Continue an inquiry-based research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to construct new understandings, draw conclusions, and create new knowledge. Use different clues (placement in text, signal words, focal point of illustration) to determine important ideas in illustrations and text.	0	3	13	8	24	3.21
AASL.4.2a.G5	Seek information for personal learning in a variety of formats and genres. Select books from favorite authors and genres; try new genres when suggested.	0	5	9	10	24	3.21
AASL.1.3b.G5	Demonstrate mastery of technology tools for accessing information and pursuing inquiry. Use selected websites and periodical databases to find appropriate information.	0	3	13	7	23	3.17
AASL.2.1a.G5	Continue an inquiry-based research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to construct new understandings, draw conclusions, and create new knowledge. Find similar big ideas in more than one source.	0	4	12	8	24	3.17
AASL.1.2a.G5	Find, evaluate, and select appropriate sources to answer questions. Select and use appropriate sources, including specialized reference sources and databases, to answer questions.	0	4	13	7	24	3.13
AASL.4.2b.G5	Seek information for personal learning in a variety of formats and genres. Select information in various formats based on a theme, topic, and connection to classroom learning or personal interest.	0	5	11	8	24	3.13
AASL.4.7a.G5	Organize personal knowledge in away that can be called upon easily. Use two-column approach to note-taking to capture personal connections to information.	2	1	13	8	24	3.13

Appendix 7 Results of NBCT ratings: Developmental Appropriateness and Important to Teach Grade 8

Grade 8 Developmentally Appropriate to Teach

Participants were asked to rate the 8th grade standards for developmental appropriateness to teach on a scale of Strongly Disagree – Disagree – Agree – Strongly Agree. The table shows the results ranked from high (strongly agree) to low (strongly disagree).

Tot is the total number of responses for each item. Standards statement identification (SS ID) is an identifier for each statement. CC = Common Core and AASL = American Association of School Librarians. The last number is the grade level; in this table all are 8th grade.

Standard Statement ID	Standards Statement	SD	D	A	SA	Tot	Mean
CC.ELA.LS.VAU.4.G8	Vocabulary Acquisition and Use. Use context (e. g. , the overall meaning of a sentence or paragraph; a word's position or function in a sentence) as a clue to the meaning of a word or phrase.	0	1	6	26	33	3.76
CC.ELA.WSHSSSTS.RBP.9.G8	Research to Build and Present Knowledge. Draw evidence from literary or informational texts to support analysis, reflection, and research.	0	0	8	25	33	3.76
AASL.1.3a.G8	Demonstrate mastery of technology tools for accessing information and pursuing inquiry. Use technology resources such as online encyclopedias, online databases, and Web subject directories to locate information.	0	0	8	23	31	3.74
CC.ELA.STL.KID.1.G8	Key Ideas and Details. Cite specific textual evidence to support analysis of science and technical texts.	0	0	10	22	32	3.69
CC.ELA.WHSST.RBPK.9.G8	Research to Build and Present Knowledge. Draw evidence from informational texts to support analysis reflection, and research.	0	0	10	20	30	3.67

Standard Statement ID	Standards Statement	SD	D	A	SA	Tot	Mean
AASL.2.1a.G8	Continue an inquiry-based research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to construct new understandings, draw conclusions, and create new knowledge. Identify main ideas and find supporting examples, definitions, and details.	0	1	10	20	31	3.61
AASL.3.3a.G8	Participate and collaborate as members of a social and intellectual network of learners. Ask questions of others in a group to elicit their information and opinions.	0	1	10	19	30	3.60
CC.ELA.RSL.KID.3.G8	Key Ideas and Details. Analyze how particular lines of dialogue or incidents in a story or drama propel the action, reveal aspects of a character, or provoke a decision.	0	3	8	22	33	3.58
AASL.2.1b.G8	Continue an inquiry-based research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to construct new understandings, draw conclusions, and create new knowledge. Analyze different points of view discovered in different sources.	0	1	12	18	31	3.55
AASL.3.5a.G8	Use information and technology ethically and responsibly. Avoid plagiarism by rephrasing information in their own words.	1	0	11	19	31	3.55
AASL.4.4a.G8	Read widely and fluently to make connections with self, the world, and previous reading. Read with purpose to investigate new ideas beyond the required curriculum.	0	1	11	17	29	3.55
AASL.4.5a.G8	Respond to literature and creative expressions of ideas in various formats and genres. Use illustrations, context, graphics, and layout to extract meaning from different formats.	0	0	14	17	31	3.55

Standard Statement ID	Standards Statement	SD	D	A	SA	Tot	Mean
CC.ELA.IT.CS.6.G8	Craft and Structure. Determine an author's point of view or purpose in a text and analyze how the author acknowledges and responds to conflicting evidence or viewpoints.	0	1	13	19	33	3.55
CC.ELA.LS.VAU.4.G8	Vocabulary Acquisition and Use. Consult general and specialized reference materials (e. g. , dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning or its part of speech.	0	1	13	19	33	3.55
AASL.1.2a.G8	Find, evaluate, and select appropriate sources to answer questions. Evaluate sources based on criteria such as copyright date, authority of author or publisher, comprehensiveness, readability, and alignment with research needs.	0	0	15	16	31	3.52
AASL.1.3b.G8	Demonstrate mastery of technology tools for accessing information and pursuing inquiry. Implement keyword search strategies.	0	1	13	17	31	3.52
CC.ELA.IT.KID.1.G8	Key Ideas and Details. Cite the textual evidence that most strongly supports an analysis of what the text says explicitly as well as inferences drawn from the text.	0	2	12	19	33	3.52
CC.ELA.L.KID.1.G8	Key Ideas and Details. Cite the textual evidence that most strongly supports an analysis of what the text says explicitly as well as inferences drawn from the text.	0	2	12	19	33	3.52
CC.ELA.LS.VAU.5.G8a	Vocabulary Acquisition and Use. Use the relationship between particular words to better understand each of the words.	0	2	12	19	33	3.52
CC.ELA.STL.CS.4.G8	Craft and Structure. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.	0	0	16	16	32	3.50

Standard Statement ID	Standards Statement	SD	D	A	SA	Tot	Mean
CC.ELA.STL.KID.2.G8	Key Ideas and Details. Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.	0	2	12	18	32	3.50
AASL.1.6a.G8	Read, view, and listen for information presented in any format (e. g. textual, visual, media, digital) in order to make inferences and gather meaning. Use both facts and opinions responsibly by identifying and verifying them.	0	0	16	15	31	3.48
AASL.3.1a.G8	Connect learning to community issues. Seek information from different sources to get balanced points of view.	0	0	16	15	31	3.48
AASL.3.3b.G8	Participate and collaborate as members of a social and intellectual network of learners. Accurately describe or summarize ideas of others.	1	1	11	18	31	3.48
AASL.4.7a.G8	Organize personal knowledge in away that can be called upon easily. Develop visual pictures of the main ideas and design concept maps, webs, or graphics to capture the ideas.	0	0	16	15	31	3.48
CC.ELA.STL.CS.6.G8	Craft and Structure. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.	0	2	14	16	32	3.44
AASL.1.4a.G8	Use prior and background knowledge as context for new learning. Observe and analyze an experience, demonstration, or source that introduces a topic, problem, or question to gather background information.	0	1	16	14	31	3.42
AASL.4.2a.G8	Seek information for personal learning in a variety of formats and genres. Explore new genres that fulfill interests and reading level (graphic novels, magazines, online magazines, e-books).	0	1	16	14	31	3.42
AASL.4.2c.G8	Seek information for personal learning in a variety of formats and genres. Select resources on topics of interest at both a comfortable reading level and at higher levels of comprehension.	0	1	16	14	31	3.42

Standard Statement ID	Standards Statement	SD	D	A	SA	Tot	Mean
CC.ELA.HSSL.6.G8	Craft and Structure. Identify aspects of a text that reveal an author's point of view or purpose (e. g. , loaded language, inclusion or avoidance of particular facts).	1	2	12	17	32	3.41
CC.ELA.STL.IKI.8.G8	Integration of Knowledge and Ideas. Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.	0	3	13	16	32	3.41
AASL.1.3c.G8	Demonstrate mastery of technology tools for accessing information and pursuing inquiry. Use a variety of search engines to do advanced searching.	0	0	19	12	31	3.39
AASL.2.1c.G8	Continue an inquiry-based research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to construct new understandings, draw conclusions, and create new knowledge. Interpret information and ideas by defining, classifying, and inferring from information in text.	0	2	15	14	31	3.39
AASL.4.2b.G8	Seek information for personal learning in a variety of formats and genres. Select resources for classroom learning and for personal exploration.	0	1	17	13	31	3.39
AASL.4.2d.G8	Seek information for personal learning in a variety of formats and genres. Select print, nonprint, and electronic materials based on personal interests and knowledge of authors.	0	1	17	13	31	3.39
AASL.1.2b.G8	Find, evaluate, and select appropriate sources to answer questions. Select a variety of credible sources in different formats relevant to research needs.	1	1	15	14	31	3.35
AASL.1.5b.G8	Evaluate information found in selected sources on the basis of accuracy, validity, appropriateness for needs, importance, and social and cultural context. Evaluate and select information based on usefulness, currency, accuracy, authority, and point of view.	1	2	13	14	30	3.33

Standard Statement ID	Standards Statement	SD	D	A	SA	Tot	Mean
AASL.4.1b.G8	Read, view, and listen for pleasure and personal growth. Read, listen to, and view an increasingly wide range of genres and formats for recreation and information.	0	2	17	12	31	3.32
AASL.4.3a.G8	Use social networks and information tools to gather and share information. Use advanced strategies (Boolean searches) to locate information about personal-interest topics in the library's online catalog.	0	2	17	12	31	3.32
CC.ELA.LS.VAU.5.G8b	Vocabulary Acquisition and Use. Distinguish among the connotations (associations) of words with similar denotations (definitions) (e. g. , bullheaded, willful, firm, persistent, resolute).	0	3	16	13	32	3.31
CC.ELA.SL.CC.1.G8	Comprehension and Collaboration. Delineate a speaker's argument and specific claims, evaluating the soundness of the reasoning and relevance and sufficiency of the evidence and identifying when irrelevant evidence is introduced.	1	2	16	14	33	3.30
AASL.1.2d.G8	Find, evaluate, and select appropriate sources to answer questions. Locate appropriate nonfiction resources by using the libraries classification scheme.	0	3	16	12	31	3.29
AASL.4.1a.G8	Read, view, and listen for pleasure and personal growth. Independently locate and select information for personal, hobby, or vocational interests.	0	3	16	12	31	3.29
AASL.1.2c.G8	Find, evaluate, and select appropriate sources to answer questions. Recognize the organization and use of special sections in the library (for example, reference, reserve books, paperbacks).	1	2	17	11	31	3.23
CC.ELA.IT.CS.5.G8	Craft and Structure. Analyze in detail the structure of a specific paragraph in a text, including the role of particular sentences in developing and refining a key concept.	0	4	18	10	32	3.19
AASL.1.5a.G8	Evaluate information found in selected sources on the basis of accuracy, validity, appropriateness for needs, importance, and social and cultural context. Recognize that information has a social or cultural context based in currency, accuracy, authority, and point of view.	1	3	18	9	31	3.13

Grade 8 Important to Teach

Participants were asked to rate the 8th grade standards for important to teach on a scale of Strongly Disagree – Disagree – Agree – Strongly Agree. The table shows the results ranked from high (strongly agree) to low (strongly disagree).

Tot is the total number of responses for each item. Standards statement identification (SS ID) is an identifier for each statement. CC = Common Core and AASL = American Association of School Librarians. The last number is the grade level; in this table all are 8th grade.

SS ID	Standards statement	SD	D	A	SA	Tot	Mean
CC.ELA.WSHSSSTS.RBPK.9.G8	Research to Build and Present Knowledge. Draw evidence from literary or informational texts to support analysis, reflection, and research.	0	0	6	26	32	3.81
AASL.1.3a.G8	Demonstrate mastery of technology tools for accessing information and pursuing inquiry. Use technology resources such as online encyclopedias, online databases, and Web subject directories to locate information.	1	0	5	24	30	3.73
CC.ELA.WHSST.RBPK.9.G8	Research to Build and Present Knowledge. Draw evidence from informational texts to support analysis reflection, and research.	0	1	7	22	30	3.70
CC.ELA.LS.VAU.4.G8	Vocabulary Acquisition and Use. Use context (e. g. , the overall meaning of a sentence or paragraph; a word's position or function in a sentence) as a clue to the meaning of a word or phrase.	1	2	3	26	32	3.69
AASL.3.5a.G8	Use information and technology ethically and responsibly. Avoid plagiarism by rephrasing information in their own words.	0	3	4	23	30	3.67

AASL.2.1b.G8	Continue an inquiry-based research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to construct new understandings, draw conclusions, and create new knowledge. Analyze different points of view discovered in different sources.	0	1	9	20	30	3.63
CC.ELA.STL.KID.1.G8	Key Ideas and Details. Cite specific textual evidence to support analysis of science and technical texts.	0	0	12	19	31	3.61
AASL.2.1a.G8	Continue an inquiry-based research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to construct new understandings, draw conclusions, and create new knowledge. Identify main ideas and find supporting examples, definitions, and details.	0	2	9	19	30	3.57
AASL.3.1a.G8	Connect learning to community issues. Seek information from different sources to get balanced points of view.	0	1	11	18	30	3.57
AASL.3.3a.G8	Participate and collaborate as members of a social and intellectual network of learners. Ask questions of others in a group to elicit their information and opinions.	0	4	5	21	30	3.57
CC.ELA.STL.IKI.8.G8	Integration of Knowledge and Ideas. Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.	0	0	14	17	31	3.55
AASL.1.2a.G8	Find, evaluate, and select appropriate sources to answer questions. Evaluate sources based on criteria such as copyright date, authority of author or publisher, comprehensiveness, readability, and alignment with research needs.	0	0	14	17	31	3.55

CC.ELA.LS.VAU.4.G8	Vocabulary Acquisition and Use. Consult general and specialized reference materials (e. g. , dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning or its part of speech.	0	1	14	17	32	3.50
AASL.1.5b.G8	Evaluate information found in selected sources on the basis of accuracy, validity, appropriateness for needs, importance, and social and cultural context. Evaluate and select information based on usefulness, currency, accuracy, authority, and point of view.	0	1	13	16	30	3.50
CC.ELA.STL.KID.2.G8	Key Ideas and Details. Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.	0	2	12	17	31	3.48
CC.ELA.L.KID.1.G8	Key Ideas and Details. Cite the textual evidence that most strongly supports an analysis of what the text says explicitly as well as inferences drawn from the text.	0	1	15	16	32	3.47
CC.ELA.IT.CS.6.G8	Craft and Structure. Determine an author's point of view or purpose in a text and analyze how the author acknowledges and responds to conflicting evidence or viewpoints.	0	1	15	16	32	3.47
CC.ELA.IT.KID.1.G8	Key Ideas and Details. Cite the textual evidence that most strongly supports an analysis of what the text says explicitly as well as inferences drawn from the text.	0	1	15	16	32	3.47
CC.ELA.STL.CS.4.G8	Craft and Structure. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.	0	0	16	14	30	3.47

AASL.1.2b.G8	Find, evaluate, and select appropriate sources to answer questions. Select a variety of credible sources in different formats relevant to research needs.	1	0	13	16	30	3.47
AASL.1.6a.G8	Read, view, and listen for information presented in any format (e. g. textual, visual, media, digital) in order to make inferences and gather meaning. Use both facts and opinions responsibly by identifying and verifying them.	0	3	10	17	30	3.47
AASL.3.3b.G8	Participate and collaborate as members of a social and intellectual network of learners. Accurately describe or summarize ideas of others.	0	4	8	18	30	3.47
AASL.4.5a.G8	Respond to literature and creative expressions of ideas in various formats and genres. Use illustrations, context, graphics, and layout to extract meaning from different formats.	0	3	10	16	29	3.45
AASL.1.3b.G8	Demonstrate mastery of technology tools for accessing information and pursuing inquiry. Implement keyword search strategies.	1	3	8	18	30	3.43
CC.ELA.LS.VAU.5.G8a	Vocabulary Acquisition and Use. Use the relationship between particular words to better understand each of the words.	0	4	11	17	32	3.41
AASL.1.4a.G8	Use prior and background knowledge as context for new learning. Observe and analyze an experience, demonstration, or source that introduces a topic, problem, or question to gather background information.	0	2	14	14	30	3.40
AASL.4.4a.G8	Read widely and fluently to make connections with self, the world, and previous reading. Read with purpose to investigate new ideas beyond the required curriculum.	0	2	14	14	30	3.40
CC.ELA.RSL.KID.3.G8	Key Ideas and Details. Analyze how particular lines of dialogue or incidents in a story or drama propel the action, reveal aspects of a character, or provoke a decision.	0	3	14	14	31	3.35

CC.ELA.HSSL.6.G8	Craft and Structure. Identify aspects of a text that reveal an author's point of view or purpose (e. g. , loaded language, inclusion or avoidance of particular facts).	0	4	12	14	30	3.33
AASL.1.5a.G8	Evaluate information found in selected sources on the basis of accuracy, validity, appropriateness for needs, importance, and social and cultural context. Recognize that information has a social or cultural context based in currency, accuracy, authority, and point of view.	0	3	14	13	30	3.33
AASL.2.1c.G8	Continue an inquiry-based research process by applying critical-thinking skills (analysis, synthesis, evaluation, organization) to information and knowledge in order to construct new understandings, draw conclusions, and create new knowledge. Interpret information and ideas by defining, classifying, and inferring from information in text.	1	2	13	14	30	3.33
CC.ELA.LS.VAU.5.G8b	Vocabulary Acquisition and Use. Distinguish among the connotations (associations) of words with similar denotations (definitions) (e. g. , bullheaded, willful, firm, persistent, resolute).	0	1	19	11	31	3.32
CC.ELA.STL.CS.6.G8	Craft and Structure. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.	0	2	17	12	31	3.32
AASL.4.7a.G8	Organize personal knowledge in away that can be called upon easily. Develop visual pictures of the main ideas and design concept maps, webs, or graphics to capture the ideas.	0	4	13	13	30	3.30
AASL.4.2c.G8	Seek information for personal learning in a variety of formats and genres. Select resources on topics of interest at both a comfortable reading level and at higher levels of comprehension.	0	4	14	12	30	3.27

AASL.4.3a.G8	Use social networks and information tools to gather and share information. Use advanced strategies (Boolean searches) to locate information about personal-interest topics in the library's online catalog.	0	4	14	11	29	3.24
AASL.1.3c.G8	Demonstrate mastery of technology tools for accessing information and pursuing inquiry. Use a variety of search engines to do advanced searching.	0	4	15	11	30	3.23
AASL.4.2a.G8	Seek information for personal learning in a variety of formats and genres. Explore new genres that fulfill interests and reading level (graphic novels, magazines, online magazines, e-books).	0	5	13	12	30	3.23
AASL.4.2d.G8	Seek information for personal learning in a variety of formats and genres. Select print, nonprint, and electronic materials based on personal interests and knowledge of authors.	1	4	13	12	30	3.20
AASL.1.2c.G8	Find, evaluate, and select appropriate sources to answer questions. Recognize the organization and use of special sections in the library (for example, reference, reserve books, paperbacks).	1	5	12	12	30	3.17
AASL.4.2b.G8	Seek information for personal learning in a variety of formats and genres. Select resources for classroom learning and for personal exploration.	0	5	15	10	30	3.17
CC.ELA.STL.CC.1.G8	Comprehension and Collaboration. Delineate a speaker's argument and specific claims, evaluating the soundness of the reasoning and relevance and sufficiency of the evidence and identifying when irrelevant evidence is introduced.	0	5	16	10	31	3.16
AASL.4.1a.G8	Read, view, and listen for pleasure and personal growth. Independently locate and select information for personal, hobby, or vocational interests.	0	7	12	11	30	3.13

AASL.4.1b.G8	Read, view, and listen for pleasure and personal growth. Read, listen to, and view an increasingly wide range of genres and formats for recreation and information.	1	5	14	10	30	3.10
AASL.1.2d.G8	Find, evaluate, and select appropriate sources to answer questions. Locate appropriate nonfiction resources by using the libraries classification scheme.	1	7	11	11	30	3.07
CC.ELA.IT.CS.5.G8	Craft and Structure. Analyze in detail the structure of a specific paragraph in a text, including the role of particular sentences in developing and refining a key concept.	0	8	16	7	31	2.97

Appendix 8 Standard Statement Identification Codes

The first section indicates one of the two issuing organizations, either the American Association of School Librarians (AASL) or the Common Core State Standards (CC).

The second number for the AASL standard statements is the AASL standard number (one of four standards). That is followed by a number and letter for the AASL indicator and finally by a G2, G5, or G8 for the grade level.

The Common Core has two types of standards, English Language Art and Mathematics. None of the Mathematics standard statements were included in the survey. The second part of the Common Core standard statements is ELA for English Language Arts. Following the ELA designator comes a combinator of the following indicators followed by a number indicating the standard statement number and finally a G2, G5, or G8 for the grade level.

L - Literature

IT – Informational Text

LS – Language Standards

RFS – Reading, Foundational Skills

KID – Key Ideas and Details

CS – Craft and Structure

IKI – Integration of Knowledge and Ideas

PWR – Phonics and Word Recognition

F – Fluency

CC – Comprehension and Collaboration

VAU – Vocabulary Acquisition and Use

CSE – Conventions of Standard English

KL – Knowledge of Language

RBPK – Research to Build and Present Knowledge

HSSTST = History/Social Studies, Science and Technology

HSS – History Social Studies

STL – Science and Technical Literacy

TTP – Text Types and Purpose

PDW – Production and Distribution of Writing

RW – Range of Writing

WSHSSSTS – Writing Standards for History Social Studies Science and Technical Subjects

WHSST – Writing Standards for History Social Studies

Appendix 9 Instruction to Coders – Task Count Index and Clarity Rating

Task Count Identification

1) Please count the number of separate tasks each “Standard Statement” includes. Things to be aware of are the words “and” and “or.” These indicate multiples of a single task. Also be alert for the use of a semicolon to tack on an additional statement/s at the end of a standard statement.

If a standard statement lists examples (in parentheses, or with an e.g.) you do not need to count these as separate tasks. If the standard statement uses the word “including” count all those items as separate tasks.

Please see the examples I’ve included in the spreadsheet.

The Excel notebook I’ve attached has two sheets – one of examples, and one sheet for you to code.

For reference, in my own counting of the number of tasks in all the standards statements, the number of tasks has ranged from one to 18.

2) After counting the tasks in an individual benchmark, please give the standard statement a rating for clarity based on the following scale –

- 3 = Clear and easy to understand
- 2 = Still understandable but a bit awkward and/or confusing
- 1 = Overly complex, more than 3 “ands/“ors”; wording is confusing or easily mixed up.

I left some identifying information in the spreadsheet.

Type = either A for American Association of School Librarians (AASL) or C for Common Core State Standards (CCSS).

Number = my number for ordering/sorting

If any of this is confusing, or if you have questions please contact me, either by email or feel free to call my cell phone (xxx) xxx-xxxx.

Lastly, I would appreciate it if you could have these back to me by the end of August.

Thanks,

Dave

Samples provided to Coders for coding Task Count Index

Standard statement	# of Tasks	Clarity Rating	Breaking the standard statement down into individual tasks.	Comments
Distinguish between fiction and nonfiction books.	1	3	Distinguish between fact and fiction	One item; easy to understand
Determine the meaning of words and phrases as they are used in a text, including figurative language such as metaphors and similes.	4	2	1. Meaning of words	This should be interpreted as 4 separate tasks.
			2. Meaning of phrase	
			3. Meaning of metaphors	
			4. Meaning of similes	
Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.	2	2	1. Quote Accurately from a text when explaining explicitly	The "and" puts two tasks together and I found it somewhat less than clear.
			2. Quote accurately from a text when drawing inferences	
Determine a theme of a story, drama, or poem from details in the text, including how characters in a story or drama respond to challenges or how the speaker in a poem reflects upon a topic; summarize the text.	7	1	1. Determine the theme of a story from details in the text	This is confusing due to its complexity. There are seven different tasks embedded in one standard statement.
			2. Determine the theme of a drama from details in the text	
			3. Determine the theme of a poem from details in the text	
			4. How do characters respond to a challenge in a story?	
			5. How characters respond to a challenge in a drama?	
			6. How does a speaker in a poem reflect upon a topic?	
			7. Summarize the text.	

Observe and analyze an experience, demonstration, or source that introduces a topic, problem, or question to gather background information.	18	1	1. Observe an experience that introduces a topic to gather background information.	I gave it a one due to the number of different tasks involved.
			2. Observe an experience that introduces a problem to gather background information.	
			3. Observe an experience that introduces a question to gather background information.	
			4. Observe a demonstration that introduces a topic to gather background information.	
			5. Observe a demonstration that introduces a problem to gather background information.	
			6. Observe a demonstration that introduces a question to gather background information.	
			7. Observe a source that introduces a topic to gather background information.	
			8. Observe a source that introduces a problem to gather background information.	
			9. Observe a source that introduces a question to gather background information.	
			10. Analyze an experience that introduces a topic to gather background information.	
			11. Analyze an experience that introduces a problem to gather background information.	
			12. Analyze an experience that introduces a question to gather background information.	
			13. Analyze a demonstration that introduces a topic to gather background information.	
			14. Analyze a demonstration that introduces a problem to gather background information.	

			15. Analyze a demonstration that introduces a question to gather background information.	
			16. Analyze a source that introduces a topic to gather background information.	
			17. Analyze a source that introduces a problem to gather background information.	
			18. Analyze a source that introduces a question to gather background information.	