Indiana Academic Standards

Content Area Literacy: Science/Technical Subjects

I. Introduction

The college and career ready Indiana Academic Standards for English/Language Arts are the result of a process designed to identify, evaluate, synthesize, and create the most high-quality, rigorous standards for Indiana students. The definitions that guided this work were created by the Indiana Education Roundtable, Department of Education, Center for Education & Career innovation, Commission for Higher Education and the Department of Workforce Development. The definition for college and career ready by this group and used throughout this process is as follows: "College-and – career ready means an individual has the knowledge, skills and abilities to succeed in post-secondary education and economically-viable career opportunities." Additionally Public Law 31-2014 [SEA 91] defines college and career readiness educational standards as "the standards that a high school graduate must meet to obtain the requisite knowledge and skill to transition without remediation to post-secondary education or training, and ultimately into a sustainable career."

Standards Process

The Indiana Academic Standards were created through a collaborative process with input from teams of K-12 educators and parents representing school corporations located throughout the state of Indiana; professors of higher education, representing a wide range of Indiana's public and private colleges and universities; and representatives from Indiana businesses and industries. The purpose of the standards process was to design college and career ready standards that would ensure students who complete high school in Indiana are ready for college and careers.

History

Public Law 286 was passed by the Indiana General Assembly in 2013, which created Indiana Code 20-19-2-14.5. The law requires the Indiana State Board of Education to perform a comprehensive review of Indiana's current standards (which were the 2010 Common Core State Standards[1]) and to adopt college and career ready educational standards no later than July 1, 2014.

In the fall of 2013, the Indiana Department of Education established Technical Teams, which were comprised of K-12 educators in English/Language Arts and Mathematics. The Technical Teams were responsible for reviewing the existing Indiana Academic Standards (Common Core State Standards) and providing suggestions for edits and word changes to improve the clarity and progression of the standards. The Department also created Advisory Teams, which were made up of educators from k-12, parents, community members, and higher education institutions across Indiana. The Advisory Teams were responsible for reviewing the work of the Technical Teams and providing additional input.

Evaluation Process

In January of 2014, the Indiana Department of Education, in collaboration with the Indiana State Board of Education, established Evaluation Teams. The Evaluation Teams were responsible for additional layers beyond the work of the Technical and Advisory Teams. The Evaluation Teams were tasked with conducting a comprehensive analysis of several sets of standards, with the goal of identifying the standards that most clearly aligned with the content and skills that Hoosier students would need to know and be able to do in order to be college and career ready.

Membership for the Evaluation Teams was gleaned from individuals who had previously participated on either a Technical Team or an Advisory Team. The Evaluation Team members were selected for their subject matter expertise (in English/Language Arts or Mathematics) and their classroom teaching experience. The Evaluation Teams were made up of K-12 educators who represented a wide variety of Indiana school corporations with over 445 years of combined

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classroom teaching experience, and higher education subject matter experts in English/Language Arts and Mathematics, representing Indiana's public and private institutions of higher education.

The Evaluation Teams met for the first time in February of 2014. The English/Language Arts evaluation teams were given the E/LA Common Core State Standards, as well as Indiana's 2006 E/LA Academic Standards and the standards created by the National Council of Teachers of English. The Mathematics evaluation teams were given the Mathematics Common Core State Standards, as well as Indiana's 2000 Math Academic Standards, Indiana's 2009 Math Academic Standards, and the standards created by the National Council of Teachers of Mathematics.

The panel was instructed to independently evaluate each set of standards, identifying whether the standard was wholly aligned with what a Hoosier student would need to know and be able to do in order to be college and career ready; partially aligned with what a Hoosier student would need to know and be able to do in order to be college and career ready; or not aligned with what a Hoosier student would need to know and be able to do in order to be college and career ready. The results of the evaluation were processed according to a forced consensus requirement—a majority requirement was calculated for each group of standards that was reviewed. Any standard that received a fully aligned rating by the majority of reviewers was marked as fully aligned; any standard that received a not aligned rating by the majority of reviewers was marked as not aligned; and any standard that received a partially aligned rating by the majority, or did not have a majority result, was marked as partially aligned.

Once the evaluations were complete, the results were compiled, and the Evaluation Teams were brought together to conduct a consensus process. The consensus process was blind (meaning that the Evaluation Team members did not know the origin of the standards that they were discussing). Through the consensus process, the Evaluation Teams were asked to select the standards that best and most thoroughly represented what students should know and be able to do in various areas of English/Language Arts and Mathematics in order to be college and career ready. The Evaluation Teams selected the standards that they found to be most appropriate; combined standards to create a more appropriate, rigorous, or clear standard; or, if they determined that gaps existed, wrote standards, or reviewed standards from other states (for example, the English/Language Arts Evaluation Teams reviewed the 2010 draft standards from Massachusetts).

Once the Evaluation Teams had selected the standards (from Common Core State Standards, Indiana Academic, or other states) or had written standards where they found gaps, the list of knowledge and skills identified as necessary for students to be college and career ready was posted for public comment.

Public Comment, Public Hearings, and National Expert Review

The draft college and career ready Indiana Academic Standards were posted for the public to review on February 19, 2014. The public was invited to provide comment through March 12. Over 2000 public comments were received. There were also three public hearings, which were held in southern, central, and northern Indiana, to receive public comment on the draft standards.

The comments from both the online public comment and the public hearings were compiled, reviewed and used to contribute to further iterations of the standards.

In addition, a variety of national experts were contacted to review the draft standards posted on February 19. The results of the reviews were discussed, and portions of the reviews were incorporated into further iterations of the standards.

Reconvening of Evaluation Teams

The Evaluation Teams were reconvened in March of 2014. The teams were tasked with incorporating public comment, and l national expert review to ensure that the draft standards were aligned across grade levels and showed appropriate progression from grade to grade. The Evaluation Teams were also tasked with editing and revising standards for clarity, and addressing any other public comments and national expert review around grade appropriateness, bias, embedded pedagogy, or other factors.

Once the Evaluation Teams completed their reviews, the results were sent to the College and Career Ready (CCR) Panels for final review and approval. The results were also shared with additional national experts, who provided reviews. The results of those reviews were analyzed and synthesized and shared with the CCR Panels.

College and Career Ready (CCR) Panels

The College and Career Ready Panels were created in order to ensure that the standards that Indiana developed were aligned with what colleges, universities, industries, and businesses deem necessary for students to be college and career ready. The CCR Panels were made up of subject matter experts from a variety of Indiana public and private colleges and universities, as well as individuals representing Indiana's businesses and industries.

The CCR Panels were brought together in late March of 2014 to review the draft Indiana Academic Standards that had been reviewed and vetted by the Evaluation Teams in mid-March of 2014. The CCR Panels were tasked with reviewing the standards from 12th grade through kindergarten to ensure that the standards were clear and understandable; aligned across grade levels, showing appropriate progression from grade to grade; and designed to prepare students for college and career readiness. The CCR panels met several times throughout the end of March 2014 and early April 2014 to accomplish this task. At their last meeting, the CCR panel members were asked to sign-off on the draft standards, indicating whether, in their professional opinion, the standards were poised to prepare Hoosier students to be college and career ready.

Indiana Academic Standards

The culmination of the efforts of the Technical Teams, Advisory Teams, Evaluation Teams, and CCR Panels is the college and career ready Indiana Academic Standards that are college and career ready. While many of the standards originated from various sources, including the Common Core State Standards; 2000, 2006, and 2009 Indiana Academic Standards; Massachusetts 2010 Draft English/Language Arts Standards; Virginia Standards of Learning; Nebraska English/Language Arts Standards; the National Council of Teachers of Mathematics; and the National Council of Teachers of English, a number of original standards were also written by members of the Evaluation Teams or CCR Panels.

The process was designed to identify the clearest, most rigorous, and best aligned standards in Mathematics and English/Language Arts to ensure that Hoosier students will graduate meeting the definitions for college and career as defined in Indiana's processes.

What are college and career ready Indiana Academic Standards?

The college and career ready Indiana Academic Standards are designed to help educators, parents, students, and community members understand what students need to know and be able to do at each grade level, and within each content strand, in order to exit high school college and career ready. The Indiana Academic Standards for English/Language Arts demonstrate what students should know and be able to do in the areas of Reading, Writing, Speaking and Listening, and Media Literacy. The Indiana Academic Standards for Mathematics demonstrate what students should know and be able to do in the areas of K-8 Mathematics; Algebra I, II, and Geometry; and higher-level high school Mathematics courses. The Indiana Academic Standards for Content Area Literacy (History/Social Studies and Science/Technical Subjects) indicate ways in which students should be able to incorporate literacy skills into various content areas at the 6-12 grade levels.

What are the college and career ready Indiana Academic Standards NOT?

1). *The standards are not curriculum.*

While the standards may be used as the basis for curriculum, **the college and career ready *Indiana Academic Standards are not a curriculum*.** Therefore, identifying the sequence of instruction at each grade—what will be taught and for how long—requires concerted effort and attention at the corporation and school levels. While the standards may have examples embedded, and resource materials may include guidelines and suggestions, the standards do not prescribe any particular curriculum. Curriculum is determined locally by a corporation or school and is a prescribed learning plan toward educational goals that includes curricular tools and instructional materials, including textbooks, that are selected by the corporation/school and adopted through the local school board.

2). *The standards are not instructional practices.*

While the standards demonstrate what Hoosier students should know and be able to do in order to be prepared for college and careers, the standards are not instructional practices. The educators and subject matter experts that worked on the standards have taken care to ensure that the standards are free from embedded pedagogy and instructional practices. ***The standards do not define how teachers should teach.*** The standards must be complemented by well-developed, aligned, and appropriate curricular materials, as well as robust and effective instructional best practices.

3). *The standards do not necessarily address students who are far below or far above grade-level.*

The standards are designed to show what the average Hoosier student should know and be able to do in order to be prepared for college and career. However, some students may be far below grade level or in need of special education, and other students may be far above grade level. The standards do not provide differentiation or intervention methods necessary to support and meet the needs of these students. It is up to the district, school, and educators to determine the best and most effective mechanisms of standards delivery for these students.

4). *The standards do not cover all aspects of what is necessary for college and career readiness*

While the standards cover what have been identified as essential skills for Hoosier students to be ready for college and careers, the standards are not—and cannot be—an exhaustive list of what students need in order to be ready for life after high school. Students, especially younger students, require a wide range of physical, social, and emotional supports in order to be prepared for the rigors of each educational progression (elementary grades to middle grades; middle grades to high school; and high school to college or career).

II. Acknowledgements

The college and career ready Indiana Academic Standards could not have been developed without the time, dedication, and expertise of Indiana's K-12 teachers, parents higher education professors, and representatives of Indiana business and industry. Additionally, the members of the public, including parents, community members, policymakers, and educators who took time to provide public comments, whether through the online comment tool or in person at the various public hearings, have played a key role in contributing to the Indiana Academic Standards.

The Indiana Department of Education and Indiana State Board of Education would like to thank Ms. Sujie Shin of the Center on Standards and Assessment Implementation for providing expert facilitation throughout the process and acting in an advisory capacity. The Department and Board would also like to thank the individuals and organizations who provided national expert reviews of the draft standards.

We wish to specially acknowledge the members of the Technical Teams, Advisory Teams, Evaluation Teams, and College and Career Ready Panels who dedicated hundreds of hours to the review, evaluation, synthesis, rewriting, and creation of standards designed to be of the highest quality so that our Hoosier students who are ready for college and careers.

LITERACY IN SCIENCE AND TECHNICAL SUBJECTS

Guiding Principle: *Students develop discipline-specific reading and writing skills. Within the content areas of Science and Technical Subjects, students apply these skills in order to develop a deeper understanding of the content area.*

There are six key areas found in the Literacy in Science and Technical Subjects section for grades 6-12: Key Ideas and Textual Support, Structural Elements and Organization, Synthesis and Connection of Ideas, Writing Genres, the Writing Process, and the Research Process. By demonstrating the skills listed in each section, students should be able to meet the Learning Outcome for Literacy in Science and Technical Subjects.

Note that the standards in this section are not designed for implementation in an English/Language Arts classroom. Instead, they provide guidance to content-area teachers in grades 6-12 (e.g., History/ Social Studies teachers, Science teachers, Career and Technical Education teachers, etc.) on expectations for integrating reading and writing skills into their classrooms.

In Literacy in Science and Technical Subjects, students are expected to do the following:

LEARNING OUTCOMES	**LST.1: LEARNING OUTCOME FOR LITERACY IN SCIENCE/TECHNICAL SUBJECTS** **Read and comprehend science and technical texts independently and proficiently and write effectively for a variety of discipline-specific tasks, purposes, and audiences**		
	GRADES 6-8	**GRADES 9-10**	**GRADES 11-12**
	6-8.LST.1.1: Read and comprehend science and technical texts within a range of complexity appropriate for grades 6-8 independently and proficiently by the end of grade 8.	**9-10.LST.1.1:** Read and comprehend science and technical texts within a range of complexity appropriate for grades 9-10 independently and proficiently by the end of grade 10.	**11-12.LST.1.1:** Read and comprehend science and technical texts within a range of complexity appropriate for grades 11-CCR independently and proficiently by the end of grade 12.
	6-8.LST.1.2: Write routinely over a variety of time frames for a range of discipline-specific tasks, purposes, and audiences.	**9-10.LST.1.2:** Write routinely over a variety of time frames for a range of discipline-specific tasks, purposes, and audiences.	**11-12.LST.1.2:** Write routinely over a variety of time frames for a range of discipline-specific tasks, purposes, and audiences.
KEY IDEAS AND TEXTUAL SUPPORT	**LST.2: KEY IDEAS AND TEXTUAL SUPPORT (READING)** **Extract and construct meaning from science and technical texts using a variety of comprehension skills**		
	GRADES 6-8	**GRADES 9-10**	**GRADES 11-12**
	6-8.LST.2.1: Cite specific textual evidence to support analysis of science and technical texts.	**9-10.LST.2.1:** Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.	**11-12.LST.2.1:** Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
	6-8.LST.2.2: Determine the central ideas or conclusions of a text; provide an accurate, objective summary of the text.	**9-10.LST.2.2:** Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate, objective summary of the text.	**11-12.LST.2.2:** Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.

	6-8.LST.2.3: Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.	**9-10.LST.2.3:** Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.	**11-12.LST.2.3:** Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
STRUCTURAL ELEMENTS AND ORGANIZATION	**LST.3: STRUCTURAL ELEMENTS AND ORGANIZATION (READING)** **Build understanding of science and technical texts, using knowledge of structural organization and author's purpose and message**		
	GRADES 6-8	**GRADES 9-10**	**GRADES 11-12**
	6-8.LST.3.1: 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.	**9-10.LST.3.1:** 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 9-10 texts and topics.	**11-12.LST.3.1:** 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 11-12 texts and topics.
	6-8.LST.3.2: Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic.	**9-10.LST.3.2:** Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., *force, friction, reaction force, energy*).	**11-12.LST.3.2:** Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
	6-8.LST.3.3: Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.	**9-10.LST.3.3:** Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.	**11-12.LST.3.3:** Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.
SYNTHESIS AND CONNECTION OF IDEAS	**LST.4: SYNTHESIS AND CONNECTION OF IDEAS (READING)** **Build understanding of science and technical texts by synthesizing and connecting ideas and evaluating specific claims**		
	GRADES 6-8	**GRADES 9-10**	**GRADES 11-12**
	6-8.LST.4.1: Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., *in a flowchart, diagram, model, graph, or table*).	**9-10.LST.4.1:** Translate quantitative or technical information expressed in words in a text into visual form (e.g., *a table or chart*) and translate information expressed visually or mathematically (e.g., *in an equation*) into words.	**11-12.LST.4.1:** Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., *quantitative data, video, multimedia*) in order to address a question or solve a problem.
	6-8.LST.4.2: Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.	**9-10.LST.4.2:** Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.	**11-12.LST.4.2:** Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.

	6-8.LST.4.3: Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.	**9-10.LST.4.3:** Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.	**11-12.LST.4.3:** Synthesize information from a range of sources (e.g., *texts, experiments, simulations*) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
WRITING GENRES	**LST.5: WRITING GENRES (WRITING)** **Write for different purposes and to specific audiences or people**		
	GRADES 6-8	**GRADES 9-10**	**GRADES 11-12**
	6-8.LST.5.1: Write arguments focused on discipline-specific content.	**9-10.LST.5.1:** Write arguments focused on discipline-specific content.	**11-12.LST.5.1:** Write arguments focused on discipline-specific content.
	6-8.LST.5.2: Write informative texts, including scientific procedures/experiments or technical processes that include precise descriptions and conclusions drawn from data and research.	**9-10.LST.5.2:** Write informative texts, including scientific procedures/experiments or technical processes that include precise descriptions and conclusions drawn from data and research.	**11-12.LST.5.2:** Write informative texts, including scientific procedures/experiments or technical processes that include precise descriptions and conclusions drawn from data and research.
THE WRITING PROCESS	**LST.6: THE WRITING PROCESS (WRITING)** **Produce coherent and legible documents by planning, drafting, revising, editing, and collaborating with others**		
	GRADES 6-8	**GRADES 9-10**	**GRADES 11-12**
	6-8.LST.6.1: Plan and develop; draft; revise using appropriate reference materials; rewrite; try a new approach; and edit to produce and strengthen writing that is clear and coherent, with some guidance and support from peers and adults.	**9-10.LST.6.1:** Plan and develop; draft; revise using appropriate reference materials; rewrite; try a new approach, focusing on addressing what is most significant for a specific purpose and audience; and edit to produce and strengthen writing that is clear and coherent.	**11-12.LST.6.1:** Plan and develop; draft; revise using appropriate reference materials; rewrite; try a new approach, focusing on addressing what is most significant for a specific purpose and audience; and edit to produce and strengthen writing that is clear and coherent.
	6-8.LST.6.2: Use technology to produce and publish writing and present the relationships between information and ideas clearly and efficiently.	**9-10.LST.6.2:** Use technology to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.	**11-12.LST.6.2:** Use technology to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.

THE RESEARCH PROCESS	LST.7: THE RESEARCH PROCESS (WRITING) **Build knowledge about the research process and the topic under study by conducting short or more sustained research**		
	GRADES 6-8	**GRADES 9-10**	**GRADES 11-12**
	6-8.LST.7.1: Conduct short research assignments and tasks to answer a question (including a self-generated question), or test a hypothesis, drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.	**9-10.LST.7.1:** Conduct short as well as more sustained research assignments and tasks to answer a question (including a self-generated question), test a hypothesis, or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.	**11-12.LST.7.1:** Conduct short as well as more sustained research assignments and tasks to answer a question (including a self-generated question), test a hypothesis, or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
	6-8.LST.7.2: Gather relevant information from multiple sources, using search terms effectively; annotate sources; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation (e.g., *APA or CSE*).	**9-10.LST.7.2:** Gather relevant information from multiple authoritative sources, using advanced searches effectively; annotate sources; assess the usefulness of each source in answering the research question; synthesize and integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation (e.g., *APA or CSE*).	**11-12.LST.7.2:** Gather relevant information from multiple types of authoritative sources, using advanced searches effectively; annotate sources; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; synthesize and integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation (e.g., *APA or CSE*).
	6-8.LST.7.3: Draw evidence from informational texts to support analysis, reflection, and research.	**9-10.LST.7.3:** Draw evidence from informational texts to support analysis, reflection, and research.	**11-12.LST.7.3:** Draw evidence from informational texts to support analysis, reflection, and research.