Iowa Core Curriculum

Final Report to the State Board of Education
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Iowa Department of Education

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Purpose Statement

Iowa Core Curriculum Project

The Iowa Core Curriculum (previously called the Model Core Curriculum) gives local school districts a guide to delivering instructional content that is challenging and meaningful to all students. The curriculum identifies the essential concepts and skill sets for literacy, mathematics, science and social studies, as well as 21st century learning skills (civic literacy, financial literacy, technology literacy, health literacy and employability skills).

The Iowa Core Curriculum was first initiated through Senate File 245 and called for identifying the core content and skills in high school math, science and literacy.

Senate File 588, passed in 2007, expanded the Iowa Core Curriculum to include social studies and 21st century skills and to extend all five content areas to cover kindergarten through high school grades. The Core Curriculum Lead Team in this report addresses those Phase 2 directives.

As with Phase 1 of the Core Curriculum work, the intent of this latest effort is two-fold:

1) To ensure that all Iowa students engage in a rigorous and relevant curriculum to prepare them for success in post-secondary education, the workforce and the emerging global economy, and;
2) To provide Iowa educators with the tools to assure that essential subject matter is being taught and essential knowledge and skills are being learned.

Participants

Lead Team

Rita Martens, Iowa Department of Education
Phyllis Anderson, Grant Wood AEA 10
Timothy Ansley, University of Iowa
Ray Beets, Iowa Central Community College
Hope Bossard, Gilbert Schools
Maureen Busta, Upper Iowa University
Bill Callahan, University of Northern Iowa
Nadene Davidson, University of Northern Iowa
Kameron Dodge, State Board of Education
Bob Driggs, Kirkwood Community College
Kevin Fangman, Iowa Department of Education
Dale Gruis, Iowa Department of Education
Eric Hart, Maharishi University
Julie Hukee, Heartland AEA 11
Rosie Hussey, State Board of Education
Alissa Jourdan, Kemin Industries
Margaret Kelly, curriculum director, retired
Shirley Kelly, Charles City Schools
Jan Keese, Iowa Teacher of the Year
Debbie Lee, Waterloo Community Schools
Carlene Lodermeier, Iowa Department of Education
Kathy McKee, Iowa Department of Education
Lynn Nielsen, University of Northern Iowa
Susie Olesen, Iowa Association of School Boards
Timm Pilcher, Iowa State Education Association
LuAnn Richardson, Sioux City Schools
Kim Rost, Prairie Lakes AEA 8
Mary Beth Runge, Council Bluffs CSD
Sue Runyon, Keystone AEA 1
Phyllis Staplin, West Des Moines Community Schools
Kristin Steingreaber, Great Prairie AEA
David Whaley, Iowa State University
John Winter, retired, John Deere Waterloo Operations
Ann Wooldridge, School Administrators of Iowa
Sue Wood, Fort Dodge CSD

Work Teams

* denotes team chairs

K-8 Science Core Curriculum
Kathy McKee*, Iowa Department of Education
Phyllis Anderson*, Grant Wood AEA 10
Becky Fish, Gladbrook-Reinbeck CSD
Mary Stichter, Malcolm Price Laboratory School
Kari Pingel, Pella CSD
Kaitlyn Hood, Des Moines Independent CSD
Gary Morris, Des Moines Independent CSD
Kris Kilibarda, Central College
Morgan Masters, Ankeny CSD

K-8 Literacy Core Curriculum
Carlene Lodermeier*, Iowa Department of Education
Sue Wood*, Fort Dodge CSD
Karla Koch, Malcolm Price Laboratory School
Dana Schon, Denison CSD
Kelli Berke, Loess Hills AEA 13
Lou Ann DeMarie, Iowa Association of School Boards
Barbara Wells, Mason City CSD
Peggy Pruisner, Wartburg College
Jan Smith, Iowa Testing Program
Jan Keese, 2007 Iowa Teacher of the Year
Marcia DeVore, Charles City CSD
Mike Nieland, Ankeny CSD

K-8 Mathematics Core Curriculum
Maureen Busta*, Upper Iowa University
Sue Runyon*, Keystone AEA 1
Denise Carlson, Heartland AEA 11
Sue Daker, West Delaware CSD
Nancy File, Lewis Central CSD
Eric Hart, Maharishi International University
Jennifer Johnson, Des Moines CSD
Cathy Ruff, Cedar Falls CSD
Diane Thiessen, University of Northern Iowa

Social Studies Core Curriculum
Mary Beth Runge*, Council Bluffs CSD
Lynn Nielsen*, University of Northern Iowa
Brian Connick, Algona CSD
Don Harms, Indianola CSD
David Johns, Des Moines Independent CSD
Catherine Mein, Ballard CSD
Kevin Neal, West Des Moines CSD
Curt Nielsen, Malcolm Price Laboratory School
Robert Pittman, Charles City CSD
Louise Thurn, AEA consultant, retired
Dirk Waller, Council Bluffs CSD

21st Century Skills Core Curriculum
Nadene Davidson*, University of Northern Iowa
Margaret Kelly*, curriculum director, retired
Mary Lou Erlacher, Workplace Learning Connection
Dal Grooms, Iowa Farm Bureau Federation
Leasha Henriksen, Malcolm Price Laboratory School
Dave Juon, John Deere
Karen Atwood, Consumer Credit Counseling of NE Iowa
Donna Briggs, University of Northern Iowa
Tahira Hira, Iowa State University
Rob Miller, Iowa College Access Network
Rhonda Bottke, Black Hawk County Health Department
Kim Burnett, Ames CSD
Beth Pelton, University of Iowa
Diane Petersen, Central Clinton CSD
Lori Smith, Malcolm Price Laboratory School
Anne Howe, North Polk CSD
Aaron Spurr, Malcolm Price Laboratory School
Bob Steingreaber, Great Prairie AEA
Gail Wortmann, Iowa Learning Online

Writer
Diane Graham

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Executive Summary

Iowa schools remain the envy of many states. Yet new challenges confront our beloved reputation as the "education state." Expectations continue to rise at every turn — at colleges, in the workplace and on the global economic stage. Even students are beginning to wonder if they'll be prepared after graduation for the 21st century challenges that await.

The Iowa Core Curriculum project is the state's ambitious response to this education challenge and offers state educators a new template to lead students from kindergarten through grade 12. Its two guiding principles:

- Pare down the volume of what is taught.
- Focus on what's essential for students to master.

This report supports both of those goals, and includes a menu of essential skills and concepts that is both challenging and relevant to the lives of today's students.

This marks the second major chapter in the Iowa Core Curriculum project. The initiative began in 2005 after Iowa Department of Education Director Judy Jeffrey and members of the State Board of Education completed a series of high school visits in spring 2005. About the same time, the Iowa legislature passed and then-Governor Thomas J. Vilsack signed into law Senate File 245, which requires identification of a model core curriculum among other directives.

The first-phase report encompassed high school literacy, math and science and was endorsed by the State Board of Education in spring 2006. Over the past two years, the Department has worked with the Area Education Agencies to introduce this new strategy to Iowa high school classrooms.

But authors of that first report also urged education leaders not to stop with *only* high school and *only* three subjects. The Iowa legislature and Governor Chet Culver agreed, and in 2007 a new law was passed, expanding the scope of the Iowa Core Curriculum to include kindergarten through grade 8 for math, science and literacy and to add social studies and what are called 21st century skills: employability skills, financial literacy, health literacy and technology literacy for kindergarten through grade 12.

The decision to extend the Core Curriculum all the way to kindergarten was recognition that learning is interconnected. The Lead Team even instructed the Work Teams writing K-8 curriculum to always keep this question in mind: "Will this provide the foundation for success in our high schools?"

In both phases, curriculum guidelines were developed by Work Teams for each subject and then vetted by a Lead Team that included a cross-section of the state's best teachers, administrators, college educators and business leaders. Each Work Team's membership also brought to the table a real depth of knowledge in that given area. The teams met over a period of several months hammering out the essential skills and concepts.

Both times, the Lead Teams stayed true to the mission of the initial Core Curriculum legislation:

- To ensure that all Iowa students experience a challenging — often called rigorous and relevant — learning environment that prepares them for lifelong success.
- To give Iowa educators a tool to ensure that essential — or most critical — subject matter is being taught.

Lead and Work Team members repeatedly have noted that the biggest challenge has been narrowing the focus to just the essential skills and content for each subject. And yet, they also admit that it is among their most crucial roles. Too often, Iowa's teachers are expected to add

tasks to their plate with no guidance on what to remove. The result is a learning environment where content is a "mile wide and an inch deep."

Team members also were attuned to:

- **Putting students first.** The mission is to boost the achievement of all students, whether headed for two- or four-year college or a technical program.
- **A changing workforce and rising global competition**. Employers lament that graduates don't have the skills needed in today's work world. And the Lead Team knows that Iowa and the United States are lagging in the production of college graduates ready to fill the rapidly expanding opportunities for scientists, engineers and technicians.

The teams examined education success stories from states that outperform Iowa; curriculum-related efforts of the leading testing programs, and recommendations from leading national professional associations in the key subject areas. They also read the latest research in each field.

In this latest effort, teams faced new challenges posed by the wide range of skills represented from kindergarten to 8th grade. Their response was to design the Core Curriculum in grade bands: primary (K-2), intermediate (3-5) and middle (6-8). Later work will break it down by grades.

Also, while math, science and literacy teams had the earlier high school curriculums as guides, social studies and 21st century skill teams were plowing new ground. Thus, they completed the high school portion and will follow later with K-8 curriculum.

The final reports demonstrate the importance placed on:

- Delivering a rigorous, relevant world-class education for all students.
- Illustrating curriculum with concrete examples to help guide teachers.
- Gathering feedback. More than 2,500 online validation surveys were completed. Teachers, administrators, parents and business leaders all were invited to comment.

The curriculum recommendations will show that:

- Only essential concepts are included, yet the guidelines offer depth and breadth.
- Bringing this work to life with teachers and students is a critical next step. That's an important lesson learned from the Phase 1 of Core Curriculum work.

Report highlights

K-8 Literacy:

- Literacy and learning go hand in hand. A literate person can become informed, inform others and make informed decisions.
- The Literacy Core Curriculum calls for a mastery of the essential skills in reading, writing, speaking, listening and viewing.
- Literacy is key to all learning. Thus, teachers in all subject areas must take ownership for literacy development, and see that the essential concepts and skills are woven throughout a school's curriculum.
- Students also use similar language skills throughout their school careers. Thus, essential concepts and skills are similar in each grade band. Teaching strategies will vary, though.
- The five essential skills support each other; they would be best taught in an integrated way.

K-8 Mathematics:

- The United States faces a crisis in mathematics education, and American students are losing ground to graduates in other countries. The cause: Teaching too many topics without providing depth.
- Iowa's math curriculum must focus on adding rigor and relevance, providing students with a deep understanding of the most critical areas of math.

- The most important skills required are problem solving; communication; reasoning and proof; an ability to recognize, make and apply connections; and an ability to construct and apply multiple connected representations.
- A world-class math curriculum should include key characteristics, including teaching for understanding, problem-based instructional tasks, distributed practice that is meaningful and purposeful, an emphasis on mathematical representations, effective use of technology and teaching that is coherent and connected.

K-8 Science:

- In today's technology-driven world, mastery of key scientific concepts is critically important.
- The curriculum focused on the same four content areas found in the 2006 high school report: Science as inquiry, physical science, earth and space science and life science.
- The curriculum is just a framework, and local districts must decide how best to put it into practice to meet the needs of students.

Social Studies — high school:

- Because of the broad definition of social studies, deciding what was essential to teach was a significant challenge.
- "Civic competence" became a kind of guiding light; social studies teachers are doing nothing short of educating America's future leaders and citizens, the Team determined.
- Essential content was identified as behavioral sciences, economic, geography, history, political science and civic literacy.

21st century skills — high school:

- The key skills needed by today's high school students include employability skills, financial literacy, health literacy and technology literacy, as specified in Senate File 588.
- Each skill had its own mini-team representing education, business and industry, as well as the public sector.
- The goal: Craft curriculum that prepared students to do well in their lives outside of school.
- Schools now must find ways to add this new curriculum with a student focus that embraces the essential concepts of employability; physical, emotional and mental health; critical-thinking; a strong work ethic, and social responsibility.

In the three years since the Core Curriculum efforts began, support is growing for making meaningful, significant change in Iowa schools. The Department and the Area Education Agencies have partnered to offer extensive professional development to guide high school teachers in infusing more rigorous and relevant work in their classrooms. And soon, new model unit plans for math, science and literacy will be available from the Iowa Department of Education. Yet there remains more to do:

- Professional development aimed at improving instruction must expand to serve elementary, middle school and high school teachers.
- Districts must be asked to assure the State Board that the curriculum changes are being introduced.

In the end, higher student achievement scores will answer the most important question of whether the Iowa Core Curriculum is delivering real, fundamental change.

Iowa Core Curriculum

A foundation for Iowa schools

Introduction

The work of Iowa schools is never done, it seems. Even though student achievement remains impressive, Iowa's image as the "education state" is tarnishing. The bar on student expectations keeps rising. Competition for post-graduation jobs intensifies. The pace of technological change quickens.

Students are changing, too. They sense something more is needed for success beyond high school, and increasingly they question whether their schools are meeting those needs. They don't want to be 21st century graduates armed with 20th century diplomas.

"We must raise the bar and expect more from our students in the classroom. …Our goal is simple: To teach our kids to "love to learn" — to love to learn more chemistry, more physics, more algebra and more trigonometry."

Governor Chet Culver
State Budget Address
January 15, 2008

Iowa's economy is also shifting. Demand for skilled workers in the state is outstripping supply, and economists see a huge mismatch looming where skilled jobs could go begging. Left unchecked, the worker shortage could drive companies out of Iowa.

"If we want to be competitive and sustain economic growth in Iowa in the future, our state will need up to 150,000 skilled workers within the next five years," warned Governor Chet Culver, speaking in November at the High School Math and Science Summit hosted by the Price Lab School in Cedar Falls. And they must have the right skills — "the very best in math and science and engineering and technology," in the Governor's words.

Iowa's demographics are changing, too. Population continues its steady migration away from Iowa's smallest towns and into larger cities and county seat towns. Meanwhile, Iowa classrooms are becoming more diverse. And while achievement levels have improved among minority students, there is a need to do more.

Still it's hard to embrace the notion of changing a system that's worked so well for so long. Parents and even some educators wonder if all this hand wringing about Iowa's schools isn't overdone. After all, one doesn't have to look far to still find encouraging reports about Iowa students' achievements. If it's not broke, don't fix it, say these skeptics.

We wish that it were so. But if Iowa schools stand still, student standing is all but guaranteed to slip. It won't happen overnight. But other states — and other countries — are moving aggressively to address issues of rigor and relevance in classroom teaching. Iowa students deserve the same or better.

In some ways, Iowa's school system is a bit like Sears. For decades, both enjoyed enviable reputations for quality and service. Now, there's a need to refocus and revamp to serve a new generation of "customers."

Of course, that's where the comparison stops. This isn't about selling refrigerators; it's about nothing less than the future success of Iowa's young people. Tough questions must be answered:

- Are students across Iowa receiving equal access to a challenging curriculum?
- Are Iowa high school seniors ready for what's ahead — whether it be college, career-technology training or a full-time job?
- Is there a good match between employers' needs and student's skills?

This Iowa Core Curriculum project helps address those questions. It's recognition that serious work needs to be done by teachers and students in every school — large or small, public or private. Iowa is the only state taking such an ambitious approach, and it gives educators here a new template to lead students from kindergarten through grade 12. Its two guiding principles are:

- Pare down the volume of what is taught.
- Focus on what's essential for students to master.

"It's time for us to start a new conversation about our children, one that puts them at the center and supports them in this world that they're living in. It's a different world."

Ray McNulty
International Center for Leadership in Education, 2007 Iowa High School Summit

The recommendations in support of those goals hopefully will open Iowans' collective minds to a crucial message: Today's students need something starkly different in their K-12 years — teaching that is challenging and relevant to their lives both now and in the future.

Director Judy Jeffrey talked about doing right by Iowa's students in her address to educators attending last December's Iowa High School Summit:

"They enter your doors in high schools with those hopes and dreams, believing they will be successful, believing they have a future beyond high school. And are we doing everything we can to make sure we can fulfill their hopes and dreams?"

The comprehensive reports that follow should arm Iowa's teachers, school leaders, parents and students with a road map to help answer that important question. It will hopefully inspire and inform a transformation of classroom instruction.

How the Iowa Core Curriculum came to be

The Iowa Core Curriculum project began in late 2005 after the director of the Iowa Department of Education and Iowa State Board of Education members completed several high school visits that spotlighted the need for classroom change.

They weren't the only leaders who sensed the need. About the same time, the Iowa Legislature passed and then-Governor Tom Vilsack signed into law a call for new model curriculum content for high school math, literacy and science.

It was time to move beyond all the talk about "raising the bar" on student performance. This project would help explain where the bar needed to be set.

Over the next few months, three Work Teams developed a list of essential content and skills for those initial content areas, receiving guidance from a Lead Team representing a cross section of the top teachers, educators and business leaders.

The goals then and now remain the same:

- To ensure that all Iowa students engage in a rigorous and relevant curriculum.
- To equip educators with tools for assuring that essential — or the most critical — subject matter is taught.

Jeffrey spoke to both points in her first meeting with the 2006 Lead Team. She reminded the group that the Core Curriculum was to be written with ALL students in mind, including those who do not have a four-year college career in their sights. As Jeffrey and the Lead Team members all recognize, even students headed into technical training are expected these days to possess a different set of learning skills.

"We used to memorize facts, but that's not going to serve us well any longer because our employers want problem solvers, they want team workers, they want people who can analyze the problem, come to a good solution and be able to decide if it's working or not."

Judy Jeffrey
Director, Iowa Department of Education

Jeffrey also stressed that this was to be a valuable, flexible tool for teachers — not a report that gathered dust. She urged members to think about designing a "rich, challenging curriculum, the curriculum that builds on the knowledge and experiences gained by students as they move through school and life; the curriculum that is the bridge from one grade to the next."

Establishing a world-class curriculum

The recommendations, presented in depth later in this report, benefited greatly from the trailblazing work of the 2006 Core Curriculum project. During that first phase, the Lead Team spent significant time writing basic definitions: What exactly should be the characteristics of a world-class core curriculum? What are the essential skills and content for such a program? There were no handy lists or crib sheets to borrow for that challenging work. The findings:

Characteristics of a world-class curriculum included:

- Empowers students
- Makes it relevant and engaging
- Promotes working as a team
- Improves student achievement

Among the essential skills, students must be:

- Critical, high-order thinkers
- Flexible, able to apply learning to new situations
- Team players and collaborators
- Lifelong learners
- Caring, confident and globally aware

The list of essential content was somewhat prophetic. It included math, literacy and science but also added social studies and a need to integrate careers and technology into all content. The latter amounted to the beginnings of a 21st Century Core Curriculum, now a part of this report.

Momentum builds

The 2006 Core Curriculum report — originally called the Model Core Curriculum — certainly hasn't collected dust. Its mission has steadily gained momentum since earning the endorsement of the Iowa State Board of Education in spring 2006. Among key developments that supported or expanded the Model Core work:

"The Iowa Core Curriculum should be so beneficial to *all* students -- and to all teachers, regardless of whether you are in a large district with multiple people in your department or the "lone ranger" with no one to easily share ideas with to determine what is essential to teach."

Jan Keese
Lead Team Member
2007 Iowa Teacher of the Year

- The Iowa Department of Education and Iowa's Area Education Agencies designed new professional development sessions to show Iowa high school educators how best to embrace the Core Curriculum and the rigor-and-relevance approach. In the next phase of this training program, teachers will have access to extensive model unit plans in each curriculum area.

- The Department conducted a baseline survey of the state's high school math, literacy and science teachers, to assess how far they'd come in including Core Curriculum teaching in classrooms. The survey of 610 teachers showed high schools remain more "traditional" than the Core Curriculum authors envisioned. "We have a lot of room for growth," the Lead Team heard from Rita Martens. She has served as the Iowa Department of Education's point person on Core Curriculum efforts.

- The Iowa High School Project, supported by the International Center for Leadership in Education, has reached out to 60 high schools statewide offering access to innovative improvement and teaching reform ideas from this nationally recognized consulting group. It's just one more avenue of support to schools working to increase rigor and relevance in classroom teaching.

- The legislature passed and Governor Culver signed a new law last year requiring a "4-3-3-3" program in so-called core courses. Starting with the graduating class of 2011, all students must take four years of English, and three years each of math, science and social studies.

- Also in 2007, the Iowa Legislature passed and Governor Culver signed legislation to expand the Core Curriculum project by adding subjects and folding in grades K through 8.

- Political leaders also adopted into law broad core content standards for reading, math and science. These state standards remain constant throughout a student's school career, but the complexity of student work increases with each grade. The Core Curriculum, in turn, supports these broad core-content standards.

- The Department also is working with nine districts that volunteered to test-drive a program to encourage students to use more sophisticated thinking skills. The program — called

Authentic Intellectual Work — has a long, strong track record for improving student achievement. Early reviews from teachers and the districts are enthusiastic.

Now, what began life as voluntary Core Curriculum guidelines may become required for all Iowa public and private schools. In his January Condition of the State address, Governor Culver pledged to do whatever it takes to expand the Iowa Core Curriculum to every school district in the state by 2010.

Meanwhile, the Iowa legislature is considering Senate File 2216, which supports the Governor's 2010 idea and also calls for full implementation of the high school Core Curriculum by July 2012. Schools must fully introduce the Core Curriculum to elementary and middle schools by the 2014-2015 school year. Culver has pledged to sign the bill.

Supporters of a required statewide curriculum say this will help Iowa's students prepare for the rigors of their next life stage, whether that is attending college or directly entering the workforce.

"The Iowa Core Curriculum offers our teachers a valuable tool to help bring the most essential and relevant learning to classrooms. It's an excellent way to ensure students are ready for the challenges ahead."

Kevin Fangman
Lead Team Member
PK-12 Education
Division Administrator
Iowa Department of Education

Laying the ground work

As the Iowa Core Curriculum teams began their work, they soon recognized that the biggest challenge they faced would be narrowing their sights to the essential skills and concepts in each subject area. "It can't be what's good or nice. It has to be essential," they were advised.

In the past, educators have been guilty of continually adding new curriculum requirements without eliminating the old. By trying to cover too much, the curriculum winds up "a mile wide and an inch deep." By narrowing the focus, can ultimately achieve greater quality and depth.

To prepare, the Lead and Work Teams — in 2006 and again this year — reviewed the most compelling findings about current conditions in U.S. and Iowa schools. They also looked at what was happening in other states and countries where students are outperforming Iowa students.

They also reviewed Iowa's historical rankings in all major assessments, including the highly regarded National Assessment of Educational Progress — sometimes called the "Nation's Report Card" — and on standardized tests such as ACT and the Iowa Tests of Educational Development.

The teams also were briefed on demographic and economic changes in Iowa — including the job growth trends and employer expectations that will face high school graduates. They also heard more about Iowa's worker shortage cited by Governor Culver earlier in this report.

Finally, they saw how other countries are beginning to dwarf the United States in producing college graduates — especially in high-demand, high-paying engineering and science fields.

Taken together, it was a compelling case for change.

Not the 3 R's, but the 2 R's

"The strength of this curriculum rests in its rigor and relevance framework, which offers guidance to Iowa schools without prescribing or endorsing any particular set of curriculum theories or materials."

Tim Ansley
Lead Team Member
University of Iowa

Everyone knows the 3 R's of education — reading, writing and 'rithmetic. Now, educational reformers often speak of the *two* R's — rigor and relevance. Uniting those two words to form a new educational mission was initially the work of Dr. Willard Daggett, Ed.D, a consultant and founder of the International Center for Leadership in Education (ICLE). Daggett believes that adding rigor to U.S. classrooms is the key to providing the kind of education today's students need and deserve.

The Iowa Department of Education also has talked at length about how rigor and relevance are critical to delivering a world-class education. Its message, in short, says it's not enough any more to just teach a set of facts. Schools today also must find relevant ways to teach students how to think and how to apply those facts to problem-solving examples that often involve real-world situations. "Stretch learning" is another term for this approach.

Students with deep exposure to this rigorous teaching leave high school better grounded in core subjects. Perhaps more important, they leave knowing that what they learned can be applied to their post-graduate studies or in the workplace.

The quadrant approach for rigor and relevance

Dr. Daggett explains rigor and relevance in terms of four learning quadrants, with Quadrant A at the lower end representing basic knowledge and Quadrant D sharing more complex lessons. While there is a place for lessons from all four quadrants, the goal is to add more challenging Quadrant D work. Here is how the ICLE distinguishes the four learning quadrants:

"I particularly like the integration of technology in every aspect of learning and the cross-discipline learning. In business, all disciplines collide, and we must understand how they impact each other."

Alissa Jourdan
Lead Team Member
Kemin Industries

Quadrant C - Assimilation Students extend and refine their acquired knowledge to be able to use that knowledge automatically and routinely to analyze and solve problems and create solutions.	Quadrant D - Adaptation Students have the competence to think in complex ways and to apply their knowledge and skills. Even when confronted with perplexing unknowns, students are able to use extensive knowledge and skill to create solutions and take action that further develops their skills and knowledge.
Quadrant A - Acquisition Students gather and store bits of knowledge and information. Students are primarily expected to remember or understand this knowledge.	Quadrant B - Application Students use acquired knowledge to solve problems, design solutions, and complete work. The highest level of application is to apply knowledge to new and unpredictable situations.

Source: international Center for Leadership in Education

The Lead and Work Teams also endorsed this quadrant approach as a way of showing how the more conceptual Core Curriculums can come to life in a classroom with real-world, problem-solving examples.

Work Team members devoted hours to crafting rigorous examples of Quadrant D teaching, which they believe will point the way for teachers as they adjust their own teaching practices. Lead Team members, though, also stressed that these be viewed as samples and not some checklist to work through and be done with.

To learn more about the rigor and relevance framework, visit the Iowa Department of Education web site at http://www.iowa.gov/educate/content/view/673/1024/ or the ICLE site at http://www.leadered.com/rigor.shtml.

Why a Phase 2 for the Iowa Core Curriculum?

"I commend Iowa for having courage to develop the Iowa Core, in order to best prepare our students to be 21st Century problem solvers."

Hope Bossard
Lead Team Member
Gilbert Schools

From the earliest days, Lead Team members talked of important "next steps" with Core Curriculum work. In 2006, those steps included calls for:

- Expanding to other curriculum areas, such as social studies and 21st century skills.
- Adding elementary and middle schools to the mix, to ensure effective synergy from kindergarten through 12th grade instruction.

In 2007, the Iowa Legislature agreed and endorsed both proposals with passage of Senate File 588. Key provisions included:

- Extending high school curriculum guides for math, literacy and science into kindergarten through grade 8 classrooms.
- Adding Core Curriculum for social studies in grades K-12.
- Calling for groundbreaking model curriculum in 21st century skills in grades K-12.

The decision to extend the Core Curriculum all the way to kindergarten classes was recognition that learning is interconnected. Raise the bar of expectations at the high school level, and there's a domino affect reaching back to a student's earliest days in a classroom.

The Lead Team even instructed the Work Teams writing K-8 curriculum to always keep this question in mind: "Will this provide the foundation for success in our high schools?"

Guidance for new Work Teams

Developing curriculum for the K-8 grades presented new challenges for the Work Teams. For example, the Quadrant D teaching examples do help bring the essential skills to life. But Iowa's elementary and middle school teachers haven't had training yet for quadrant teaching. Some team members even argued that for that reason, these K-8 Core Curriculum reports shouldn't adopt the quadrant strategy.

But in the end, it was decided that consistency from kindergarten through high school was important, and quadrant examples should be

incorporated. The Iowa Department of Education and Area Education Agencies also will work with K-8 teachers to provide training on developing Quadrant D work.

The authors also wrestled with the wide range of learner skills represented from kindergarten to 8th grade. To address that, they elected to write the Core Curriculum in bands: primary (K-2), intermediate (3-5) and middle (6-8). Another layer of work will follow to give some teams the chance to break down the skills even further, grade level by grade level.

"It's exciting to know that the essential concepts and skills of literacy will support the development of language and vocabulary across the content areas."

Carlene Lodermeier
Co-Chair
K-8 Literacy Work Team

The Core Curriculum web site also will eventually offer more supporting materials, intended to help flesh out the essential concepts.

Highlights of the Work Team Reports

K-8 Literacy Core Curriculum

Literacy and learning go hand in hand. Thus, mastery of a challenging literacy curriculum will equip students with the skills needed to succeed in general. As the Work Team put it, "being literate gives people the ability to become informed, to inform others and to make informed decisions."

To achieve this, literacy must encompass key concepts and skills for reading, writing, speaking, listening and viewing. But the Literacy Work Team and the Lead Team noted that language arts aren't learned in isolation. Literacy is key to all learning. And each curriculum area — whether it's math, science or social studies — even has its own "language" that must be mastered. Thus, the essential concepts and skills here must be woven into all content areas of a school's curriculum.

Two other key concepts guided the design of the literacy content:

- Students use similar language arts skills from K-8. Thus, the essential skills in each grade band sound similar. Teachers will simply use different strategies depending on the grade.
- Although the five strands of literacy are listed separately, they are intertwined and support each other. So they are best taught in an integrated manner.

The Literacy Work Team had the advantage of building on the high school curriculum crafted by its 2006 predecessors. It modeled its findings closely after that report but also adjusted for the unique issues presented by K-8 learners.

"The Math Core Curriculum sets high standards for K-8 students that will allow all students to be successful both in high school mathematics and in the world beyond K-12 education."

Maureen Busta
Co-Chair
K-8 Math Work Team

K-8 Math Core Curriculum

When debate turns to American students' competitive standing, math is often the first subject cited. The reason: "The United States is facing a crisis in mathematics education." That's the blunt assessment of this Work Team.

U.S. high school students rank near the bottom on key international mathematics tests. Yet our math teachers feel pressured to cover so many topics that they often must sacrifice depth and quality.

To avoid that, the Work Team offers clear direction on what math themes

deserve the most time and attention. It built upon the efforts of the 2006 high school Math Work Team and identified similar essential characteristics, skills and content of a world-class math curriculum. It also consulted similar resources, such as the National Council of Teacher of Mathematics, Iowa's Every Student Counts math initiative and best practices from several top research and education organizations.

The team cited these essential characteristics for the math curriculum:

- Teaching for understanding
- Problem-based instructional tasks
- Distributed practice that is meaningful and purposeful
- Emphasis on mathematical representations
- A focus on deep conceptual and procedural knowledge
- Rigor and relevance
- Effective use of technology
- Coherent and connected content

"To help Iowa students attain the scientific literacy necessary for success in the 21st Century, we must focus simultaneously on this framework of science concepts and skills as well as on how students learn science."

Phyllis Anderson
Co-Chair
K-8 Science Work Team

Key skills are critical, too, for success in a globally competitive 21st century, the team found. Those skills include:

- Problem solving
- Communication
- Reasoning and proof
- Ability to recognize, make and apply connections
- Ability to construct and apply multiple connected representations

Finally, the team developed a short list of essential content or topics a math teacher should emphasize. This would be tailored to each grade, of course:

- Number and operations
- Algebra
- Geometry and measurement
- Data analysis and probability

A student exposed to this essential teaching will come away proficient in critical math procedures and understand how to apply them in useful ways. "We want them ready for high school, and think this document will support that," said one team member. It will be left to each district to determine how best to infuse the curriculum with these essential characteristics, content and skills.

K-8 Science Core Curriculum

A mastery of science is seen as essential for students to succeed in the 21st century. "The economic productivity of our society is tightly linked to the scientific and technological skills of our work force," says the "call to action" from the respected National Science Education Standards (NSES).

But as with math, science teachers often try to teach too much in too little time, and wind up with the oft-cited "mile-wide, inch-deep" curriculum. Instead, schools need to deliver a strategic mix of science concepts combined with critical skills.

With that in mind, the K-8 Science Work Team took a similar approach used by the 2006 high school Science Work Team. It expanded on the same four content areas used for high schools, themes that were drawn

from the National Science Education Standards:

- Science as inquiry
- Physical science
- Earth and space science
- Life science

Science as inquiry heads the list because it is about both *understanding* science and the ability to *do* the science. The remaining NSES categories — science and technology, science in personal and social perspectives and the history and nature of science — deal with the application of knowledge. So the Work Team recommended that those be woven throughout the four content areas.

"All students can learn at higher levels if we are willing to meet the challenge of learning how to teach in ways that address the diverse learning needs of our student population."

Kim Rost
Lead Team Member
Prairie Lakes AEA

The team called its curriculum a framework that still allows individual districts to determine how best to put it into practice and meet the needs of students. The team report highlighted two Iowa Department of Education programs that could help science teachers as they begin using the Core Curriculum. The Iowa Content Network tracks the best research in learning and instruction, while Every Learner Inquires (ELI) is a community of Iowa teachers sharing best practices.

Social Studies Core Curriculum

No high school Core Curriculum team had blazed a trail for the Social Studies Work Team. From the start, the team grappled with how to identify just the core concepts among a smorgasbord of topics often grouped under the social studies "tent."

Adding to the challenge: Team members saw their jobs as nothing less than inspiring Iowa's teachers in the education of America's future leaders and citizens. The phrase "civic competence" became a kind of guiding light for the team's work. As the final report notes:

"Our guiding principle focused on the word 'core.' What was the core social studies curriculum for grades 9-12? "

Lynn Nielsen
Co-chair
Social Studies
Work Team

"The founders of our country emphasized that the vitality and security of a democracy depends upon the education and willingness of its citizens to participate actively in society. This level of participation requires civic competence. In other words, it is imperative that our future generations gain an understanding of the core concepts of social studies."

The team began by first identifying core concepts and essential skills for high schools. Grades K-8 will follow in a separate report, and will be grounded in the same core concepts. The essential areas identified are:

- Behavioral sciences
- Economics
- Geography
- History
- Political science and civic literacy

In each area, the team spelled out the knowledge and skills needed to grasp the economic, political and social forces that drive the nation and the world. The Work Team called the result a "bold step toward a vision of social and civic literacy for all of Iowa's students."

21st Century Skills Core Curriculum

"The 21st Century Curriculum provides the foundation skills for students to be able to fully master the other content areas and transition to life beyond school."

Nadene Davidson
Co-Chair
21st Century Work Team

This Work Team faced some unique challenges, too. What they discovered, as they read the literature, was that a debate was still being waged over what should be considered 21st century skills.

But this team was guided by state legislation, which stated that Iowa's 21st century skills must include:

- Employability
- Financial literacy
- Health literacy
- Technology literacy

And there was no debate over the importance of such skills for today's students. The team report says the trends are very clear: Each Iowa student needs essential 21st century skills. It quoted Ken Kay, president of the Partnership for 21st Century Skills, who called this skill set a "ticket to economic upward mobility."

The work team almost functioned as four mini-teams, assigning a separate subgroup to each skill area. Team membership also was wide-ranging, drawn from education, business and industry and the public sector. They reviewed a broad array of research and literature to help craft the vision and rationale for these new essential concepts and skills.

"We kept on asking ourselves what are the most significant processes and knowledge each student needs to learn. Problem solving in the 21st century favors the well-prepared mind…"

Phyllis Staplin
Lead Team Member
West Des Moines
Community Schools

The team also kept in mind the remarks of consultant Ray McNulty, who spoke last December at the Iowa High School Summit:

"The primary aim of education is not to enable students to do well in school, but to help them do well in the lives they lead outside of school."

Traditional academics aren't to be squeezed out by these new initiatives. Rather, schools will be challenged to find ways of creating a student-focused system that includes essential concepts such as critical-thinking; a strong work ethic; employability skills; physical, emotional and mental health and social responsibility.

Web-based validation

To gather feedback on these newest Iowa Core Curriculum recommendations, the Department conducted an online feedback survey. Department consultants, AEA consultants and Lead Team members all invited a cross section of Iowans — from teachers to principals, parents to business leaders — to participate in the survey.

The effort was structured in grade bands. So 10 separate online surveys were available for the five core curriculum areas. More than 2,500 surveys were completed by early March. Some participants went directly to their subject of interest, while others completed multiple surveys. Thus, it isn't known how many unique visitors participated.

Visitors were asked to indicate their level of agreement for including the

essential concepts and skills in each core curriculum. None received fewer than a majority endorsement and only a few received ratings below 80 percent. The vast majority received 90 percent endorsement or higher.

Participants also had the ability to add comments, which were then shared with Work Team co-chairs and the rest of the Lead Team. These feedback remarks offered an excellent opportunity to adjust the reports, to ensure they clearly sounded the right themes and covered truly essential content.

Lead Team review and endorsement

At its final March meeting, the Lead Team gave its full endorsement to all five curricula reports. The action came after team members had carefully vetted each Work Team report. They repeatedly praised the Work Teams for the breadth and depth of the essential skills and content, particularly given the tight timetables and challenging winter that wreaked havoc with Team meeting schedules.

"Every country with high achievement pays attention to the quality of teaching in its classrooms. Teachers truly are what will make a difference in improving student achievement in Iowa. There is no other way to do it."

Judy Jeffrey
Director
Iowa Department of Education

But Lead Team members also wanted to reassure themselves that the results truly would help raise student achievement in Iowa schools. They devoted considerable time to reviewing the quadrant teaching examples, to make certain they were consistent, challenging and yet grade-appropriate.

They also stressed the importance of viewing the reports collectively, not in silos. For example, literacy should become a part of all curriculum areas. In another example, personal health concepts may in fact be spelled out in the 21st Century report. But that doesn't mean a science teacher can't provide the instruction on personal health. Those are the kinds of choices the individual districts will be making.

Finally, they were sensitive to the fact that the elementary curriculum is a different beast from high school content. Even after breaking it down into grade bands of K-2, 3-5 and 6-8, the Lead Team members recognized that teachers and parents alike would be hungry for more grade-specific guidance. For example, the kind of math to be taught in kindergarten will differ sharply from the instruction found in a second-grade classroom. And parents or grandparents will be asking, "What is it that my third grader should know?"

What's ahead?

*** K-8 Curriculum in social studies, 21st century skills**

For the social studies and 21st Century Work Teams, their tasks aren't finished. Both groups will continue to meet in the coming months to develop Core Curriculums for grades K-8, in keeping with the state law. Both teams envision completing that second phase by next winter or early spring.

The Work Teams also intend to develop some sample teaching units.

*** Professional development for elementary, middle school**

Meanwhile, the Iowa Department of Education will extend its professional training on Core Curriculum and high quality instruction to include more of Iowa's elementary, middle and high school educators. As with the first round of high school work, the Department will partner with the Area Education Agencies for this effort.

For elementary and middle school teachers, the concept of quadrants will be new. But as some Lead Team members noted, K-8 teachers are old hands at weaving curriculum across subject areas — for example, finding math teaching opportunities during a science unit or working on reading comprehension during a history lesson. Breaking down those walls and teaching the essential content and skills wherever appropriate is precisely what the Lead Team has in mind.

"Some say that not all students can learn challenging content. Not only do we at the IASB not believe that…we believe that we have a moral imperative to define that challenging content and provide the supports necessary for all kids to learn it."

Susie Olesen
Lead Team Member
Iowa Association of School Boards

Reaching out to all the elementary, middle and high school teachers marks a significant expansion of Core Curriculum-related work. To help keep the massive effort on task and to continue to make progress on the curriculum initiatives, the Department has proposed having key staffers work with an External Advisory Team including representatives from the state's key education associations, the Regents schools, the state's largest urban school districts and the Core Curriculum Lead Team.

*** Expanding a supportive pilot program**

The Iowa Department of Education also intends to add another 20 districts this coming year to its newest professional development program now at work in nine Iowa districts. The program has a proven track record for raising student achievement.

Known as Authentic Intellectual Work (AIW), it calls for devoting more student time to using higher-order thinking skills. That, in turn, develops a deeper grasp of a subject. It also requires a student to perform real-world tasks in the process.

Rather than teaching that's "a mile wide and an inch deep," Jeffrey says AIW encourages teaching is "a mile deep." It's the perfect complement to the Core Curriculum effort.

Research behind the work, first developed by Dr. Fred Newmann in the 1980s, shows that achievement improves regardless of grade level, urban or rural districts or demographics.

"We talk a lot about rigor and relevance in students' work. This (training) puts a definition on what rigor really means," explains Jeffrey.

Teachers who have participated in the pilot program have called it the most intensely rewarding training they've experienced.

*** Assessment issues**

Team members also recognized that while next-step work must emphasize training and professional development for Iowa's teachers, leaders mustn't take their collective eyes off the prize: "It has to be about the students," said

one member. “What are the essential concepts that students have to have at a particular grade level?”

That raised some questions about how best to measure student progress once the Core Curriculum is in wide use. One possibility includes new end-of-year, subject-specific tests being developed by Iowa Testing Programs of Iowa City. Tim Ansley, who is with Iowa Testing and a member of the Lead Team, said end-of-term tests are already available for math and science and social studies literacy and 21st century skills will be out next year. The tests are designs to align with the skills and concepts outlined in the Core Curriculum work. But if will be up to individual districts to determine how best to assess student progress. The districts, in turn, must file a report with the Iowa Department of Education that shows they have a method for determining progress.

Bringing it all back to the student

In the end, what matters is what is best for Iowa’s students.

Iowa can design the most innovative and rigorous Core Curriculum but — to borrow from the African proverb — it takes a village to educate a child. School administrators, teachers and parents must pull together to enthusiastically embrace the guidelines of the Core Curriculum. Teachers must receive the necessary training to show them the path to introducing these new concepts to classrooms. And parents must realize that children truly need a classroom experience different than the one Mom and Dad fondly recall.

Of course, it also takes motivated students. But done well, endorsement of the Core Curriculum should inspire Iowa students to aim higher. It should equip them to be successful in whatever career path they choose. And it should train them to be lifelong learners, a must in today’s complex world.

And Iowans can take satisfaction in knowing that they’ve done the hard work necessary to preserve the state’s legacy as the “education state.”

Complete Core Curriculum Reports

These reports spell out the essential content and skills necessary to deliver a world-class education in K-8 literacy, math and science as well as in high school social studies and 21st century skills. Later reports will expand social studies and 21st century skill to the elementary and middle school levels.

Students introduced to the content in these documents will experience a rigorous and relevant learning experience. Teachers also should find these reports rich with examples of how to bring these rigorous concepts to life in their classrooms.

Authors of the curriculum reports were sensitive to the fact that kindergarten through 8th grade covers a vast range of student performance. A slight tug of war developed: Some called for developing content skills — and relevant quadrant examples — by specific grade. Others noted that not all schools teach the exact same concepts in the same grade and would want to retain that flexibility. They recommended staying with grade bands — K-2, 3-5, 6-8. But grade specific materials will come later.

Authors also wanted to remind readers that the quadrant examples are just that, not a must-do list of things to teach. Rather, they are examples designed to fuel ideas and guide the thinking of local administrators, curriculum directors and teachers as they begin adopting these recommendations in their home districts.

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Essential Concepts and Skill Sets of the Iowa Core Curriculum

Literacy

Literacy — defined by Meltzer, Smith, and Clark as the ability to read, write, speak, listen, and think effectively — enables students to learn and to communicate clearly about what they know. Being literate gives people the ability to become informed, to inform others, and to make informed decisions (2001). Literacy is synonymous with learning. The integration among reading, writing, speaking, listening, and viewing — connecting with the ever-increasing knowledge base for each content area — provide the means for thinking among and between concepts and ideas. It is an active process.

The Reading, Writing, Speaking, Listening, and Viewing Essential Skills and Concepts found in the Iowa Core Curriculum describe what students should know and be able to do in English language arts at the primary (K–2), intermediate (3–5), middle (6–8), and high school (9–12) levels. The essential skills and concepts described in this document should be considered the focal points for instruction and student learning. The language arts: reading, writing, speaking, listening, and viewing — are different from other content areas because they provide the processes that students use to learn and understand the complex world in which they live. Each discipline has a language and vocabulary of its own. Because of the inclusive nature of language arts, it is critical that these essential literacy concepts and skills be integrated throughout the content areas.

The purpose of this document is to guide school districts in the development of effective literacy curricula. Two fundamental concepts have guided its creation. First, literacy learning is recursive. This means students apply similar language arts skills and concepts at every developmental level as they encounter increasingly complex materials. Therefore, the essential skills and concepts for each level (primary, intermediate, middle, and high school) are very similar. Their implementation at each level will vary by instructional strategies, learning materials, and assessment. As a result, students will build upon and refine their knowledge, and gain sophistication and independence in their use and application of the essential skills and concepts.

Second, although listed separately in the Iowa Core Curriculum, the individual strands of Reading, Writing, Speaking, Listening, and Viewing are intertwined. Each strand links to and supports the other strands. At any time, or at the same time, students may read, write, and view, or speak and listen, to convey meaning. To be learned and used effectively, the processes of reading, writing, speaking, listening, and viewing are best taught in an integrated manner and assessed in the same way.

Primary Elementary Grades

Curricular Area	Essential Concept or Skill Set
Reading	Demonstrates an understanding of written language and the relationship of letters and words to the sounds of speech
	Uses multiple decoding strategies to accurately read words in text
	Independently reads a significant number of books and text each year. This reading should include both fiction and nonfiction in a variety of genres
	Reads for a variety of purposes and across content areas
	Uses a variety of skills and strategies to comprehend non-fiction and informational text
	Uses a variety of strategies and skills to comprehend and interpret fiction
	Reads with fluency silently and aloud to support comprehension
	Uses a variety of strategies to develop and expand reading vocabulary

Illustration of ***Reads for a variety of purposes and across content areas*** in the ICLE's Rigor and Relevance Framework

Quadrant C Students read and gather information on two topics: the physical and behavioral characteristics of a variety of animals and the attributes of a variety of habitats. The students compare the information gathered to predict the animals' habitats. Students read to verify their predictions.	**Quadrant D** Students investigate ways they and their families might help animals abandoned locally. They read and gather information about the animals recently rescued. The students then develop an informational flier to distribute to parents and the community describing actions that can be taken.
Quadrant A Students read informational text and generate a list of physical and behavioral characteristics of a variety of animals.	**Quadrant B** Students read to compare and contrast humans to a variety of animals with regard to their basic needs for water, food, and shelter.

Curricular Area	Essential Concept or Skill Set
Writing	Uses an effective writing process
	Uses knowledge of purpose, audience, format and medium in developing written communication
	Applies writing skills and strategies to communicate effectively in a variety of genres with various audiences
	Uses writing as a tool for learning
	Engages in the information literacy process: accesses, evaluates, and communicates information and ideas
	Is able to write on demand
	Adheres to conventions generally established in spelling, punctuation, grammar, usage, syntax and style
	Incorporates technology as a tool to enhance writing

Illustration of ***Uses knowledge of purpose, audience, format, and medium in developing written communication*** in the ICLE's Rigor and Relevance Framework

Quadrant C The teacher and students discuss the concept of family. Following the discussion, students draw or cut pictures from magazines representing families. Students write acrostic poems using words describing families.	**Quadrant D** The students discuss ways to show good character at school - in the room, in the hallways, or on the playground. They write character sketches of ordinary students whose good character traits during times of crisis result in heroic actions. The sketches are posted online using the eCreate option at www.myhero.com.
Quadrant A The teacher reviews and models how to write a paragraph describing a familiar object. The students write paragraphs describing classroom objects. The paragraphs are read aloud, and students match the paragraphs and objects.	**Quadrant B** The students choose pictures from current magazines and write paragraphs describing them. The pictures and paragraphs are randomly placed on a table. The students match the pictures with the descriptive paragraphs.

Curricular Area	Essential Concept or Skill Set
Speaking	Considers audience and variables in the speaking situation
	Produces a coherent message
	Participates in a variety of communication situations
	Uses appropriate content and conventions for purpose, audience, occasion, and context
	Demonstrates use of presentation skills to communicate
	Participates appropriately in one-on-one situations and group settings
	Recognizes the role of evaluation in oral communication
	Recognizes the role of response in oral communication

Illustration of ***Participate in a variety of communication situations*** in the ICLE's Rigor and Relevance Framework

Quadrant C Students make predictions about what seeds need to grow. Students read or listen to text about two different varieties of plants and their differing needs. Students use Venn diagrams to compare and contrast the different care needs of the two plants. In small groups, students share their diagrams and thinking with peers.	**Quadrant D** Students make predictions and generate questions about what plants need to germinate and grow. In pairs, students investigate answers to their own questions by designing and conducting experiments with seeds. Students keep logs documenting the planting, care, and growth of plants over time - frequently sharing observations with peers. After several weeks, partnered students share final experiment results with the class and a local farmer who gives them feedback on their processes and discusses organic farming with them. Students read or listen to text about plant growth and development, and in groups, they discuss the text in relation to their experiment questions and findings.
Quadrant A Students read or listen to a text that discusses the essential elements required by seeds to germinate and grow into healthy plants. Students create posters with labels showing plant growth needs. In small groups, students share and describe their posters.	**Quadrant B** After reading about the essential elements plants need to germinate and develop, students plant a variety of seeds in small containers. Students keep logs documenting the planting, care, and growth of plants over time. In small groups, students frequently share observations with their peers.

Curricular Area	Essential Concept or Skill Set
Listening	Listens for information and understanding
	Listens for interpretation, analysis, and evaluation
	Listens to establish, maintain and enhance relationships

Illustration of ***Listens for information and understanding*** in the ICLE's Rigor and Relevance Framework

Quadrant C Students listen to the teacher read a non-traditional version of Cinderella. They discuss the selection of story elements and then role play the story. (For example, the selection of elements in a portrayal varies for a Native American Cinderella, a Hispanic Cinderella, or a Chinese Cinderella, etc.)	**Quadrant D** The teacher reads several different non-traditional versions of Cinderella. The class listens for common elements and notes the differences and similarities in the use of these elements in the different versions. Students then create story maps of their own non-traditional versions. They tell their new versions to the class and/or small groups who identify the common elements.
Quadrant A Students listen to the teacher read a traditional version of Cinderella and draw a story map to use in retelling the story.	**Quadrant B** Students listen to a version of Cinderella posted on YouTube. They use the sketch-to-stretch strategy to picture the details they heard in the story.

Curricular Area	Essential Concept or Skill Set
Viewing	Demonstrates an awareness of the effects of visual media on society and culture
	Uses a range of strategies to interpret visual media
	Applies a variety of criteria to evaluate informational media
	Understands how literary forms can be represented in visual narratives

Illustration of ***Applies a variety of criteria to evaluate informational media*** in the ICLE's Rigor and Relevance Framework

Quadrant C The teacher presents definitions and models of fact and opinion statements. Students watch a prerecorded news program, analyze the broadcast for facts and opinions, and watch for visual cues that accompany the presentation of facts and opinions.	**Quadrant D** The teacher presents definitions and models of fact and opinion statements. Students select two news programs from the local listings. They view each, analyze the broadcasts for facts and opinions, and watch for visual cues that accompany the presentation of facts and opinions. They compare the presentations in the two viewing experiences.
Quadrant A The teacher presents definitions and models of fact and opinion statements. Students watch a prerecorded news program, separate facts from opinions on a list prepared by the teacher, and record the statements on a t-chart.	**Quadrant B** The teacher presents definitions and models of fact and opinion statements. Students select and watch a news program, separate the facts from the opinions that were noted by the teacher during the transmission, and record the statements on a t-chart.

Intermediate Elementary Grades

Curricular Area	Essential Concept or Skill Set
Reading	Uses multiple decoding strategies to accurately read words in text
	Independently reads a significant number of books and text each year. This reading should include both fiction and nonfiction in a variety of genres
	Reads for a variety of purposes and across content areas
	Uses a variety of skills and strategies to comprehend non-fiction and informational text
	Uses a variety of strategies and skills to comprehend and interpret fiction
	Reads with fluency silently and aloud to support comprehension
	Uses a variety of strategies to develop and expand reading vocabulary

Illustration of ***Uses a variety of strategies and skills to comprehend and interpret fiction*** in the ICLE's Rigor and Relevance Framework

Quadrant C Students read Number the Stars by Lois Lowry and keep a split page reading log. On the left side of the log, they chart the literary characteristics of the text and questions about the text prompted by the teacher. On the right side of the log, they record their personal response to the text, including connections they make to prior reading, to their lives, or to prior experiences.	**Quadrant D** As a way to learn about the Holocaust, students identify community members with wartime experiences and invite them to partner read sections of Number the Stars by Lois Lowry. Students and reading partners dialogue and share personal reflections, questions, and experiences related to the reading. They participate in a journal exchange facilitated by the teacher. Upon completion of the novel, the outside reading partners are invited to the classroom to participate in a whole-group conversation about Lowry's story and that period in history.
Quadrant A Students read Number the Stars by Lois Lowry. Small groups generate content and vocabulary questions; they share and answer peer questions.	**Quadrant B** As students read Number the Stars by Lois Lowry, they identify and map the various settings. Students read diaries of wartime survivors and map their journeys, making comparisons across the settings.

Curricular Area	Essential Concept or Skill Set
Writing	Uses an effective writing process
	Uses knowledge of purpose, audience, format, and medium in developing written communication
	Applies writing skills and strategies to communicate effectively in a variety of genres with various audiences
	Uses writing as a tool for learning
	Engages in the information literacy process: accesses, evaluates, and communicates information and ideas
	Is able to write on demand
	Adheres to conventions generally established in spelling, punctuation, grammar, usage, syntax, and style
	Incorporates technology as a tool to enhance writing

Illustration of ***Uses knowledge of purpose, audience, format, and medium in developing written communication*** in the ICLE's Rigor and Relevance Framework

Quadrant C Students brainstorm a list of possible between-meal snacks. Students read the school's wellness policy and apply the standards defined in the policy to their list. Students create and conduct a survey among their classmates to determine the most popular snacks from among those they have found appropriate under the school's wellness policy. They synthesize the results of the survey and write an editorial for the classroom newspaper.	**Quadrant D** In order to provide input on what items should be included in a new vending machine to be located in the school lobby, students research the school's wellness policy, brainstorm a list of possible snacks, and apply the standards defined in the policy to their list. Students write their rationale and recommendations for items to be sold in a blog on the school's Web site. They continue to blog as they receive feedback. In an effort to persuade the administration to accept their input, students select a medium and present the results of their research, a summary of the information they gathered, and their final recommendations.
Quadrant A Students read the school's wellness policy. They read the nutrition labels on a variety of snacks and write a paragraph that identifies the snacks that would be acceptable under the school's policy.	**Quadrant B** In order to provide input on what items should be included in a new vending machine to be located in the school lobby, students read the school's wellness policy, brainstorm a list of possible snacks, and apply the standards defined in the policy to their list. They write a paragraph that identifies the snacks that would be acceptable under the school's policy.

Curricular Area	Essential Concept or Skill Set
Speaking	Considers audience and variables in the speaking situation
	Produces a coherent message
	Participates in a variety of communication situations
	Uses appropriate content and conventions for purpose, audience, occasion, and context
	Demonstrates use of presentation skills to communicate
	Participates appropriately in one-on-one situations and group settings
	Recognizes the role of evaluation in oral communication
	Recognizes the role of response in oral communication

Illustration of ***Participate in a variety of communication situations*** in the ICLE's Rigor and Relevance Framework

Quadrant C In small groups, students read and present to the class the historical background and a storytelling example from a Native American tribe. The class works together to weave the different traditions and stories into an oral tradition timeline. They present this oral history, complete with examples of Native American storytelling, to an audience that includes classmates, parents, and school dignitaries.	**Quadrant D** Students learn about the history and oral traditions of different Native American tribes through reading and viewing. After discussing their findings in small groups, students identify major concerns of the past and present such as the environment, technology, government, and human rights. In the pattern of Native American folklore, students write their own stories about the problems facing our world today. They present these oral stories to the class and tape them to be broadcast on the school network channel.
Quadrant A A class assignment asks students to read about the oral traditions of different Native American tribes. In small groups, students work together to identify and record their findings in a reading log. This culminates in a small group oral presentation to the entire class.	**Quadrant B** A guest speaker from the Bureau of Indian Affairs is invited to the classroom to chronicle the importance of the oral tradition. Students then select a topic, read widely, and present to the class an informative speech summarizing their findings on some aspect of Native American history or contemporary concern.

Curricular Area	Essential Concept or Skill Set
Listening	Listens for information and understanding
	Listens for interpretation, analysis, and evaluation
	Listens to establish, maintain and enhance relationships

Illustration of ***Listens for interpretation, analysis, and evaluation*** in the ICLE's Rigor and Relevance Framework

Quadrant C Students listen to recordings of famous poets reading their poems and identify various elements of poetry (e.g. alliteration, repetition and consonance). They write and perform original poems using the identified elements.	**Quadrant D** Local authors published in Lyrical Iowa read original works to the class. Students identify the poetic elements they hear (e.g. alliteration, repetition and consonance) and record their personal responses to those elements. They write letters to the poets thanking them for performing; they explain their responses to the readings using citations from the original poems.
Quadrant A Students listen to poetry and identify the use of various elements (e.g. alliteration, repetition and consonance) in the poems from a chart of poetry elements and illustrative examples provided by the teacher.	**Quadrant B** Students listen to popular songs and identify the use of various elements (e.g. alliteration, repetition and consonance) in the songs using a chart of poetry elements and illustrative examples provided by the teacher.

Curricular Area	Essential Concept or Skill Set
Viewing	Analyzes the effects of visual media on society and culture
	Uses a range of strategies to interpret visual media
	Applies a variety of criteria to evaluate informational media
	Understands how literary forms can be represented in visual narratives

Illustration of ***Understands how literary forms can be represented in visual narratives*** in the ICLE's Rigor and Relevance Framework

Quadrant C Students review relationships among literary elements and watch a recorded performance of Charlotte's Web in language arts class. Students analyze the relationships among the literacy elements and write a review of the performance and these relationships to be included in their class newsletter distributed monthly to parents.	**Quadrant D** Students review the relationships among literary elements and attend a performance of Charlotte's Web at the local theater - looking critically at how each character remains unchanged or changes and analyzing how each character is impacted by the themes in the book. Synthesizing these analyses, students collaborate to write character sketches that will be included in the program for a future presentation of the production.
Quadrant A Students review literary elements, watch a recorded performance of Charlotte's Web in language arts class, and identify the literary elements using a viewing guide prepared by the teacher.	**Quadrant B** Students review literary elements and attend a performance of Charlotte's Web at the local theater. Children are assigned to follow one of the characters throughout the performance, and they record their observations of the characters on character trait charts.

Middle School Level

Curricular Area	Essential Concept or Skill Set
Reading	Independently reads a significant number of books and text each year. This reading should include both fiction and nonfiction in a variety of genres
	Reads for a variety of purposes and across content areas
	Uses a variety of skills and strategies to comprehend non-fiction and informational text
	Uses a variety of strategies and skills to comprehend and interpret fiction
	Reads with fluency silently and aloud to support comprehension
	Uses a variety of strategies to develop and expand reading vocabulary

Illustration of ***Reads for a variety of purposes and across content*** in the ICLE's Rigor and Relevance Framework

Quadrant C Students read a text explaining a governmental policy. Using a discussion web, they develop arguments for and against the policy based on their reading of the text and their own personal viewpoints. They discuss their reasoning and write a position statement.	**Quadrant D** Students read the user's guide for the latest video game. They write a single page quick guide to the program. They invite other students to test the effectiveness of their quick guide. Based upon the feedback they receive from their testers, they revise their guide.
Quadrant A Students learn how to use knowledge of text structure to increase their understanding of the descriptive, sequential, and cause-effect passages in a history text.	**Quadrant B** Students read the procedures for registering to vote and delineate the specific steps to be followed for registration.

Curricular Area	Essential Concept or Skill Set
Writing	Uses an effective writing process
	Uses knowledge of purpose, audience, format, and medium in developing written communication
	Applies writing skills and strategies to communicate effectively in a variety of genres with various audiences
	Uses writing as a tool for learning
	Engages in the information literacy process: accesses, evaluates, and communicates information and ideas
	Is able to write on demand
	Adheres to conventions generally established in spelling, punctuation, grammar, usage, syntax, and style
	Incorporates technology as a tool to enhance writing

Illustration of ***Applies writing skills and strategies to effectively communicate in a variety of genres with various audiences*** in the ICLE's Rigor and Relevance Framework

Quadrant C Students research the time periods of historical family events; they write multi-genre (e.g., editorial, diary entry, poetry) papers retelling and reflecting on the events.	**Quadrant D** Students write multi-genre (e.g., editorial, diary entry, poetry) collections covering historical family events. Utilizing interviews, print, and electronic resources, students write from multiple perspectives.
Quadrant A Students practice sentence combining techniques for a variety of genres.	**Quadrant B** Students generate idea webs for future writing projects based on their family histories.

Curricular Area	Essential Concept or Skill Set
Speaking	Considers audience and variables in the speaking situation
	Produces a coherent message
	Participates in a variety of communication situations
	Uses appropriate content and conventions for purpose, audience, occasion, and context
	Demonstrates use of presentation skill to communicate
	Participates appropriately in one-on-one situations and group settings
	Recognizes the role of evaluation in oral communication
	Recognizes the role of response in oral communication

Illustration of ***Uses appropriate content and conventions for purpose, audience, occasion, and context*** in the ICLE's Rigor and Relevance Framework

Quadrant C Students choose propaganda techniques and create their own advertisements for existing or new products. Complete with costumes and props, students perform the advertisements for the class.	**Quadrant D** Students choose propaganda techniques and create one-minute television commercials or public service announcements supporting or refuting real causes, organizations, events, campaigns, or political candidates.
Quadrant A Students review advertisements selected by the teacher, write summaries of the propaganda techniques used, and orally present their summaries to the class.	**Quadrant B** In small groups, students view separate television commercials, identify the propaganda techniques used in the commercials, and share their findings orally with the class.

Curricular Area	Essential Concept or Skill Set
Listening	Listens for information and understanding
	Listens for interpretation, analysis, and evaluation
	Listens to establish, maintain and enhance relationships

Illustration of ***Listens for interpretation, analysis, and evaluation*** in the ICLE's Rigor and Relevance Framework

Quadrant C Students listen to the inaugural address of President Kennedy and evaluate the delivery for style, substance, and the effectiveness of his message based on criteria created by the class. They determine the priority the President placed on the issues by analyzing and reflecting on his method of delivery.	**Quadrant D** Students listen to a podcast of a debate on a timely issue in a legislative session. Students evaluate the strength of the arguments presented – determining the positive or negative impact of public speaking skills on the arguments. Students write opinion statements on the issue and present them to the class - who in turn comment on the impact of their speaking skills on the strength of the opinion presented.
Quadrant A The students listen to John F. Kennedy's inaugural speech. They generate a list of the main topics presented by President Kennedy.	**Quadrant B** In groups, students read articles covering the main issues of voters in l961. Students listen to John F. Kennedy's inaugural speech. They determine if the issues identified by voters that were also covered in President Kennedy's speech.

Curricular Area	Essential Concept or Skill Set
Viewing	Analyzes the effects of visual media on society and culture
	Uses a range of strategies to interpret visual media
	Applies a variety of criteria to evaluate informational media
	Understands how literary forms can be represented in visual narratives

Illustration of ***Uses a range of strategies to interpret visual media*** in the ICLE's Rigor and Relevance Framework

Quadrant C After viewing a television show from the 1970s, students write essays examining the positive and negative changes in media messages and the impact of those changes on society.	**Quadrant D** Students analyze the use of stereotypes, the coherence of the message, the credibility of the story, and the use of logic after viewing popular television shows from various decades. They determine the similarities and differences of these messages through the decades, and they determine which decade was the best match for various groups of people.
Quadrant A Students read about the history of close-ups and various camera techniques/strategies used to convey messages. They identify these techniques as they view a prerecorded television show.	**Quadrant B** Students read about the history of close-ups and various camera techniques/strategies used to convey messages. They choose and view current television shows, identifying these techniques/strategies.

Essential Concepts and Skills Sets of the Iowa Core Curriculum

Mathematics

Recent results of national and international tests show that the United States is facing a crisis in mathematics education. American high school students score near the bottom on the international TIMSS and PISA tests. Analysis of this poor performance shows that the U.S. mathematics curriculum is "a mile wide and an inch deep," trying to cover too many topics in not enough depth. All Iowa high students must be better prepared in mathematics to successfully compete in the technology-rich, information-dense, global society. To achieve this we must redesign our K-12 mathematics curriculum so that it is focused on providing deep understanding of important mathematics.

In this document we identify the essential skills, content, and characteristics of the world-class mathematics curriculum that Iowa needs. This core curriculum for K-12 school mathematics is based on recommendations from the National Council of Teachers of Mathematics (NCTM, 2000), five years of experience with Iowa's Every Student Counts mathematics initiative (ESC), and best practices identified from reviews of research conducted by the National Research Council (2001), the International Bureau of Education (2000), the National Council of Teachers of Mathematics (2003), the federal What Works Clearinghouse, and Iowa's Mathematics Content Network project.

In addition, the essential skills and content recommended in this core curriculum document have been informed by a careful review of many background resources, including the Focal Points for K-8 Mathematics from the National Council of Teachers of Mathematics (NCTM, 2006), the Mathematics Framework for the National Assessment of Educational Progress (NAEP, 2007), mathematics standards recommended by Achieve (2007), mathematics standards recommended by the College Board (2007), ACT core curriculum recommendations (2005), the mathematics curricula of Japan and Singapore, the National Center for the Study of Mathematics Curricula, and recommendations from Iowa's Core Curriculum Lead Team.

In order to provide effective guidance and technical assistance for Iowa's schools, this document has drawn from the above resources to identify the essential skills, content, and characteristics of a world-class K-12 mathematics curriculum.

Characteristics of a World-Class Core Curriculum in Mathematics

A world-class mathematics curriculum should have the following essential characteristics:

- Teaching for Understanding
- Problem-Based Instructional Tasks
- Distributed Practice that is Meaningful and Purposeful
- Emphasis on Mathematical Representations
- Focus on Deep Conceptual and Procedural Knowledge
- Rigor and Relevance
- Effective Use of Technology
- Coherent and Connected Content

Essential Skills of a World-Class Core Curriculum in Mathematics

Students need powerful skills to be successful in the globally competitive workforce of the 21st century. Business and industry demand workers who can solve problems, work in teams, and are

able to apply learning to new and changing situations, especially as workers change jobs and careers many times in their lifetimes. Therefore, students must acquire powerful, flexible, and widely-applicable mathematical skills by the time they graduate from high school. Many such skills have been discussed in surveys of businesses (e.g., the SCANS report) and in the NCTM Process Standards (NCTM, 2000).

Essential Skills in a World-Class Mathematics Curriculum:

- Problem Solving
- Communication
- Reasoning and Proof
- Ability to Recognize, Make, and Apply Connections
- Ability to Construct and Apply Multiple Connected Representations

Essential Content of a World-Class Core Curriculum in Mathematics

All students should acquire a deep and powerful understanding of mathematics. But which areas and topics of mathematics should be included in the K-8 curriculum? The most telling criticism of the U.S. mathematics curriculum is that it is "a mile wide and an inch deep." We cannot continue to teach too many topics in too little depth. Long lists of recommended topics are symptomatic of and serve to exacerbate this problem. In order to provide effective guidance to Iowa's elementary and middle schools, this document identifies essential mathematical strands and essential focal points in each strand. The emphases for these grade strands will vary within and between the grade bands. For instance, Number and Operations will receive greater emphasis in K-2 and less instructional time in 6-8.

Essential Mathematical Strands in a World-Class High School Mathematics Curriculum:

- Number and Operations
- Algebra
- Geometry and Measurement
- Data Analysis and Probability

Primary Elementary Grades

Curricular Area	Essential Concept or Skill Set
Number and Operations	Count, represent, read, compare, order and conserve whole numbers
	Develop understandings of addition and subtraction and strategies for basic addition facts and related subtraction facts
	Express numbers as equivalent representations to fluently compose and decompose numbers (putting together and taking apart)
	Develop fluency and quick recall of addition facts and related subtraction facts and fluency with multi-digit addition and subtraction
	Estimate the answer to an addition or subtraction problem before computing, and determine whether the computed answer makes sense
	Develop an understanding of whole number relationships, including grouping in tens and ones and apply place-value concepts
	Understand fractional parts are equal shares or equal portions of a whole unit (a unit can be an object or a collection of things)

Illustration of ***Develop understandings of addition and subtraction and strategies for basic addition facts and related subtraction facts*** in the ICLE's Rigor and Relevance Framework.

Quadrant C I have six crayons and my friend gave me some more and now I have ten. How many crayons did my friend give me?	**Quadrant D** I opened a box of ten crayons. All of the crayons in the box were red or blue. What are the possible combinations of red and blue crayons that could be in my box?
Quadrant A 6 + 4 = 10	**Quadrant B** I have six crayons and my friend gave me four more. How many crayons do I have now?

Curricular Area	Essential Concept or Skill Set
Algebra	Recognize, describe, create and extend repeating and growing patterns such as physical, geometric and numeric patterns and translate from one representation to another
	Sort, classify, and order objects by size, number and other properties
	Demonstrate the use of the commutative and associative properties and mathematical reasoning to solve for the unknown quantity in addition and subtraction problems; justify the solution
	Understand equality as meaning "the same as" and use the = symbol appropriately

Illustration of ***Recognize, describe and extend repeating and growing patterns such as physical, geometric and numeric patterns and translate from one representation*** to another in ICLE's Rigor and Relevance Framework.

Quadrant C Using pattern blocks, the teacher creates an ABAB pattern. The students are requested to duplicate the teacher's pattern. Ask students to describe the pattern and name the next three components.	**Quadrant D** In pairs, each student creates a repeating linear pattern for a table runner using a set of pattern blocks. Students ask their partner to tell them the next shape in their pattern, then the next. Students ask their partner to predict the fifteenth shape in the pattern. Students duplicate the pattern to produce the table runner using appropriate materials.
Quadrant A Using pattern blocks, the teacher creates an ABAB pattern. The students are requested to duplicate the teacher's pattern.	**Quadrant B** In art class, students use pattern blocks of only one shape and three different color (or 3 shapes of one color) and design their own pattern.

Curricular Area	Essential Concept or Skill Set
Geometry	Recognize and describe shapes and structures in the physical environment
	Compose and decompose geometric shapes, including plane and solid figures to develop a foundation for understanding area, volume, fractions, and proportions
	Identify, name, sort, and describe two- and three- dimensional geometric figures regardless of size or orientation
	Describe and specify space and location with simple relationships and with coordinate systems
	Experience and recognize slides, flips, turns and symmetry to analyze mathematical situations
	Use attributes of geometric figures to solve spatial problems

Illustration of ***Compose and decompose geometric shapes, including plane and solid figures to develop a foundation for understanding area, volume, fractions, and proportions*** in the ICLE's Rigor and Relevance Framework.

Quadrant C Students are given a set of pattern blocks with all squares and tan rhombuses removed. Teacher asks, 1) How many green triangles are needed to cover one blue rhombus? 2) How many green triangles to cover three blue rhombuses? 3) How many green triangles do you need to cover one red trapezoid? 4) What other relations can you show between the shapes?	**Quadrant D** During the fish unit, children are given two outlines, one of a long skinny fish and one of a short fat fish. Given a set of pattern blocks with all squares and tan rhombuses removed, students are asked to cover the shapes and determine which fish has the larger area.
Quadrant A Using a set of pattern blocks with all squares and tan rhombuses removed, show the students different shapes and ask them to name the shapes. Teacher demonstrates that a blue rhombus can be covered with two green triangles.	**Quadrant B** Students design the background for the cover of a shapes book. The cover has connected outlines of the hexagon shapes. Students are provided hexagons, triangles, trapezoids, and rhombuses to create the cover.

Curricular Area	Essential Concept or Skill Set
Measurement	Identify attributes that are measurable, such as length, weight, time and capacity, and use these attributes to order objects and make direct comparisons
	Estimate, measure and compute measurable attributes while solving problems
	Estimate and measure length using standard (customary and metric) and non-standard units with comprehension

Illustration of ***Estimate and measure length using of standard (customary and metric) and non-standard units with comprehension*** in the ICLE's Rigor and Relevance Framework.

Quadrant C With a partner, measure your arm span and your height. Check with another group. What do you notice about the measurements?	**Quadrant D** The library is getting new bookshelves. Your teacher would like to have one of the short bookshelves in your classroom, but she doesn't know if one will fit. The only possible place the bookshelf will fit is under the window. You and your partner decide on a unit of measure to use when determining if the bookshelf will fit. Record what you did and what your results were.
Quadrant A Using a ruler and unifix cubes, measure the length of the lines on the worksheet your teacher has given you. Record your results.	**Quadrant B** Using a ruler and unifix cubes, measure the length and width of your math book. Record your results.

Curricular Area	Essential Concept or Skill Set
Data Analysis	Collect, sort, organize, and represent data to ask and answer questions relevant to the K-2 environment
	Compare different representations of the same data using these types of graphs: bar graphs, frequency tables, line plots, and picture graphs
	Use information displayed on graphs to answer questions and make predictions, inferences and generalizations such as likely or unlikely events

Illustration of ***Collect, sort, organize, and represent data to answer questions relevant to the K-2 environment*** in the ICLE's Rigor and Relevance Framework.

Quadrant C Given a set of buttons, children are asked to sort them by an attribute and asked to organize the information to determine how many are in each group, ordering the groups from least to greatest.	**Quadrant D** Students generate a question they want answered from the class, collect the data, represent the information on a graph and report their findings to the class that answers his/her own question.
Quadrant A Given a set of buttons, children are asked to sort them by color and determine the quantity of each group.	**Quadrant B** Each child makes a unifix train with one cube for each button they have on their clothing. The class organizes their individual unifix trains from least to greatest to create a class graph.

Intermediate Elementary Grades

Curricular Area	Essential Concept or Skill Set
Number and Operations	Develop an understanding of multiplication and division concepts and strategies for basic multiplication facts and related division facts
	Develop fluency and quick recall of multiplication facts and related division facts and fluency with multi-digit multiplication and division
	Develop the ability to estimate the results of computation with whole numbers, fractions or decimals and be able to judge reasonableness
	Extend place value concepts to represent and compare both whole numbers and decimals
	Use benchmarks to help develop number sense
	Develop an understanding of commonly used fractions, decimals, and percents, including recognizing and generating equivalent representations
	Develop an understanding of and fluency with addition and subtraction of fractions and decimals

Illustration of ***Develop an understanding of multiplication and division concepts and strategies for basic multiplication facts and related division facts*** in the ICLE's Rigor and Relevance Framework.

Quadrant C Use base ten blocks to show 24 x 8 and explain your work.	**Quadrant D** Write a story problem to illustrate 24 x 8 and show at least two ways to get the answer.
Quadrant A Multiply: 24 x 8	**Quadrant B** Draw a diagram and explain how you would find the area of a room that measures 24 feet by 8 feet.

Curricular Area	Essential Concept or Skill Set
Algebra	Represent and analyze patterns and relationships involving multiplication and division to introduce multiplicative reasoning
	Identify the commutative, associative, and distributive properties and use them to compute with whole numbers
	Understand and apply the idea of a variable as an unknown quantity and express mathematical relationships using equations
	Represent and analyze patterns and functions, using words, tables, and graphs

Illustration of: **Understand and apply the idea of variable as an unknown quantity and express mathematical relationships using equations**.

Quadrant C Using cubes illustrate the following relationships: One blue cube plus two yellow cubes equal 8 red cubes. Two yellow cubes equal 3 red cubes. How many red cubes equal one blue cube?	**Quadrant D** After reading the story of "Acrobats, Grandmas and Ivan" write an equation in which the Grandmas win without Ivan. Explain why or why not this is possible.
Quadrant A Solve: X + 2Y = 8Z 2Y = 3Z X = ? Z	**Quadrant B** Solve the following problem and explain your work: Ivan and 2 acrobats were tied with 8 Grandmas in the first round of a tug-of-war. Then in the second round 2 acrobats tied with 3 Grandmas. What would happen in the third round with 5 Grandmas against Ivan?

Curricular Area	Essential Concept or Skill Set
Geometry and Measurement	Describe, analyze and classify two-dimensional and three-dimensional shapes
	Explore congruence and similarity
	Predict and describe the results of sliding (translation), flipping (reflection), and turning (rotation) two-dimensional shapes
	Use ordered pairs on a coordinate grid to describe points or paths (first quadrant)
	Use geometric models to solve problems, such as determining perimeter, area, volume, and surface area
	Select and apply appropriate standard (customary and metric) units and tools to measure length, area, volume, weight, time, temperature, and the size of angles
	Select and use benchmarks (1/2 inch, 2 liters, 5 pounds, etc.) to estimate measurements

Illustration of ***Describe, analyze and classify two-dimensional and three-dimensional shapes*** in the ICLE's Rigor and Relevance Framework.

Quadrant C Draw as many different nets, as possible, for cubes that are 3 cm on each side. • Are any of the nets identical? How can you tell? • Without folding, can you determine if a net will fold into a cube? How? • What properties are common to all nets that will form a cube?	**Quadrant D** A box company wants to save money, so they try to fit as many nets as possible on one sheet. If the company uses a cardboard shape that is 20 cm by 20 cm, how many nets of any type will fit? They can be arranged in any way as long as the net folds into a cube.
Quadrant A Looking at the drawing of a cube in a textbook, list the properties or characteristics of the cube.	**Quadrant B** A box company needs a cube that is 3 cm on each side for jewelry boxes. How many different nets can you draw that can be folded into a cube that is 3 cm on each side?

Curricular Area	Essential Concept or Skill Set
Data Analysis and Probability	Represent and analyze data using tallies, pictographs, tables, line plots, bar graphs, circle graphs and line graphs
	Describe the distribution of the data using mean, median, mode or range
	Propose and justify conclusions and predictions based on data
	Predict the probability of simple experiments and test the predictions
	Describe events as likely or unlikely and discuss the degree of likelihood using words like certain, equally likely and impossible

Illustration of ***Represent and analyze data using tallies, pictographs, tables, line plots, bar graphs, circle graphs and line graphs*** in the ICLE's Rigor and Relevance Framework.

Quadrant C Represent data found in a textbook or on the web, in a line plot. Have students describe where the mean, median and mode are on the line plot. Are they the same or different? Why? How does the shape of the data relate to the mean, median and mode?	**Quadrant D** Ask students to predict how long they can stand on one foot, with their eyes closed. Will it be different standing on their right and left foot? Have students discuss the appropriate guidelines for collecting this data. Have students work in pairs and collect the data and display it on two line plots for the class. Ask students to write an analysis of the data using mean, median or mode. Ask them to describe the shape of the data and what it means. Ask students to compare their predictions to the actual data.
Quadrant A Represent data found in a textbook or on the web in a line plot. Using the textbook definition of mean, show where the mean is on the line plot.	**Quadrant B** Working in pairs, ask students to collect data on how long they can stand on one foot with their eyes closed. Display this data in two line plots for the class. Ask students to identify the mean, median and mode of the data.

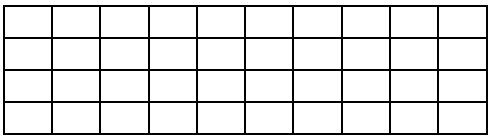
Middle School

Curricular Area	Essential Concept or Skill Set
Number and Operation	Understand, apply, and be computationally fluent with multiplication and division of fractions and decimals
	Understand, apply, and be computationally fluent with rational numbers, including negative numbers
	Understand and apply ratio and rate, including percents, and connect ratio and rate to fractions and decimals
	Understand and apply proportional reasoning
	Understand, estimate, and represent real numbers, including common irrational numbers and use of scientific notation

Illustration of ***Understand, apply, and be computationally fluent with multiplication and division of fractions and decimals and Understand and apply ratio and rate, including percents, and connect ratio and rate to fractions, decimals, and multiplication and division*** in the ICLE's Rigor and Relevance Framework.

Quadrant C

Shade 6 of the small squares in the rectangle shown below.



Using the rectangle, explain how to determine each of the following:

- the percent of the area that is shaded
- the decimal part of the area that is shaded
- the fractional part of the area that is shaded

Taken from Ron Castleman's Task in the QUASAR Project

Quadrant D

Create problems that would be appropriate to solve using fractions, decimals, and percents. Post the problems. Share with other groups. Be prepared to explain ways to solve the problems.

Quadrant A

Shade 10 X 10 grids – then give the appropriate fraction, decimal, and percent representations.

Shade 50 squares
Fraction ___ Decimal ___ Percent ___
Shade 20 squares
Fraction ___ Decimal ___ Percent ___
Shade 10 squares
Fraction ___ Decimal ___ Percent ___
Shade 1 square
Fraction ___ Decimal ___ Percent ___
Shade 150 squares
Fraction ___ Decimal ___ Percent ___

Quadrant B

Give the students a newspaper with a set of ads showing various percent off sales. Fill in a grid for each ad showing the percent. Also label the colored part of the grid with the related fractions and decimals.

Curricular Area	Essential Concept or Skill Set
Algebra	Write, interpret, and use mathematical expressions, find equivalent forms, and relate such symbolic representations to verbal and tabular representations
	Understand and apply proportionality
	Understand, solve, and apply linear equations and inequalities
	Understand and apply linear functions
	Use tables and graphs to analyze systems of linear equations

Illustration of: **Write, interpret, and use mathematical expressions, find equivalent forms, and relate such symbolic representations to verbal and tabular representations.**

Quadrant C

Given a table of information

- Look for all patterns that can be found in the table. What patterns did you see in the table?
- What recursive formula(s) did you find?
- What direct (explicit) formulas did you find?
- What are some advantages and disadvantages of the two types of formulas?
- Are the formulas equivalent? How do you know?
- Why are equivalent formulas useful?

Quadrant D

http://mmmproject.org/vp/mainframeS.htm)
Examine metal beams in pictures of construction site. If the length of the beam is determined by the number of rungs on the underside of the beam, determine how many rods are needed to make different lengths of beams

- Make a table of this information.
- Look for all patterns that can be found in the table. What patterns did you see in the table?
- What recursive formula(s) did you find?
- What direct (explicit) formulas did you find?
- What are some advantages and disadvantages of the two types of formulas?
- Are the formulas equivalent? How do you know?
- Why are equivalent formulas useful?

Analyze and explain these equations
What generalizations can you make about how many rods will be needed for any beam length?

Quadrant A

Fill in the following table:

What patterns do you see?

1	3
2	7
3	11
4	
	27
8	
	39

Quadrant B

In order to build a trestle for your model, you will use toothpicks to build the beams.

- Use 3 toothpicks to create a beam of length 1.
- Make beams of length 2, 3, 4, 5 and 6.
- How many toothpicks are used to make each beam?
- Make a table with the length of the beam on one side and the number of toothpicks on the other side.
- Find any patterns you can in this table.
- Without building, determine how many toothpicks would be needed to build a beam of 7, 8, 9 and 10.

Curricular Area	Essential Concept or Skill Set
Geometry and Measurement	Understand, determine, and apply area of polygons
	Understand and apply similarity, with connections to proportion
	Understand, determine, and apply surface areas and volume of prisms and cylinders and circumference and area of circles
	Analyze two-dimensional space and figures by using distance, angle, coordinates, and transformations
	Visualize, represent, and describe three-dimensional shapes

Illustration of ***Understand, determine, and apply surface areas and volumes of prisms and cylinders and circumference and area of circles and Analyze two-dimensional space and figures by using distance, angle, coordinates, and transformations*** in the ICLE's Rigor and Relevance Framework.

Quadrant C

Students are given two rectangular prisms that are congruent (equal angles and equal sides). Change the size of the second prism. Are the two prisms still congruent? Are they similar? Find the volume using the applet "Show Volume." Change the size of the first prism again and observe the changes in the measurements. What is being depicted in the graph? What can you say about the relationship between the side lengths and the volume of a rectangular prism?

http://standards.nctm.org/document/eexamples/chap6/6.3/part2.htm

Quadrant D

Emma works at the Acme Box Factory. Her job is to construct cubes that will be used as jewelry boxes. Her job is to find as many unique nets for boxes that are 3 cm per side as she can. Find all the different nets that can be folded into a cube. The company wants to make these jewelry boxes as efficiently as possible. They can save money by fitting as many nets as possible on one piece of cardboard. The company will be using cardboard that is 20 cm by 20 cm. What is the greatest number of nets (of any type) that can be arranged to fit on one piece of cardboard?

See lesson on NCTM website (Illuminations) http://illuminations.nctm.org/LessonDetail.aspx?id=L570)

Quadrant A

A box has dimensions of 60 cm, 18 cm, and 8 cm.

What is the volume of the box?

What is the surface area of the box?

Quadrant B

Find a variety of real-life objects to bring to class (prisms and cylinders). Find surface area and volume of each of these items. Find which items have the same surface area and determine which of these objects has the greater volume.

Curricular Area	Essential Concept or Skill Set
Data Analysis and Probability	Understand, interpret, determine, and apply measures of center and graphical representations of data
	Understand and represent simple probabilistic situations
	Use proportions and percentages to analyze data and chance
	Analyze and summarize data sets, including initial analysis of variability
	Understand, compute, and estimate simple probabilities using counting strategies and simulation

Illustration of ***Understand, interpret, determine, and apply measures of center and graphical representations of data and Analyze and summarize data sets, including initial analysis of variability*** in the ICLE's Rigor and Relevance Framework.

Quadrant C

Are students carrying backpacks that are too heavy? Students use TinkerPlots data already collected from a group of 1st, 5th, and 7th grade students regarding their weight and the weight of their backpacks. Students visually describe their data and make conclusions about whether students or groups of students are carrying backpacks that are too heavy.

Quadrant D

A group of students will design and conduct a statistical study to answer a statistical question they have formulated (for example, a question about backpack weight). They can either collect data or use sources of information containing the data needed to answer the questions. They will summarize the data, display appropriate visuals, and describe the data – including measures of central tendency and variability. They will answer the questions they formulated and will use the data to explain their answers.

Quadrant A

Here is a collection of weights. Find what percent B is of A. Find the mean, median, and mode of this new set of data.

Weight A	Weight B
87	21
94	5
78	14
82	12
72	9
114	22
98	19
107	39
120	20
104	27
79	19
95	19

Quadrant B

Given this collection of data about a group of seventh graders and their backpacks, use TinkerPlots or a spreadsheet to find what percent the backpack is of each student's weight.

Name	Gender	Weight	Backpack Weight
Katie	F	87	21
Deborah	F	94	5
Jennifer	F	78	14
Lori	F	82	12
Sherry	F	72	9
Kathy	F	114	22
Pat	F	98	19
Gayle	F	107	39
Myrle	F	120	20
Jeffrey	M	104	27
Alan	M	79	19
Paul	M	95	19

Essential Concepts and Skills Sets of the Iowa Core Curriculum

Science

Introduction

The Iowa Science Core Curriculum is a framework of science concepts and skills. This document provides a scaffold upon which each district will develop grade level expectations. The vision is that all Iowa students will have access to this common core and that individual districts will decide how they will extend this core to meet the needs of their students.

The committee used international, national, and state level documents in this process. The final core concepts and skills are drawn from the respected work of the National Research Council's (NRC) National Science Education Standards (NSES). This document is framed upon the four content categories (Science as Inquiry; Physical Science; Earth and Space Science; and Life Science). The remaining categories (Science and Technology; Science in Personal and Social Perspectives; and The History and Nature of Science) address the application of knowledge and should be integrated throughout the content categories.

For this core to become viable, teachers will need to be aware of and effectively use research-based, best practice instructional strategies. The Iowa Content Network - http://www.iowa.gov/educate/prodev/main.html scrutinizes research in instruction and learning. This research base provided the impetus for the Every Learner Inquires (ELI) initiative. The purpose of ELI is to establish a learning community among Iowa teachers as they utilize best practices (such as learning cycles) to help students become more scientifically literate. ELI is a state-wide teaching and learning initiative that will improve Iowa students' access to this core of science concepts and skills. These two Department of Education programs should work hand-in-hand to help students attain the scientific literacy necessary for success in the 21st century.

Primary Elementary Grades

Curricular Area	Essential Concept or Skill Set
Science as Inquiry	Ask questions about objects, organisms, and events in the environment
	Plan and conduct simple investigations
	Use tools to gather data and extend the senses
	Use mathematics in scientific inquiry
	Use data to construct reasonable explanations
	Communicate investigations and explanations orally, in writing or through drawings
	Follow appropriate safety procedures when conducting investigations

Illustration of ***Plan and conduct simple investigations*** in the ICLE's Rigor and Relevance Framework

Quadrant C The teacher asks a scientifically oriented question and the class designs an investigation to seek answers.	**Quadrant D** The class asks a scientifically oriented question and designs and conducts an investigation to seek answers.
Quadrant A The teacher asks a scientifically oriented question and tells students how to find an answer.	**Quadrant B** Students ask a scientifically oriented question. The teacher designs the investigation used by students to seek an answer.

Curricular Area	Essential Concept or Skill Set
Earth and Space Science	Apply and understand properties of earth materials
	Apply and understand observable information about daily and seasonal weather conditions
	Apply and understand events around us that have repeating patterns including the seasons of the year, day and night

Illustration of ***observable information about daily and seasonal weather conditions*** in the ICLE's Rigor and Relevance Framework

Quadrant C Students compare and contrast their collected weather data with that found on official weather websites. Together they discuss possible reasons for any differences.	**Quadrant D** Students explore correlations between dress and weather. They write weather dress codes to be adopted by the elementary grades.
Quadrant A The teacher records student generated weather vocabulary on an ABC framework and uses those words to create a matching game for students to learn weather vocabulary.	**Quadrant B** Students discuss precipitation. The teacher introduces the GLOBE (Global Learning and Observations to Benefit the Environment) protocol for measuring precipitation and the class collects measurements throughout the remainder of the season.

Curricular Area	Essential Concept or Skill Set
Life Science	Apply and understand the characteristics of living things and how living things are both similar to and different from each other and from non-living things
	Apply and understand life cycles of plants and animals
	Apply and understand the basic needs of plants and animals and how they interact with each other and their physical environment
	Apply and understand ways to help take care for the environment
	Apply and understand fundamental human body parts and their functions
	Apply and understand good health habits

Illustration of ***Apply and understand the basic needs of plants and animals and how they interact with each other and their physical environment*** in the ICLE's Rigor and Relevance Framework

Quadrant C The teacher will ask the class to help design experiments that will provide evidence of the conditions needed for optimal growth of bean seeds. They will grow bean seeds under different conditions, record their observations, and draw conclusions about needs for the bean plant.	**Quadrant D** Students plan, plant and tend a butterfly or hummingbird garden.
Quadrant A Using prior knowledge and information text, students and teacher will use a Venn diagram to compare and contrast the basic needs of plants and animals.	**Quadrant B** The teacher asks the class if they would like to have a classroom pet. Students form small groups to discuss responsibilities of taking care of a class pet. The whole class meets together to share ideas and form guidelines for the class to follow.

Curricular Area	Essential Concept or Skill Set
Physical Science	Understand and apply observable and measurable properties of objects
	Understand and apply characteristics of liquids and solids
	Understand and apply the positions and motions of objects

Illustration of ***Understand and apply the positions and motions of objects*** in the ICLE's Rigor and Relevance Framework

Quadrant C The teacher challenges students to create ramps that allow the spheres to roll following preset criteria.	**Quadrant D** Students design a blueprint and build a "Super Ramp" of their choice.
Quadrant A Students explore ramps by working with materials supplied by the teacher.	**Quadrant B** Teachers lead students on a neighborhood walk to collect and analyze examples of ramps.

Intermediate Elementary Grades

Curricular Area	Essential Concept or Skill Set
Science as Inquiry	Generate questions that can be answered through scientific investigations
	Recognize that scientists perform different kinds of investigations
	Plan and conduct scientific investigations
	Use appropriate tools and techniques to gather, process, and analyze data
	Incorporate mathematics in science inquiries
	Use evidence to develop reasonable explanations
	Communicate scientific procedures and explanations
	Follow appropriate safety procedures when conducting investigations

Illustration of ***Plan and conduct investigations*** in the ICLE's Rigor and Relevance Framework

Quadrant C The teacher asks a scientifically oriented question and students design investigations to seek answers.	**Quadrant D** Students ask scientifically oriented questions, design investigations, and conduct investigations to seek answers.
Quadrant A The teacher asks a scientifically oriented question and tells students how to conduct an investigation to find the answer. (Teacher questions, Teacher directs)	**Quadrant B** Students ask scientifically oriented questions. The teacher tells students how to conduct investigations to seek answers. (Students question, Teacher directs)

Curricular Area	Essential Concept or Skill Set
Earth and Space Science	Understand and demonstrate knowledge of properties and uses of earth materials
	Understand and demonstrate knowledge of processes and changes on or in the earth's land, oceans, and atmosphere
	Understand and demonstrate knowledge of fossils and the evidence they provide of past life on earth
	Understand and demonstrate knowledge of weather and weather patterns
	Understand and demonstrate knowledge of the properties, movements, and locations of objects in our solar system

Illustration of ***Understand and demonstrate knowledge of properties of earth materials*** in the ICLE's Rigor and Relevance Framework

Quadrant C Students use their varied soils to pot small plant cuttings and monitor growth for a month. As a class, students compare the quality of the soils based upon the growth patterns.	**Quadrant D** After going to a greenhouse and talking with the nursery technician, students design an experiment to determine the impact of varying the soil mixture upon a plant of their choice.
Quadrant A Students look at different types of soils and look on the internet to find what is in soils.	**Quadrant B** Students collect two cups of soil from their yards and bring it to school. They look at it through magnifying lenses and describe what they find.

Curricular Area	Essential Concept or Skill Set
Life Science	Understand and demonstrate knowledge of structures, characteristics, and adaptations of organisms that allow them to function and survive within their habitats
	Understand and demonstrate knowledge of how individual organisms are influenced by internal and external factors
	Understand and demonstrate knowledge of the relationships among living and non-living factors in terrestrial and aquatic ecosystems
	Understand and demonstrate knowledge of environmental stewardship
	Understand and demonstrate knowledge of basic human body systems and how they work together
	Understand and demonstrate knowledge of personal health and wellness issues

Illustration of ***how individual organisms are influenced by internal and external factors*** in the ICLE's Rigor and Relevance Framework

Quadrant C The teacher asks students to place bread, bran, potato and lettuce into the various corners of a darkling beetle container and asks students to observe and record food preferences. They then make a claim about their results.	**Quadrant D** Students generate their own questions about mealworm behavior and design investigations that allow for data collection and analysis.
Quadrant A Students are given pictures of stages of butterfly and meal worm life cycles. They record/sketch observations of each stage and then compare the similarities and differences of the two creatures.	**Quadrant B** Students are given a mealworm to observe over a two week period. Students record their data and observations.

Curricular Area	Essential Concept or Skill Set
Physical Science	Understand and demonstrate knowledge of how to describe and identify substances based on characteristic properties
	Understand and demonstrate knowledge of states of matter and changes in states of matter
	Understand and demonstrate knowledge of the concept of conservation of mass/matter
	Understand and demonstrate knowledge of the characteristic properties of sound, light, electricity, magnetism, and heat
	Understand and demonstrate knowledge of how forces are related to an object's motion

Illustration of ***Understand and demonstrate knowledge of the properties of sound, light, electricity, magnetism, and heat*** in the ICLE's Rigor and Relevance Framework

Quadrant C Students explore classroom sound centers. They change the pitch produced by each of the objects and explain their procedure.	**Quadrant D** Students create musical instruments and demonstrate how the instruments can be modified to change the pitch and volume.
Quadrant A Students listen to various sounds and group those sounds into categories	**Quadrant B** Students bring three everyday items from home that they can use to create a "sound from percussion", "a sound from a string" and a "sound from moving air." The sounds are judged by the band instructor.

Middle School

Curricular Area	Essential Concept or Skill Set
Science as Inquiry	Generate questions that can be answered through scientific investigations
	Design and conduct different kinds of scientific investigations
	Understand that different kinds of questions suggest different kinds of scientific investigations
	Select and use appropriate tools and techniques to gather, analyze and interpret data
	Incorporate mathematics in scientific inquiry
	Use evidence to develop descriptions, explanations, predictions, and models
	Think critically and logically to make the relationships between evidence and explanations
	Recognize and analyze alternative explanations and predictions
	Communicate and defend procedures and explanations
	Use appropriate safety procedures when conducting investigations

Illustration of ***Design and conduct different kinds of scientific investigations*** in the ICLE's Rigor and Relevance Framework

Quadrant C The teacher asks a scientifically oriented question and students design investigations to seek answers.	**Quadrant D** Students ask scientifically oriented questions, design investigations, and conduct investigations to seek answers.
Quadrant A The teacher asks a scientifically oriented question and tells students how to conduct an investigation to find the answer.	**Quadrant B** Students ask scientifically oriented questions. The teacher tells students how to conduct investigations to seek answers.

Curricular Area	Essential Concept or Skill Set
Earth and Space Science	Understand and demonstrate knowledge of the structure of the earth system and the processes that change the earth and its surface
	Understand and demonstrate knowledge of the water cycle, including consideration of events that impact groundwater quality
	Understand and demonstrate knowledge of our earth's history based on physical evidence
	Understand and demonstrate knowledge of the earth's atmospheric properties and how they influence weather and climate
	Understand and demonstrate knowledge of the components and predictable patterns of our solar system

Illustration of ***Understand and demonstrate knowledge of the structure of the earth system and the processes that change the earth and its surface*** in the ICLE's Rigor and Relevance Framework

Quadrant C Students make a fudge recipe and cool half in the refrigerator and half on the counter. They analyze the crystalline structure of each half and compare with types of igneous rock.	**Quadrant D** Students investigate different road materials used to fill potholes and develop a proposal to present to the city council advocating for the road material they consider most advantageous.
Quadrant A Students identify a variety of minerals using standard tests for streak, hardness, cleavage and a rock key.	**Quadrant B** Students are invited to bring a rock sample from outside the classroom. They will then apply the same mineral testing protocol to their own specimen.

Curricular Area	Essential Concept or Skill Set
Life Science	Understand and demonstrate knowledge of the basic components and functions of cells, tissues, organs, and organ systems
	Understand and demonstrate knowledge of how different organisms pass on traits
	Understand and demonstrate knowledge of the complementary nature of structure and function and the commonalities among diverse organisms
	Understand and demonstrate knowledge of the interdependency of organisms, changes in environmental conditions, and survival of individuals and species
	Understand and demonstrate knowledge of the cycling of matter and energy through ecosystems
	Understand and demonstrate knowledge of the social and personal implications of environmental issues
	Understand and demonstrate knowledge of the functions and interconnections of the major human body systems including the breakdown in structure or function that disease causes

Illustration of ***Understand and demonstrate knowledge of the interdependency of organisms, changes in environmental conditions, and survival of individuals and species*** in the ICLE's Rigor and Relevance Framework

Quadrant C Students investigate how an invasive species would affect a food web.	**Quadrant D** Students design and construct a working ecosystem in a two liter bottle. They collect data on how well it functions.
Quadrant A Given a list of organisms, students construct a food web.	**Quadrant B** Students interview a local naturalist about the presence of zebra mussels in Iowa.

Curricular Area	Essential Concept or Skill Set
Physical Science	Understand and demonstrate knowledge of elements, compounds, mixtures, and solutions based on the nature of their physical and chemical properties
	Understand and demonstrate knowledge of physical and chemical changes and their relationship to the conservation of matter and energy
	Understand and demonstrate knowledge of forms of energy and energy transfer
	Understand and demonstrate knowledge of motions and forces

Illustration of ***Understand and demonstrate knowledge of motions and forces*** in the ICLE's Rigor and Relevance Framework

Quadrant C Students test paper airplanes with different characteristics (e.g., different masses, different lengths, thrown with different amounts of effort…). Students analyze data and determine which type of plane is best suited for different types of performance.	**Quadrant D** Students construct a restraint system to keep Ken seated on a motion cart during a crash. They will test their restraint system, analyze the results, modify the restraint system and retest. A state trooper (or other qualified person) will assign final safety ratings.
Quadrant A Students make paper airplanes as directed by the teacher and collect data on how far the planes fly.	**Quadrant B** Students view a video of a skateboarder (or someone on a wheeled vehicle) and describe the steps needed to change that vehicle's motion.

Essential Concepts and Skill Sets of the Iowa Core Curriculum

Social Studies

Introduction

Social studies is the integrated study of the social sciences and humanities to promote civic competence. Within the school program, social studies provides coordinated, systematic study drawing upon such disciplines as anthropology, archaeology, economics, geography, history, law, philosophy, political science, psychology, religion, and sociology, as well as appropriate content from the humanities, mathematics, and natural sciences. The primary purpose of social studies is to help young people develop the ability to make informed and reasoned decisions for the public good as citizens of a culturally diverse, democratic society in an interdependent world.

Definition of Social Studies
National Council for the Social Studies (NCSS)

The founders of our country emphasized that the vitality and security of a democracy depends upon the education and willingness of its citizens to participate actively in society. This level of participation requires civic competence. In other words, it is imperative that our future generations gain an understanding of the core concepts of Social Studies. The United States and its democratic system are continually changing which creates varying social circumstances. As a result, citizens need to adapt to such changes in order to sustain vital democratic traditions. Meeting this need is the mission of the social studies.

In social studies, students develop knowledge, skills and dispositions including but not limited to:

- basic knowledge and ways of thinking drawn from many academic disciplines
- expressing ideas in written form
- reading reflectively and critically
- analyzing their own and others' opinions on social issues
- becoming motivated to participate in civic and community life as active and informed citizens

As we work to carry on the ideals of the founders we are compelled to revisit our fundamental beliefs and institutions and to construct new social contexts and relationships.

The Iowa Social Studies Core Curriculum reflects the belief that the informed social studies student comprehends and applies to personal and public experiences the core content perspectives of the many academic fields of the social studies. Our entire social experiences, as well as our republic, are established upon the principles of individual citizenship. Therefore, it is necessary that attention be paid to the education of those future citizens.

For that reason, the Iowa Social Studies Core Curriculum has been structured around five core social studies content areas. They are:

- Behavioral Sciences
- Economics

- Geography
- History
- Political Science/Civic Literacy

For each area, knowledge and skills have been identified and defined in terms of detailed understandings that students should be able to apply. It is of key importance that students possess the knowledge and skills associated with the economic, political, and social forces that make up the human systems in which they live. In addition, they must possess the historical knowledge, which created the spatial, temporal and cultural perspectives present in our world.

This document is premised upon a rigorous and relevant K-12 social studies program. Engaging students in the pursuit of active informed citizenship will require a broad range of understandings and skills. It will also require an articulated curriculum which connects students to the social world through informed instructional experiences led by teachers who are committed to active civic participation. This document represents a bold step toward a vision of social and civic literacy for all of Iowa's students.

High School

Curricular Area	Essential Concept or Skill Set
Behavioral Sciences	Understand the historical development of the behavioral sciences and the changing nature of society
	Understand the influences on individual and group behavior and group decision making
	Understand the appropriate research procedures and skills of the behavioral scientist
	Understand current social issues to determine how the individual is able to formulate opinions and responds to those issues
	Understand how social status, social groups, social change and social institutions influence individual and group behaviors
	Understand the process of how humans develop, learn, adapt to their environment, and internalize their culture
	Understand how personality and agents of socialization impact the individual

Illustration of ***Understand the appropriate research procedures and skills of the behavioral scientist*** in the ICLE's Rigor and Relevance Framework.

Quadrant C Compare and contrast which research methods would work best based on various scenarios.	**Quadrant D** Create and administer a survey to a group, interpret the results and present findings in an appropriate format.
Quadrant A Create a chart of the various methods of conducting research in the behavioral sciences.	**Quadrant B** Students administer a survey to a group and tally the results.

Curricular Area	Essential Concept or Skill Set
Economics	Understand the function of common financial instruments
	Understand the role of scarcity and economic trade-offs
	Understand the functions of economic institutions
	Understand how governments influence economic behavior
	Understand how universal economic concepts present themselves in various types of economies
	Understand the local, state, regional, national and international factors that create patterns of interdependence in the global economy
	Understand the impact of advancing technologies on the global economy

Illustration of ***Understand the function of common financial instruments and can demonstrate financial literacy*** in the ICLE's Rigor and Relevance Framework.

Quadrant C Students write a persuasive paper arguing for or against personal investment in the stock market as a retirement strategy.	**Quadrant D** Students create a retirement portfolio for three individuals representing varying family circumstances and income levels.
Quadrant A Students read an informative passage on the nature and function of the stock market. They subsequently write a one page summary of their findings.	**Quadrant B** Using the Internet, students research the price of selected Dow Jones Industrial Average companies over the past five years. Students then make a virtual $5000 investment in those companies and track profits and/or losses for the semester.

Curricular Area	Essential Concept or Skill Set
Geography	Understand the use of geographic tools to locate and analyze information about people, places, and environments
	Understand how physical and human characteristics create and define regions
	Understand how human factors and the distribution of resources affect the development of society and the movement of populations
	Understand how physical and human processes shape the earth's surface and major ecosystems
	Understand how human actions modify the environment and how the environment affects humans
	Understand how culture affects the interaction of human populations through time and space
	Understand how cultural factors influence the design of human communities

Illustration of ***Understand how cultural factors influence the design of human communities*** in the ICLE's Rigor and Relevance Framework.

Quadrant C Students use the geography tool OSAE (Observe, Speculate, Analyze, Evaluate) to examine a specific location in their community. Using internet resources, students complete an OSAE on a corresponding location from three other countries. Students write a paper comparing and contrasting land use in the selected countries.	**Quadrant D** Students identify a real or potential land use conflict in their community. Students use various types of geographic tools (maps, photographs, community questionnaires, GIS data, air photos, data tables and related information) to study the issue. Students evaluate and weigh data to formulate a land use policy related to the real or potential conflict. Students create a presentation related to their policy.
Quadrant A Students complete a World Atlas Scavenger Hunt to become familiar with the structure of atlases.	**Quadrant B** Students use the geography tool OSAE (Observe, Speculate, Analyze, Evaluate) to examine several locations in their community. These locations might include a residential area, a city center, a suburb, or a rural area. From the completed OSAE, students summarize how each area is used.

Curricular Area	Essential Concept or Skill Set
History	Understand historical patterns, periods of time and the relationships among these elements
	Understand how and why people create, maintain or change systems of power, authority, and governance
	Understand the role of culture and cultural diffusion on the development and maintenance of societies
	Understand the role of individuals and groups within a society as promoters of change or the status quo
	Understand the effect of economic needs and wants on individual and group decisions
	Understand the effects of geographic factors on historical events
	Understand the role of innovation on the development and interaction of societies
	Understand cause and effect relationships and other historical thinking skills in order to interpret events and issues

Illustration of ***Understand the role of culture and cultural diffusion on the development and maintenance of societies*** in the ICLE's Rigor and Relevance Framework.

Quadrant C Students analyze examples of advertisements from the 1920s and today for advertising styles and for the assumptions about people and society which the advertisements make. Students write an essay comparing Americans of the 1920s to Americans of today, using examples from their analysis of the advertisements.	**Quadrant D** Working in groups, students are assigned a product that was first introduced in the 1920s. The group of students designs an advertising campaign for their product and plans a presentation to win the account for this product. The groups will present their campaign to a committee of students and the teacher and the best ad campaign will be awarded the contract.
Quadrant A Students create a concept web of consumer products which became popular in the 1920s. The web should identify how these products affected people's lives.	**Quadrant B** Students create a collage of advertisements for products that they use regularly and write a brief description of the advertising techniques used.

Curricular Area	Essential Concept or Skill Set
Political Science/Civic Literacy	Understand the rights and responsibilities of each citizen and demonstrate the value of lifelong civic action
	Understand how the government established by the Constitution embodies the enduring values and principles of democracy and republicanism
	Understand the purpose and function of each of the three branches of government established by the Constitution
	Understand the differences among the complex levels of local, state and national government and their inherent, expressed and implied powers
	Understand strategies for effective political action that impacts local, state and national governance
	Understand how law and public policy are established at the local, state and national levels
	Understand how various political systems throughout the world define the rights and responsibilities of the individual
	Understand the role of the United States in current world affairs

Illustration of ***Ilustrate how law and public policy are established at the local, state and national levels of government*** in the ICLE's Rigor and Relevance Framework.

Quadrant C Students will predict the fate of a piece of proposed legislation based on an assessment of the current political climate, partisan perspectives, public opinion and media coverage.	**Quadrant D** Students analyze a local, state or national issue and prescribe a response that promotes the public interest or general welfare.
Quadrant A Students will be able create a sequence diagram that shows how a bill becomes a law at the federal and state level as well as how local statutes are established.	**Quadrant B** Using the Internet students identify and track a piece of legislation through a session of Congress.

Essential Concepts and Skill Sets of the Iowa Core Curriculum

21st Century Skills

Introduction

As each Iowa student is provided access to essential concepts and meaningful learning experiences in the core academic content areas, it is imperative that we also look to 21st century skills to build capacity in students so they are prepared to lead productive, satisfying lives. According to Ken Kay, president of the Partnership for 21st Century Skills, the 21st century skills set "is the ticket to economic upward mobility in the new economy" (Gewertz, 2007). Business and industry is providing a very clear message that students need the skills to "work comfortably with people from other cultures, solve problems creatively, write and speak well, think in a multidisciplinary way, and evaluate information critically. And they need to be punctual, dependable, and industrious." (Gewertz, 2007).

The Framework for 21st Century Learning stated, "We believe schools must move beyond a focus on basic competency in core subjects to promoting understanding of academic content at much higher levels by weaving 21st century interdisciplinary themes into core subjects" (2007). 21st century skills bridge the knowledge, skills, and dispositions of students from the core academic areas to real life application.

> "The primary aim of education is not to enable students to do well in school, but to help them do well in the lives they lead outside of the school."
>
> -Ray McNulty, ICLE
> Iowa High School Summit, December 10, 2007

Descriptions of the new global reality are plentiful, and the need for new, 21st century skills in an increasingly complex environment is well documented. In one form or another, authors cite (1) the globalization of economics; (2) the explosion of scientific and technological knowledge; (3) the increasingly international dimensions of the issues we face, i.e. global warming and pandemic diseases; and (4) changing demographic as the major trends that have resulted in a future world much different from the one that many of us faced when we graduated from high school (Friedman, 2005 and Stewart, 2007). The trends are very clear that each Iowa students will need essential 21st century skills to lead satisfying lives in this current reality.

Descriptions of what constitute essential 21st century skills are plentiful as well. In the 2007 session, the Iowa Legislature established the Iowa 21st century framework as:

(1) employability skills
(2) financial literacy
(3) health literacy
(4) technology literacy

Within this 21st century skill framework are the common strands of learning and innovation; communication, information, and technology; and, life and career skills.

The development of the Iowa 21st century essential concepts and skills was a collaborative process engaging the expertise of p – 16 educators, business, and industry representatives. Sources used for this work included the 1991 SCANS report, What Work Requires of Schools, and Framework for 21st Century Learning, from the Partnership for 21st Century Skills. The

committee surveyed the literature and endeavored to bring together the common elements of these frameworks. The members have outlined the concepts, dispositions and habits of mind believed essential for success in the 21st century.

The reality of building capacity for the 21st century is that we do not know what the work of the future will be like (Darling-Hammond, 2007) or how technology will influence health and financial issues. The challenge is to prepare students to think critically, to engage in mental activity, or habits of mind, that "…use facts to plan, order, and work toward an end; seek meaning or explanations; are self-reflective; and use reason to question claims and make judgments…" (Noddings, 2008). It may be that our task is not only to prepare students to "fit into the future" but to shape it. "…If the complex questions of the future are to be determined… by human beings… making one choice rather than another, we should educate youths - all of them - to join in the conversation about those choices and to influence that future…" (Meier, 2008)

High School

Curricular Area	Essential Concept or Skill Set
Financial Literacy	Demonstrate financial responsibility and planning skills to achieve financial goals for a lifetime of financial health
	Manage money effectively by developing spending plans and selecting appropriate financial instruments to maintain positive cash flow
	Make informed and responsible decisions about incurring and repaying debt to remain both creditworthy and financially secure
	Evaluate and identify appropriate risk management options, including types of insurance, non-insurance, and identity protection
	Assess the value, features, and planning processes associated with savings, investing, and asset building, and apply this knowledge to achieve long-term financial security with personal and entrepreneurial goals in a global market
	Understand human, cultural, and societal issues related to financial literacy, and practice legal and ethical behavior

Illustration of ***Access the value, features, and planning processes associated with saving, investing, and asset building, and apply this knowledge to long-term financial security with personal and entrepreneurial goals in a global market*** in the ICLE's Rigor and Relevance Framework.

Quadrant C Compare two long-term savings plan scenarios (offering different interest rates, length of time, amount contributed at different times). Determine which option offers a greater return.	**Quadrant D** Create a comprehensive savings plan based on your current income and needs. Use information you gather from a local financial institution or online to determine the most appropriate savings plan. List the reason why you believe this is the best choice for you based on your short-term and long-term goals.
Quadrant A Explain the importance of having a savings account and setting short-term and long-term goals.	**Quadrant B** Explain why you would want to have savings. Describe short-term and long-term goals you currently have. Explain how these goals will change once you have graduated from high school.

Curricular Area	Essential Concept or Skill Set
Health Literacy	Demonstrate functional health literacy skills to obtain, interpret, understand and use basic health concepts to enhance personal, family, and community health
	Synthesize interactive literacy and social skills to establish and monitor personal, family and community goals related to all aspects of health
	Apply critical literacy/thinking skills related to personal, family and community wellness
	Use media literacy skills to analyze media and other influences to effectively manage health risk situations and advocate for self and others
	Demonstrate behaviors that foster healthy, active lifestyles for individuals and the benefit of society

Illustration of ***Demonstrate functional health literacy skills to obtain, interpret, understand and use basic health concepts to enhance personal, family, and community health*** in the ICLE's Rigor and Relevance Framework.

Quadrant C Students will compare the essential nutrients found in two or more commercial diet plans.	**Quadrant D** Students will choose a family member or friend with specific dietary needs and health issues. Students will develop a one week dietary plan for that person based on his or her needs, preferences and the current research.
Quadrant A Students will read about a topic related to healthy eating behaviors such as disordered eating or specific diet plans and present the findings in a poster format.	**Quadrant B** Students will interview someone that has participated in a diet plan and share their reflections and conclusions with the class.

Curricular Area	Essential Concept or Skill Set
Technology Literacy	Demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology
	Use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others
	Apply digital tools to gather, evaluate, and use information
	Demonstrate critical thinking skills using appropriate tools and resources to plan and conduct research, manage projects, solve problems and make informed decisions
	Understand human, cultural, and societal issues related to technology, and practice legal and ethical behavior
	Demonstrate a sound understanding of technology concepts, systems and operations

Illustration of ***Understand human, cultural, and societal issues related to technology, and practice legal and ethical behavior*** in the ICLE's Rigor and Relevance Framework

Quadrant C Analyze the factors affecting the price of recorded music. Assess the importance, validity, or limitations of each factor, and hypothesize how the cost of each factor could be minimized to reduce the final cost for the consumer.	**Quadrant D** You and your friends have organized a band and decided to sell your recordings. Describe the steps you would take to accomplish this goal and make the music available to others for purchase. Identify several steps you could take to ensure that your digital rights are protected and your profits from your recordings are maximized.
Quadrant A Create a report providing an overview of the current laws regarding the duplication and distribution of recorded music	**Quadrant B** Create an overview of the current methods for legally obtaining music.

Curricular Area	Essential Concept or Skill Set
Employability	Communicate and work productively with others, incorporating different perspectives and cross cultural understanding, to increase innovation and the quality of work
	Adapt to various roles and responsibilities and work flexibly in climates of ambiguity and changing priorities
	Demonstrate leadership skills, integrity, ethical behavior, and social responsibility while collaborating to achieve common goals
	Demonstrate initiative and self-direction through high achievement and lifelong learning while exploring the ways individual talents and skills can be used for productive outcomes in personal and professional life
	Demonstrate productivity and accountability by meeting high expectations

Illustration of ***Demonstrate initiative and self-direction through high achievement and lifelong learning while exploring the ways individual talents and skills can be used for productive outcomes in personal and professional life*** in the ICLE's Rigor and Relevance Framework

Quadrant C Students research a career area of interest based on their Choices Interest Inventory results and write a paper outlining the key points for career choices.	**Quadrant D** Student designs questions and conduct an interview of a local business leader while participating in a job shadow experience. Following the job shadow experience, the student writes a reflection analyzing how his/her experience compared to what s(he) expected.
Quadrant A Students will complete the Choices Interest Inventory.	**Quadrant B** Students locate and arrange for a guest speaker from their career area of interest to present to their class

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Iowa Core Curriculum web site, including complete high school core curriculum for literacy, math and science:
http://www.iowamodelcore.org/

Iowa Department of Education core curriculum resources, including:

- Characteristics of a world-class core curriculum
- Essential content of a world-class core curriculum
- Essential skills of a world-class core curriculum

http://www.iowa.gov/educate/content/view/674/1023/

I**owa Code Section 256.7, including Subsection 26 directing the State Board of Education to develop a model core curriculum** for high school literacy, math and science.
http://coolice.legis.state.ia.us/Cool-ICE/default.asp?category=billinfo&service=IowaCode&ga=82

Senate File 588 (2007), including provisions to expand the voluntary Core Curriciulum work to grades K-8, and add social studies and 21st Century Skills.
http://coolice.legis.state.ia.us/Cool-ICE/default.asp?category=billinfo&service=billbook&GA=82&hbill=SF588

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