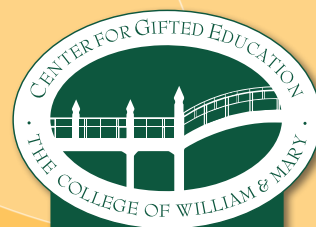


*25 Years of Commitment to Gifted Children Through Research and Curriculum
at the Center for Gifted Education at The College of William and Mary*

WHAT WORKS



Celebrating
25
years

1988-2013

LETTER

FROM THE EXECUTIVE DIRECTOR



Serving as the Executive Director for the Center for Gifted Education (CFGE) at The College of William and Mary and following in the footsteps of Dr. Joyce VanTassel-Baska is quite an honor. In 2013, the Center is celebrating its 25th anniversary. To that end, we have created an updated version of *What Works: 20 Years of Curriculum Development and Research for Advanced Learners*, which was published in 2008 to celebrate the first 20 years of the Center. More specifically, this publication illustrates many of the accomplishments by Center-related professionals in the area of curriculum development. As is well-known around the United States and the world, the Center empirically validates its curricula in a rigorous process historically unmatched in the field. The Center remains dedicated to that challenge as the cornerstone of all of its work. This document celebrates the outcomes of the hard work of numerous professionals working on behalf of students with gifts and talents.

I hope that you find this publication informative and helpful. The future looks bright for the Center, so I say onward and upward to our next 25-year celebration.

Dr. Tracy L. Cross
Executive Director, Center for Gifted Education
Jody and Layton Smith Professor of Psychology and Gifted Education
The College of William and Mary

PURPOSE

The purpose of this document is to highlight the curriculum development and research work of the Center for Gifted Education at The College of William and Mary during the past 25 years. Areas of study include curriculum development, instruction, assessment, programming for gifted students, and professional development. Through the use of the Integrated Curriculum Model (ICM; VanTassel-Baska, 1986) as a template for design, coupled with curriculum reform emphases in content areas, the Center curriculum has produced positive outcomes in student achievement and teacher use of differentiated strategies. This publication is an update to *What Works: 20 Years of Curriculum Development and Research for Advanced Learners*, published in 2008; some sections from the original publication have been included in cases where the information is still relevant today.

Credits, 2013 Edition

Editor: Jennifer H. Robins, Ph.D.
Contributing Author: Kimberley L. Chandler, Ph.D.
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Editors: Joyce VanTassel-Baska, Ed.D., and Tamra Stambaugh, Ph.D.
Contributing Authors: Bruce A. Bracken, Ph.D., Tamra Stambaugh, Ph.D., and Joyce VanTassel-Baska, Ed.D.
Graduate Student Support: Kathryn Holt and Mary Runnells

INTRODUCTION



The Center for Gifted Education, founded by Dr. Joyce VanTassel-Baska and currently under the direction of Dr. Tracy L. Cross, has been in operation at The College of William and Mary School of Education since 1988. The Center has been the recipient of 25 years of continuous funding from federal, state, and foundation grants for curriculum development, research and dissemination, and programming for gifted students. From the Center's inception, one of its major emphases has been the development of exemplary curriculum frameworks and units of study for classroom use with high-ability learners in science, language arts, mathematics, and social studies. Teams of content specialists and educators have collaborated in writing and field-testing units. Many Center materials have been recognized for their quality and enhancement of student achievement by the United States Department of Education and the National Association for Gifted Children. Specifically, 17 of the 43 units published by commercial publishers (Prufrock Press and Kendall Hunt) have received exemplary curriculum awards by the National Association for Gifted Children and seven of the problem-based science units for grades 2–8 were recognized as a promising curriculum by the United States Department of Education. A list of published curriculum developed by content area is outlined in Table 1.

The Center for Gifted Education also serves as a training site for graduate students pursuing a master's or doctoral degree at The College of William and Mary. Students who work at the Center for Gifted Education represent a variety of fields, including curriculum and instruction, gifted education, counseling, psychology, and planning, policy, and leadership. These student professionals are engaged in research, curriculum development, instrument design, assessment projects, and direct teaching or piloting of Center materials through the Summer/Saturday Enrichment program, also coordinated by the Center. This program not only serves students in grades pre-K–10 in the community, but also provides a learning laboratory for curriculum projects, research, and student teaching.

TABLE 1

THE CENTER FOR GIFTED EDUCATION'S
PUBLISHED CURRICULUM UNITS

	Titles	K	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	High School
Science	<i>Survive and Thrive</i>	•	•								
	<i>How the Sun Makes Our Day</i>	•	•								
	<i>Water Works</i>	•	•								
	<i>Budding Botanists</i>		•	•							
	<i>Where's the Beach?</i>		•	•	•						
	<i>Weather Reporter</i>			•							
	<i>What's the Matter?</i>			•	•						
	<i>What a Find!</i>			•	•	•					
	<i>Dig It!</i>				•						
	<i>Invitation to Invent</i>				•	•					
	<i>Acid, Acid Everywhere</i>						•	•	•		
	<i>Electricity City</i>						•	•	•		
	<i>Animal Populations</i>								•	•	•
	<i>Nuclear Energy: Friend or Foe?</i>								•	•	•
	<i>Something Fishy</i>								•	•	•
<i>No Quick Fix</i>								•	•	•	
Language Arts	<i>Beyond Words</i>		•	•							
	<i>Journeys and Destinations</i>			•	•						
	<i>Jacob's Ladder Reading Comprehension Program</i>				•	•	•				
	<i>Literary Reflections</i>					•	•				
	<i>Patterns of Change</i>					•	•	•			
	<i>Autobiographies and Memoirs</i>						•	•			
	<i>Persuasion</i>							•	•		
	<i>The 1940s: A Decade of Change</i>								•	•	
	<i>Utopia</i>								•	•	Grade 9
	<i>Threads of Change in 19th Century American Literature</i>								•		Grades 9-10
	<i>Change Through Choices</i>										Grades 10-12

TABLE 1, CONTINUED

	Titles	K	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	High School
Social Studies	<i>Ancient Egypt: Gift of the Nile</i>			•	•						
	<i>Ancient China: The Middle Kingdom</i>			•	•						
	<i>Building a New System: Colonial America 1607–1763</i>					•	•				
	<i>The World Turned Upside Down: The American Revolution</i>					•	•				
	<i>A House Divided? The Civil War: Its Causes and Effects</i>						•	•			
	<i>The 1920s in America: A Decade of Tensions</i>							•	•		
	<i>The 1930s in America: Facing Depression</i>							•	•		
	<i>The Road to the White House: Electing the American President</i>							•	•	•	
	<i>Primary Sources and Historical Analysis</i>										Grades 9–10
	<i>The Renaissance and Reformation in Europe</i>										Grades 9–10
<i>Defining Nations</i>										Grades 10–12	
Mathematics	<i>Splash!</i>	•	•								
	<i>Spatial Reasoning</i>			•	•	•					
	<i>Polygons Galore!</i>				•	•	•				
	<i>Beyond Base Ten</i>				•	•	•	•			
	<i>Moving Through Dimensions</i>							•	•	•	



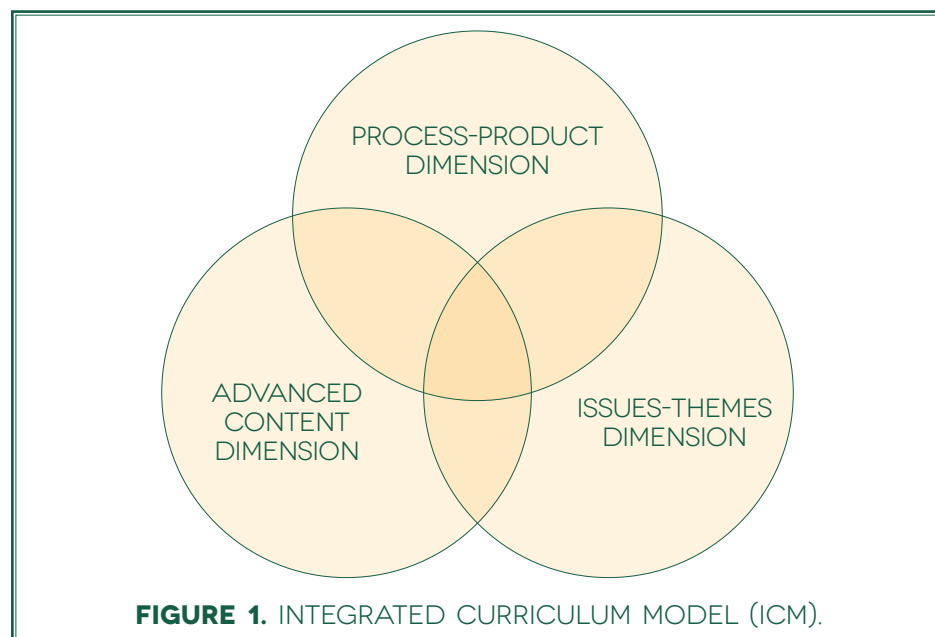


CURRICULUM DISSEMINATION

The curriculum from the Center for Gifted Education, also commonly referred to as the William and Mary units, has enjoyed national and international widespread use. It has been distributed to school districts and students in all 50 states, as well as 28 countries, including Puerto Rico and the U.S. Virgin Islands. Educators in private and public school districts, ranging from Title 1, low-income schools to high-socioeconomic status (SES) schools, have found the Center materials useful in promoting student achievement. Presentations on the curriculum have been conducted at state, national, and international conferences annually, and staff members frequently conduct implementation workshops for educators across the country and abroad. Professional development workshops for teachers provide participants with modeling and practice involving the core strategies of each unit, as well as an introduction to unit-specific resources and activities. Annual conferences held at The College of William and Mary also are provided twice per year to address curriculum, instruction, and assessment for gifted learners based on best practices in the field and current Center projects. We estimate that more than 70,000 teachers have received such training and more than 800,000 students have been impacted by the curriculum.

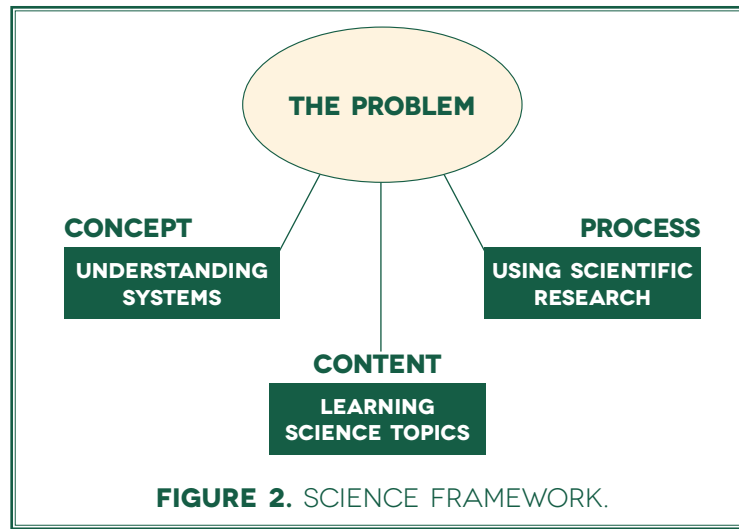
OVERVIEW OF THE INTEGRATED CURRICULUM MODEL

The Integrated Curriculum Model (VanTassel-Baska, 1986), a theoretical model of curriculum design for gifted learners (see Figure 1), emphasizes the integration of advanced content, higher order thinking processes, and connections to overarching themes and issues as the foundation for curriculum development. The greatest student learning occurs when emphasis is given to each of these dimensions within a given curriculum unit (VanTassel-Baska, 1986). The ICM was derived from the key characteristics of gifted students and how curriculum may be designed to best match those characteristics. For example, because gifted students are precocious learners, advanced content within a given subject area provides opportunities for new learning. Because gifted learners have complex thinking capacities, the provision of a curriculum that helps gifted students reason through situations and think critically about subject matter enhances engagement and creative production. Moreover, because many gifted students thrive on making connections, the focus on overarching issues, themes, and concepts elevates their understanding of the real world and how it works. These three components of the ICM (advanced content, processes/products, and overarching issues, themes, and concepts) have comprised the framework for curriculum design and differentiation in all of the William and Mary units of study.



WHAT WORKS IN TEACHING SCIENCE CURRICULUM TO ADVANCED LEARNERS

The William and Mary science curriculum uses problem-based learning as the catalyst to engage learners in scientific inquiry. As active investigators, students take on the role of scientists to solve real-world problems. The science curriculum follows the ICM in content, process, and concept dimensions, as seen in Figure 2.



The William and Mary science units introduce real-world problems to initiate scientific investigation. The following example is from *Acid, Acid Everywhere* (Center for Gifted Education, 2007):

You are the supervisor of the day shift of the State Highway Patrol. It is 6 a.m. on a cool autumn morning. You are sleeping when the phone rings. You answer and hear, “Come to the Clear Creek Bridge on Route 15. There has been a major accident and you are needed.”

Quickly you dress and get on the road to hurry to the site of the emergency. As you approach the bridge you see an overturned truck that has apparently crashed through a metal guardrail. The truck is missing a wheel and is perched on its front axle. You see “CORROSIVE” written on a small sign on the rear of the truck. There is a huge gash in the side of the truck and from the gash a liquid is running down the side of the truck, onto the road, and down the hill into a creek. Steam is rising from the creek. All the traffic has been stopped and everyone has been told to remain in their cars. Many of the motorists trapped in the traffic jam appear angry and frustrated. Police officers, firefighters, and rescue squad workers are at the scene. They are all wearing coveralls and masks. The rescue squad is putting the unconscious driver of the truck onto a stretcher. Everyone seems hurried and anxious.



Using this scenario, students actively investigate acids and bases, dilution, and issues related to the effects of an acid spill on environmental and transportation systems by creating their own experiments and using scientific processes to solve this real-world problem. All units incorporate real-world problem-based learning scenarios as the organizer for learning.

THE SCIENTIFIC RESEARCH PROCESS

Students in the primary grades, as part of the Project Clarion units, incorporate the Wheel of Scientific Investigation (see Figure 3) to develop scientific habits of mind for independent research investigations. Students learn how to make observations, ask questions about the world around them, read and learn about their new topic, design and conduct experiments, and discuss what their findings mean.

CONNECTING TO OVERARCHING CONCEPTS

All third- through eighth-grade science units incorporate the overarching concept of systems as a way to link unit components together, add depth to the content, and connect students' learning to essential interdisciplinary understandings. Examples of systems applications within the science units include how an acid spill affects the environmental system, how electrical systems impact one another, and how human body systems are interrelated. Students learn how to identify the inputs, outputs, boundaries, and interactions of elements in a system. They also learn how larger systems can encompass smaller ones, how systems are interdependent, and how systems exhibit patterns over time.



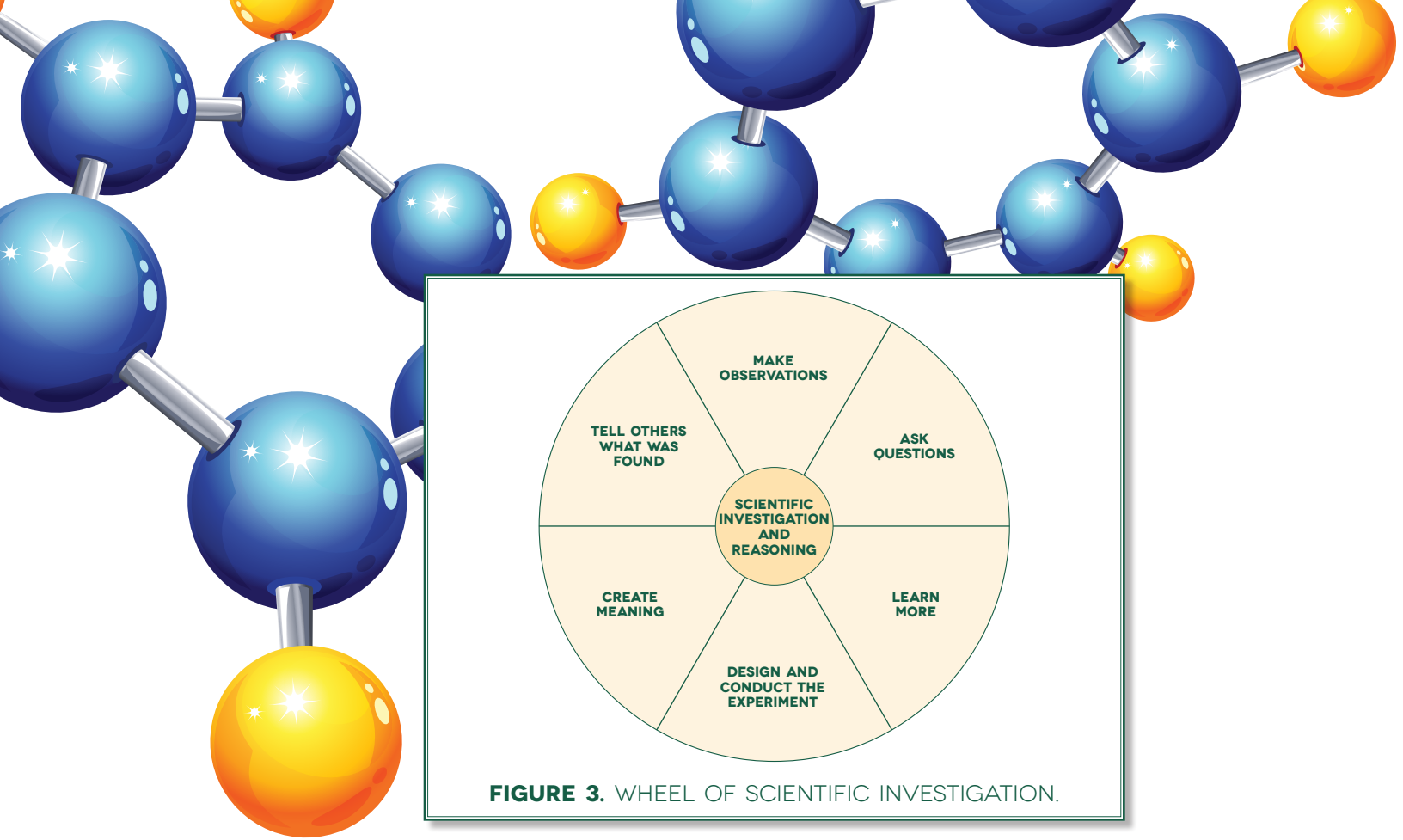


FIGURE 3. WHEEL OF SCIENTIFIC INVESTIGATION.

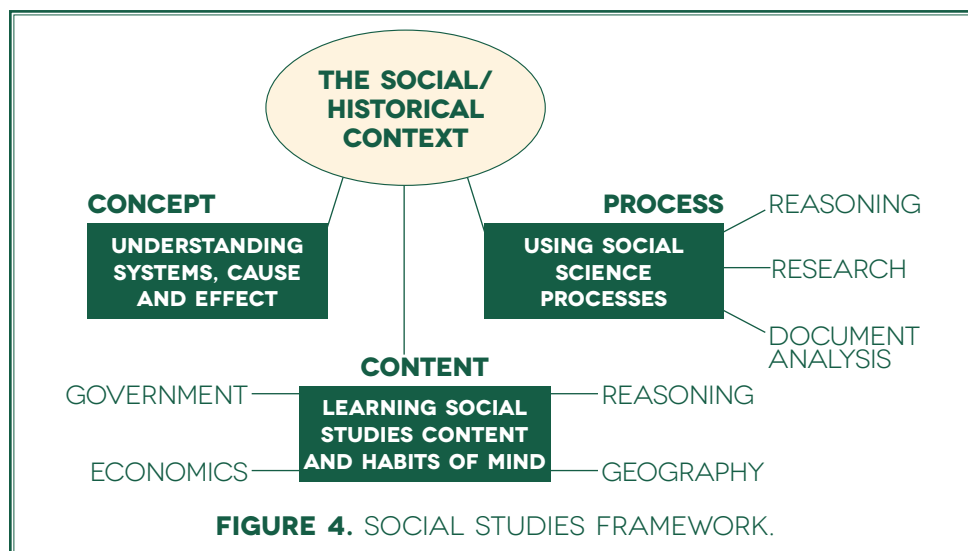
RESEARCH FINDINGS IN BRIEF

- ✧ Primary-age students exposed to the William and Mary science units performed better on a standardized achievement test in science (MAT8) than control students (VanTassel-Baska, Bracken, Stambaugh, & Feng, 2007).
- ✧ Significant and important treatment effects were found for students' ability to plan an experiment after exposure to the William and Mary units (Feng, VanTassel-Baska, Quek, O'Neil, & Bai, 2005; VanTassel-Baska, Bass, Ries, Poland, & Avery, 1998; VanTassel-Baska, Bracken, et al., 2007).
- ✧ Primary-age students who were exposed to the William and Mary units showed significant growth in critical thinking when compared to those students who used the regular science curriculum (VanTassel-Baska, Bracken, et al., 2007).
- ✧ Performance-based assessments that emphasized higher order concepts, scientific investigation, and content mastery showed significant growth for Title I students exposed to the science units (VanTassel-Baska, Bracken, et al., 2007).
- ✧ Teachers and students found problem-based science units more engaging than typical science units (Feng et al., 2005; VanTassel-Baska et al., 1998).
- ✧ Positive academic achievement effects were significant for all groups of learners, regardless of socioeconomic status, ability level, or ethnicity (Feng et al., 2005; VanTassel-Baska et al., 1998; VanTassel-Baska, Bracken, et al., 2007).
- ✧ Continued use of the problem-based learning science curriculum over a 3-year period resulted in continued academic growth for gifted students (Feng et al., 2005).



WHAT WORKS IN TEACHING SOCIAL STUDIES CURRICULUM TO ADVANCED LEARNERS

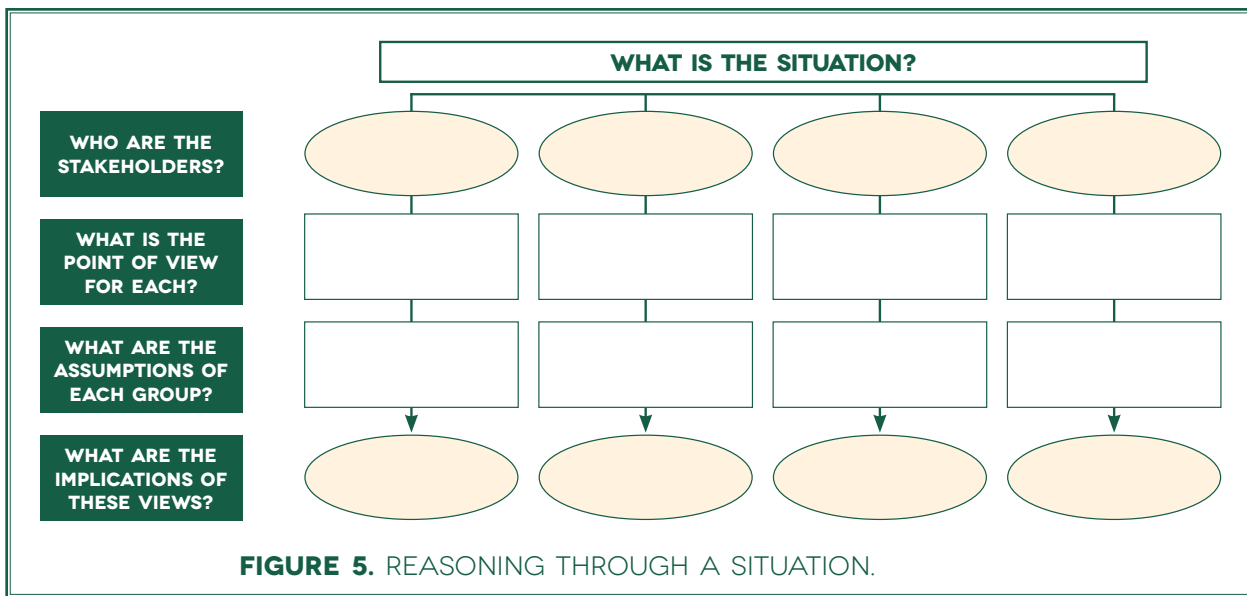
The William and Mary social studies units use historical periods and events as the catalyst for student learning (see Figure 4). Students actively engage in document analysis, issue-based research on current events, and reasoning through situations to master historical content. Students then connect this new learning to an overarching concept such as systems or cause and effect to gain a deeper understanding of history and its relationship to other areas of study within and beyond social studies.



By allowing students to analyze primary documents such as the Stamp Act, camp diaries from Civil War soldiers, or the 1920s KKK mission statement, for example, they are able to think like historians and gain a stronger appreciation of past events and their implications on the present and future. When analyzing primary documents, students establish a context and intent for each piece (author, time written, related culture and events, purpose, intended audience), work to understand the source (issues/events and values reflected in the document), and evaluate or interpret the source (reliability, representativeness, potential and actual consequences).

REASONING THROUGH HISTORY

The William and Mary social studies units guide students in analyzing a situation by looking at different points of view. Students may reason through a situation using the model shown in Figure 5 to analyze a historical situation or event through multiple stakeholder perspectives. After analyzing a situation, students may be asked to write a persuasive essay from the perspective of one of the stakeholders.



CONNECTING TO OVERARCHING CONCEPTS

The William and Mary social studies units also develop a broad understanding of the concepts of systems and cause and effect. Students examine relationships to events and eras in history as an essential area of focus. Sample systems discussions include the exploration of the silk trade as an economic system, comparison of European colonist and Native American social systems, and the American political system as a model for other countries. Students also learn about the causes of the American Revolution, the effects of the Declaration of Independence, and the causes and effects of the stock market crash.

RESEARCH FINDINGS IN BRIEF

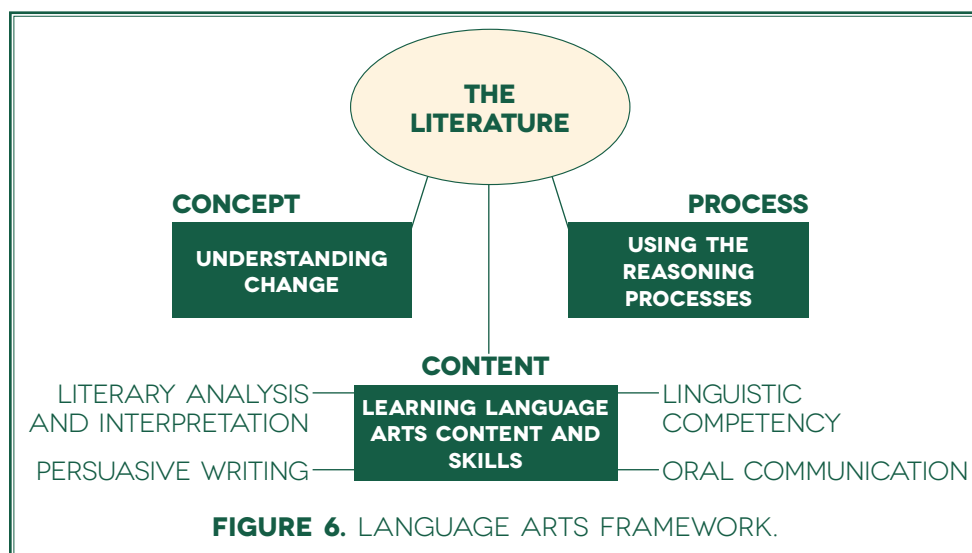
- ✦ Students engaged in the William and Mary social studies units showed significant growth in measures of conceptual thinking, content learning, and critical thinking (Little, Feng, VanTassel-Baska, Rogers, & Avery, 2007).
- ✦ Treatment effects were evident for the whole sample, including nongifted students. Gains were consistent for males and females (Little et al., 2007).
- ✦ Differences in depth of implementation across schools and teachers corresponded to differences in performance among students (Little et al., 2007).



WHAT WORKS IN TEACHING LANGUAGE ARTS CURRICULUM TO ADVANCED LEARNERS

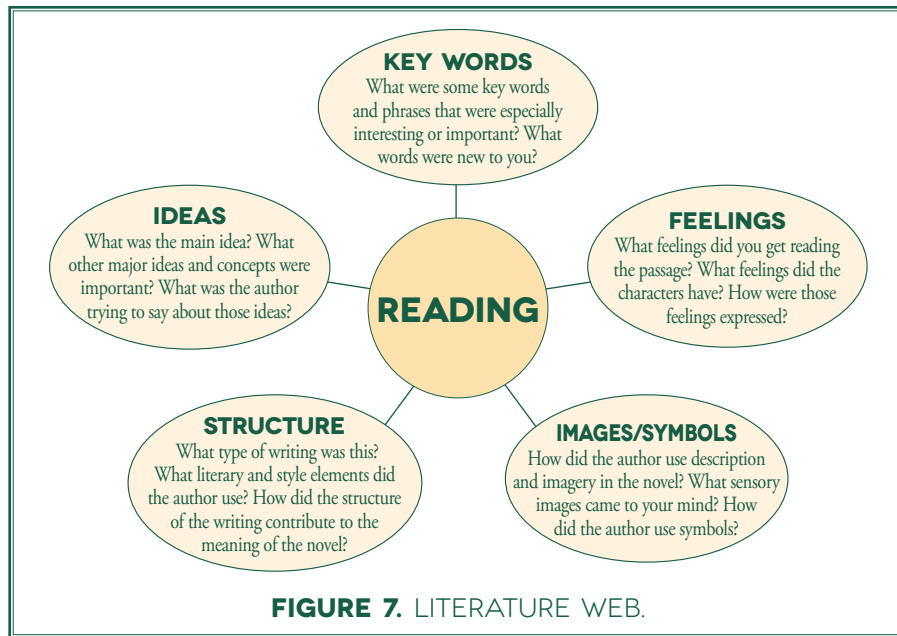


The William and Mary language arts units employ advanced-reading-level literature as the catalyst for learning. As seen in Figure 6, the Integrated Curriculum Model is operationalized through the teaching of the concept of change, the reasoning process, and advanced content skills in reading, writing, speaking, listening, and grammar.

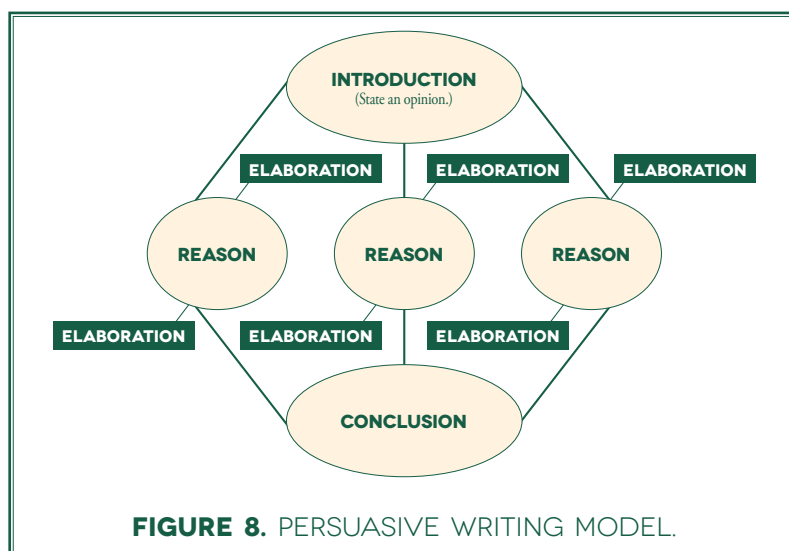


THINKING THROUGH READING AND WRITING

The language arts units incorporate advanced thinking models such as the literature web (see Figure 7) to help students understand and analyze text. Students are introduced to the literature web early in each unit. After reading a selected short story or poem, students analyze key words and feelings, describe images and symbols, identify structural elements within the story that contribute to its meaning, and elaborate on main ideas. Students are asked to reflect individually on each aspect of the web, share ideas with a partner, and then discuss findings in a small- and whole-group setting with teacher guidance and feedback.



The William and Mary units also employ the teaching of persuasive writing as an essential part of articulating and defending ideas. Students defend a character's actions, discuss the meaning of passage or novel, or analyze an issue and take a stakeholder perspective, given a historical context or problem. The hamburger model of persuasive writing is presented in Figure 8. By using this model, students learn to take a stand, provide evidence for that stand, elaborate their ideas, and summarize.



CONNECTING TO OVERARCHING CONCEPTS

Most of the language arts units focus on the overarching concept of change. Progressing through the units, students learn that change is everywhere, change is linked to time, change may be positive or negative, change may be perceived as orderly or random, and change may happen naturally or may be caused by people. As students read literature, they identify examples of how change affects the story, such as:

- ✎ Explain changes over time in the character's outlook, the setting, and the plot.
- ✎ How did the character's point of view change over time? Why is that important to the meaning of the story?
- ✎ What idea about change is explored in this poem? Justify your answer by using evidence from the text.

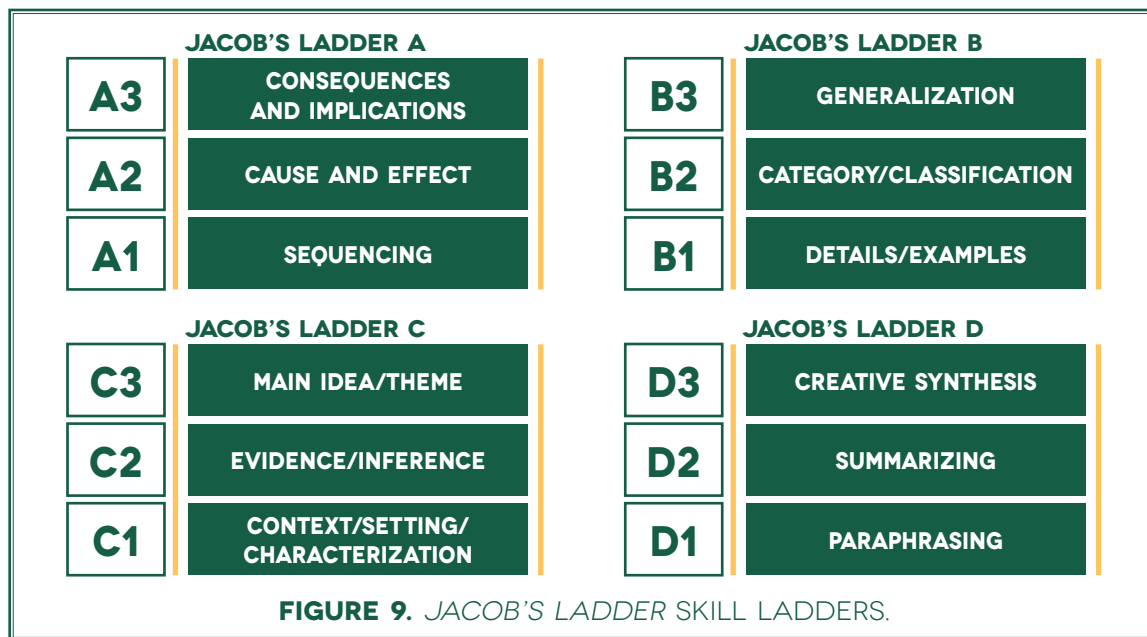
RESEARCH FINDINGS IN BRIEF

- ✎ Students in Title I schools exposed to the language arts units showed significant learning gains annually in reading comprehension when compared to students who used a basal reader or teacher-created materials (Bracken, VanTassel-Baska, Brown, & Feng, 2007; VanTassel-Baska, Bracken, Feng, & Brown, 2009).
- ✎ Students exposed to the language arts units showed significant learning gains annually in critical thinking when compared to students who used a basal reader or teacher-created materials (Bracken et al., 2007; VanTassel-Baska et al., 2009).
- ✎ Gifted, learning disabled, and typical learners all showed significant learning gains in critical thinking through persuasive writing (Hughes, 2000).
- ✎ Subanalyses suggest that student growth in critical thinking may be bounded by the characteristics of the learner, teacher skills in soliciting critical thinking behaviors, and fidelity of curriculum implementation (Bracken et al., 2007; Hughes, 2000; VanTassel-Baska et al., 2009).
- ✎ Students who were exposed to the language arts curriculum showed significant and educationally important gains in literary analysis (VanTassel-Baska, Johnson, Hughes, & Boyce, 1996; VanTassel-Baska, Zuo, Avery, & Little, 2002).
- ✎ Students who were exposed to the language arts curriculum showed significant and educationally important gains in persuasive writing (Bracken et al., 2007; Hughes, 2000; VanTassel-Baska et al., 2009; VanTassel-Baska et al., 1996; VanTassel-Baska et al., 2002).
- ✎ Teacher acceptance of curriculum materials impacts the extent to which curriculum elements are employed, how students are challenged, and continued curriculum use (VanTassel-Baska et al., 1996).
- ✎ Continued use of the language arts curriculum over a 3-year period significantly enhanced students' literary analysis skills and persuasive writing competency (Feng et al., 2005).
- ✎ Academic achievement effects were significant for all groups of learners regardless of socioeconomic status, ability level, or ethnicity (Bracken et al., 2007; VanTassel-Baska et al., 2009; VanTassel-Baska et al., 1996; VanTassel-Baska et al., 2002).

WHAT WORKS IN THE JACOB'S LADDER READING COMPREHENSION PROGRAM

The *Jacob's Ladder Reading Comprehension Program* was created based on student needs and teacher requests for additional scaffolding within the language arts curriculum, particularly for lower income students in heterogeneous classrooms.

Jacob's Ladder focuses on student-targeted readings of short stories, poetry, and nonfiction sources. Originally developed for students in grades 3–5 to enhance reading comprehension and critical thinking, *Jacob's Ladder* tasks are organized into four skill ladders in Levels 1, 2, and 3: A–D (see Figure 9). Each ladder focuses on a different set of skills, from lower order to higher order. Students “climb” each ladder by answering lower level questions and moving to higher level questions or rungs at the top of each ladder. (Please note: Additional volumes of *Jacob's Ladder* have been developed for grades K–2 and grades 6–9. The research findings noted here are related to Levels 1, 2, and 3 only.)



RESEARCH FINDINGS IN BRIEF

- ✦ When compared to students in Title I schools who used the basal readers only, those who were exposed to the *Jacob's Ladder* curriculum showed significant and educationally important gains in reading comprehension (Stambaugh, 2007).
- ✦ When compared to students in Title I schools who used the basal readers only, those who were exposed to the *Jacob's Ladder* curriculum showed significant and educationally important gains in critical thinking (Stambaugh, 2007).
- ✦ Students reported greater interest in reading after curriculum exposure to *Jacob's Ladder* (French, 2006; Stambaugh, 2007).
- ✦ Teachers reported more in-depth student discussion after teaching the *Jacob's Ladder* curriculum (French, 2006; Stambaugh, 2007).



OTHER PROMISING CENTER CURRICULUM

The *Navigator Novel Study Guides* are collections of task demands intended to support group or independent study of classic novels. The *Navigators* encourage advanced readers to develop their skills in analyzing and interpreting literature through structured questions and activities that highlight themes and concepts, literary elements, and real-world connections contained within the books. In addition, novel studies are opportunities for students to develop their own vocabulary and writing skills by exploring and emulating the language and style of authors. Interdisciplinary research opportunities and differentiated activities also are included and feature the models used in the William and Mary language arts curriculum. The Center has developed more than 50 *Navigators*, covering literature appropriate for students in grades 1–12.

Mathematics units also have been developed by the Center for Gifted Education. *Beyond Base Ten*, intended for students in grades 3–6, focuses on the representation of numbers by using place value and non-place-value systems. Bases other than base 10 are featured through the context of early civilization number systems and then compared to current number systems. *Spatial Reasoning*, a unit for students in grades 2–4, and *Moving Through Dimensions*, for students in grades 6–8, approaches spatial reasoning through one-, two-, and three-dimensional tasks and includes transitions and representations from three- to two-dimensional objects. *Polygons Galore!* is a unit for high-ability learners in grades 3–5 focusing on two-dimensional and three-dimensional components of geometry by exploring polygons and polyhedra and their properties. The van Hiele levels of geometric understanding provide conceptual underpinnings for unit activities. *Splash! Modeling and Measurement Applications for Young Learners* is a unit for high-ability learners in kindergarten and first grade focused on mathematical concepts related to linear measurement, the creativity elements of fluency and flexibility, and the overarching, interdisciplinary concept of models. The unit consists of 13 lessons centered around the idea of designing a community pool.

WHAT WORKS IN CURRICULUM IMPLEMENTATION EFFORTS

Ideas about how and why curriculum should be differentiated for the gifted relate to matching learner needs with specific interventions. As a result of the Jacob K. Javits Gifted and Talented Students Education Program in particular, data are available that provide evidence of effective curriculum interventions for producing achievement gains in gifted students. Because much of the focus of the Javits program in recent years has been specifically on examining the efficacy of interventions with underserved populations, there are also data that comprise an evidence base about the curriculum interventions that are most appropriate when working with these children, including children of poverty. School district personnel in gifted education programs have often relied on the materials produced as a result of the Javits research, in some cases resulting in the large-scale adoption and implementation of the materials. In a recent study, teachers, principals, and central office administrators involved in the implementation of the William and Mary language arts materials were surveyed to determine their perceptions about the reform efforts in language arts and the factors that contributed to or impeded the sustainability of the efforts (Chandler, 2013).

RESEARCH FINDINGS IN BRIEF

- ✦ The overall impression of the curriculum implementation was that it was challenging because of adherence to previous methods and competing priorities for teachers (Chandler, 2013).
- ✦ The teachers who felt successful in implementing the units had taken advantage of materials with additional scaffolding provided for them and developed by them (Chandler, 2013).
- ✦ Because the literature in these units represents many diverse cultures, teachers expressed a need to include a great deal of additional background information so that their students would understand the contexts of the selections (Chandler, 2013).
- ✦ Given the level of poverty in the participating districts, the teachers generally felt that the deliberate use of empirically supported features of effective curriculum for this population was important and needed greater emphasis than it had been given during the professional development (Chandler, 2013).
- ✦ Although some teachers questioned the expenditures made for frequent and sustained professional development related to the implementation, most participants discussed the importance of the training for their understanding (Chandler, 2013).



WHAT WORKS IN PRECOLLEGIATE LEARNER PROGRAMS

The Center for Gifted Education offers precollegiate learner programs to meet the needs of high-ability students. The Saturday/Summer Enrichment Program (SEP) for gifted learners offers enrichment courses for students entering grades K–9 in specialized areas of science, mathematics, arts, and humanities. It is intended to provide an opportunity to extend highly able students' learning beyond the opportunities generally offered in regular classrooms. All courses are designed to address the characteristics of advanced learners, including their ability to learn at a faster rate, engage in problem solving, manipulate abstract ideas, and use their innate curiosity to address new challenges.

The Focusing on the Future Conference is an all-day career and academic planning experience for high-ability students in grades 6–12, their parents, and counselors. The program is designed to expose high-ability learners to career opportunities in various disciplines and to inform parents and school counselors of considerations and guidelines for effective career and academic planning.



RESEARCH FINDINGS IN BRIEF

- ❧ High school students reported that they could not make a connection between academic subject-related programs and career-related programs in schools (Kim, 2010).
- ❧ High school students listed their own interests, family environment (e.g., parental expectations or a family job), and various programs, including extracurricular activities, school classes or programs, mentorships, and internships, as influencing factors for their choice of a possible future career (Kim, 2010).
- ❧ Students who participated in the Focusing on the Future Conference became more confident about college life. High school students were more interested in receiving practical and authentic information related to their career goals; however, middle school students were more interested in academic planning in high school to align with their career goals (Kim, 2013).
- ❧ Parents who participated in the Focusing on the Future Conference reported that it encouraged more open communication with their child about his or her career path because they received practical information on college admission procedures and possible talent development options in college (Kim, 2013).
- ❧ The Focusing on the Future Conference offered an opportunity for networking with other families. Parents wanted to hear from others and share information regarding their children's career development (Kim, 2013).

CAMP LAUNCH

NEED FOR CURRICULUM FOR STUDENTS FROM LOW-INCOME BACKGROUNDS



The underrepresentation of low-income and minority students in enrichment programs continues to be a concern in gifted education (Olszewski-Kubilius & Thomson, 2010; VanTassel-Baska, Feng, Swanson, Quek, & Chandler, 2009). Limited access due to transportation and financial issues, lack of parental knowledge about appropriate services, and a paucity of enrichment programs addressing their needs being offered all contribute to both an opportunity gap and an achievement gap for low-income students in comparison to their middle- and upper-class peers. Disadvantaged students who start school as high achievers begin to fall short of their more socio-economically advantaged peers almost immediately, with 44% of high-achieving lower income students falling out of the top achievement quartile in reading between first and fifth grades, compared to 31% from higher income families (Wyner, Bridgeland, & DiIulio, 2007).

In an effort to provide a unique experience for disadvantaged, high-ability students, the Center has developed an enrichment program called Camp Launch. In 2012, the Center piloted Camp Launch, a summer residential program, on The William and Mary campus. The camp initially served 55 high-ability seventh graders from low-income backgrounds and has expanded to serve 80 seventh- and eighth-grade students during its second year. Curricula in science, technology, engineering, and mathematics (STEM), personal development, and writing—all areas emphasized in Camp Launch—are in the process of being developed more fully to address the needs of this population of students. Although curriculum studies can help identify ways to best serve students from low-income backgrounds, considering different learning environments, few have been undertaken that focus on disadvantaged students' needs (Stambaugh & Chandler, 2012). Research conducted in conjunction with Camp Launch about curriculum efficacy and curriculum implementation will add to the limited knowledge base about what works with these students and what teachers must consider when they plan for them.

WHAT WORKS IN PROFESSIONAL DEVELOPMENT

An acknowledged important adjunct to demonstrating curriculum efficacy with students is the corresponding capacity of teachers to deliver the curriculum in an effective and faithful manner. Thus, the Center's research agenda has focused on this area of study as well. As part of any ongoing curriculum innovation research project, teachers typically have received 2–4 days of training in a curriculum unit of study before implementation with targeted students. The professional development agenda with teachers has focused strongly on the faithful implementation of a unit of study in a given subject area, coupled with instruction and application in the use of teaching and learning models central to curriculum delivery. Across all units of study, the professional development sessions with teachers have stressed the use of the following interdisciplinary models.

- ✦ **Problem-based learning.** The focus for professional development is on helping teachers facilitate student work through an unstructured problem in small groups of four or five students by completing a Need to Know board, asking probing questions, preparing resources needed, monitoring the preparation of problem logs, and assisting in problem resolution papers and presentations to real audiences.
- ✦ **Concept development.** Professional development sessions model teacher use of inquiry as a tool for students constructing their own understanding of a meta-concept like change or systems through guided work. Teachers provide 25 examples of a concept such as change, categorize the examples, cite nonexamples, and draw generalizations about the concept. A debriefing session allows teachers to reflect on using the approach with students.
- ✦ **Research study.** The emphasis in professional development is on providing teachers with a heuristic model of the research process that moves students from defining a problem, posing research questions, and collecting data from multiple sources, to analyzing and synthesizing findings and drawing implications for use in both written and oral venues. Teachers then work through the model in teams, discussing various applications for use in their classrooms.
- ✦ **Analyzing and interpreting text.** Preparing teachers to use the literature web involves their exploration of a poem by using the elements of the web to focus on choice of words, reader response, main ideas, imagery and symbolism, and the structure of the writing. The session facilitator then models the follow-up discussion to be conducted with students as meaning is built, and the web is used as a tool to elevate thinking about the reading selection.



- ✦ **Developing persuasive writing skills.** The professional development session helps teachers focus student writing on a model that emphasizes the structure of claim, data, and warrant in the construction of logical argument, using the analogy of building a sandwich. The use of the model in classrooms is further explained and stresses power writing, instruction in the assessment rubric, and peer review.
- ✦ **Teaching critical thinking.** The focus of professional development work is on teachers using the eight elements of reasoning (Paul, 1992) to facilitate student growth in thinking ability by employing the elements in different combinations in activities, questions, and project work. Facilitators model the various contexts in which the model may be applied.

The professional development sessions also have emphasized the importance of using performance-based assessment, built into the units of study, as a way to know that students have progressed in their learning.

The Center for Gifted Education faculty and staff have conducted several studies on professional development during the past 25 years. These studies have focused on questions of teacher efficacy, perceptions about critical thinking, differentiation strategy use, and treatment fidelity to newly designed curriculum. Central findings from these studies follow.

RESEARCH FINDINGS IN BRIEF

- ✦ Teachers can significantly improve their skills in the differentiation strategies of problem solving, critical thinking, curriculum delivery, and metacognition, given ongoing professional development in such strategies embedded in a social studies curriculum (Avery, 1999).
- ✦ Untrained teachers of the gifted in Title I schools can significantly improve their skills in the differentiation strategies of critical thinking, creative thinking, and accommodation to individual differences across 2 years, given training and implementation support in a structured language arts program (VanTassel-Baska et al., 2008).
- ✦ Two years of professional development are necessary to enhance the use of differentiation strategies, even with a curriculum base provided (VanTassel-Baska et al., 2008).
- ✦ The employment of professional development practices focused on curriculum implementation contributes to positive teacher change (Brown, 2007).



- ✦ Teachers score at differential levels in critical thinking and creative thinking, rendering it problematic for them to teach these skills to students if they are low in the capacity to use the skills themselves (McGowan, 2007).
- ✦ Exemplary secondary teachers of the gifted in specialized schools in Singapore and the United States score high in the use of differentiated strategies and have incorporated these practices effectively into their daily repertoire (VanTassel-Baska, MacFarlane, & Feng, 2006).
- ✦ Teacher self-assessments of differentiation use suggest that they are using differentiation strategies more frequently and more effectively than external trained assessors would rate them (Avery, 1999; Tyler, 2006).
- ✦ When teachers employ differentiation strategies, there is corresponding active engagement of students with the learning process (VanTassel-Baska et al., 2008).
- ✦ Although all of these studies employed quasi-experimental designs, larger scale studies on the differential impact of teacher preparation with and without a structured curriculum would prove useful for future work.



WHAT WORKS

LESSONS LEARNED FROM 25 YEARS OF CURRICULUM DEVELOPMENT AND RESEARCH

Specific lessons have been identified based on general findings from our research and development projects on the William and Mary curriculum. These lessons may prove useful for mounting new or ongoing efforts in the curriculum development enterprise for high-end learning.

LESSON #1 CURRICULUM DESIGN MATTERS

All William and Mary curricula feature the Integrated Curriculum Model as the guiding theoretical framework for curriculum design. The Center for Gifted Education units have been piloted in schools nationwide and found to improve student achievement, not only in the specific content areas, but also in critical thinking and in understanding overarching concepts. Each unit, regardless of the content focus, features the following blueprint specifications:

- ✦ a curriculum framework that identifies learning goals and anticipated outcomes;
- ✦ authentic assessments for content, concept, and process as a guide for diagnostic and prescriptive instruction, as well as formal assessment;
- ✦ emphasis on higher level thinking and reasoning through questioning and activities;
- ✦ inquiry-based meaningful, hands-on, and minds-on experiences;
- ✦ use of graphic organizers;
- ✦ inclusion of accelerated reading and advanced resources;
- ✦ use of a broad-based concept (e.g., systems, cause and effect, change) to elevate understanding of the subject under study;
- ✦ metacognition and reflection components;
- ✦ incorporation of interdisciplinary, real-world research;
- ✦ use of teaching models to scaffold instruction and to promote higher level thinking skills;
- ✦ strong content emphasis that focuses on discipline-specific skills and concepts; and
- ✦ use of technology integration tools.

LESSON # 2: THE CURRICULUM DEVELOPMENT PROCESS MATTERS

All of the curriculum developed by the Center for Gifted Education over the past 25 years has followed not only a set of design specifications consistent with curriculum reform, it also has followed a consistent approach to development.

We have developed each unit with a review of relevant research on the topic, a target age level, and the best practices for teaching in the discipline under study. This research phase also takes into account alignment with state standards and curriculum reform research in each subject matter. These findings then are used as the basis for creating a draft set of lessons. These lessons are tried out in relevant classrooms and revised, based on student receptivity and teacher feedback. Next, an entire unit of study is prepared for piloting in one teacher's classroom. Multiple data sources are used to judge the effectiveness of the unit after implementation, including teacher log notes, student learning results, and outside expert review. Revisions are then made to each unit, based on triangulation of the feedback. The units are field-tested at multiple sites with different teachers and data collected on treatment fidelity, student growth, and teacher perceptions of effectiveness. Based on these data, the units are revised a second time before they are disseminated nationally. This multistage process allows us to refine the product, based on sources of evidence, to enhance its use as an agent of positive learning.

LESSON #3: CURRICULUM DEVELOPMENT WORK FOR HIGH-END LEARNING REQUIRES COLLABORATION WITH CONTENT EXPERTS AND TEACHERS

Discipline-specific expertise is needed to design, develop, and refine curricula to be used with our best learners. Essential content understandings need be developed and articulated that are core to understanding the discipline. Content experts must be an integral part of unit design and review at the beginning stages of development, as well as critiques of later drafts of work.

Similarly, a curriculum that will significantly enhance student achievement must be created with strong teacher involvement. Collaboration among grade-level teachers, content specialists, and educators of the gifted at all phases of curriculum development produces a higher quality product. Collaboration time should be apportioned to the critical tasks of curriculum development and piloting, student assessments, grouping mechanisms, and alignment to relevant standards.

LESSON #4: STUDENT EXPOSURE TO REPEATED MODELS OVER TIME ENHANCES STUDENT ACHIEVEMENT AND LEARNING TRANSFER

Curriculum delivery requires the use of carefully selected teaching and learning models over time. Research-based, packaged curriculum that has been extensively piloted is more likely to be sustained over time and leads to statistically and educationally important gains in student achievement when compared to idiosyncratic teacher-created materials (VanTassel-Baska, 2003) or strategies devoid of content emphases (Westberg & Daoust, 2003). When students consistently are introduced to the same models (e.g., Paul's Reasoning Model, the Persuasive Writing Model, problem-based learning) over time, learning is enhanced continually (Feng et al., 2005). Moreover, students are more likely to internalize the processes inherent to each model so that their thinking becomes more automatic and thus transfers to new learning situations with ease.

LESSON #5: HIGH-LEVEL CURRICULUM MAY BE USED SUCCESSFULLY WITH ALL LEARNERS

Center studies of science and language arts curriculum effectiveness in heterogeneous Title I classrooms have shown that a curriculum written for gifted learners also is effective with non-gifted learners, given the use of proper differentiation, scaffolding, and flexible grouping techniques (VanTassel-Baska, Bracken, et al., 2007; VanTassel-Baska et al., 2008). Scaffolding may be in the form of a supplemental curriculum or specific differentiated strategies and pacing. In language arts, *Jacob's Ladder* was developed to provide additional scaffolding in reading to expose less-experienced students with models that bridge lower level to higher level thinking. *Navigator* novel studies were written so that students could have more choice in novel selections and differentiated activities at a given reading level. In science, specific models were developed to scaffold students' thinking in planning scientific investigations. Pacing of units also was modified within the regular classroom and instructional grouping encouraged effective discussions.

LESSON #6: PROMISING LEARNERS FROM LOW-INCOME BACKGROUNDS AND STUDENTS OF COLOR BENEFIT FROM HIGH-POWERED CURRICULUM

The research evidence we have collected over multiple projects, as well as evidence collected by our colleagues (e.g., Swanson, 2006), suggests that the William and Mary units are effective with these special populations of promising learners. In fact, the data suggest that, given enough time, these students perform at comparable levels of more advantaged learners in selected areas like persuasive writing (VanTassel-Baska et al., 2002). In Title I schools, all groups showed significant and important growth in key areas of language arts, social studies, and science learning after using the units, including groups of diverse learners.

The use of such curriculum, however, must be accompanied by faithful use of the teaching-learning models provided that scaffold instruction at higher levels of discourse and thought for less-experienced learners in a subject area.

LESSON #7: USE OF CURRICULUM-BASED ASSESSMENT DOCUMENTS AUTHENTIC LEARNING

Assessment should be aligned to the curriculum and standards taught within any given discipline. Many standardized assessments, although important, are broad-based and may not be sensitive enough to show specific student learning associated with a curriculum intervention. Therefore, pre- and post-curriculum-based assessments are an essential component for measuring the effectiveness of a curriculum on student achievement. In each William and Mary curriculum unit, the first lesson or set of lessons provides a curriculum-based assessment, matched to content, thinking, and problem-solving processes and overarching concepts so that teachers may use the assessment as a diagnostic tool for instruction. The last lesson of each unit contains a postassessment to assess gains in student achievement over the course of the unit.

LESSON #8: PROFESSIONAL DEVELOPMENT ON CURRICULUM MATERIALS ENHANCES FAITHFUL IMPLEMENTATION

When teaching gifted students, not only does curriculum matter, but the teacher is key. When students in the top 20th percentile grow in achievement, their success may be attributed to placement with highly effective teachers (Sanders & Rivers, 1996). When advanced students do not make noted gains, it may be caused by a lack of opportunity to proceed at their own pace or to

be accelerated in their learning, lack of challenging materials, or the concentration of instruction on average or below-average students (Wright, Sanders, & Horn, 1997). Instead, teachers need to use critical thinking and metacognition routinely to enhance student learning (Wenglinsky, 2000).

Likewise, advanced instructional practices are more likely to be sustained when a curriculum embedded with differentiation strategies is provided as the basis for professional development (VanTassel-Baska, Tieso, & Stambaugh, 2007). Direct training, as well as ongoing, on-the-job professional development concerning use and implementation of new curricula, greatly increases overall effectiveness because teachers do not have to make inferences about how to use new strategies they have learned.

LESSON #9: FIDELITY OF IMPLEMENTATION OF INNOVATIVE CURRICULUM EFFORTS REQUIRES MONITORING

Our work suggests that in order for curriculum to be implemented well, it must be monitored to ensure that teachers are using strategies both frequently and effectively. Such monitoring is a significant part of a curriculum effectiveness research protocol, but also should be an ongoing part of ensuring that professional development results in improved student learning (Guskey, 2000). Whether such monitoring is done by the principal or his or her designee, the instructional coach, the leaders of a grade-level team, or a mentor is not what matters, as each school has its own system for instructional management. What does matter is that there is documentation for teachers using higher level thinking and problem solving in their classrooms in a way that enhances student engagement and achievement over time.

LESSON #10: INSTITUTIONALIZATION OF INNOVATIVE CURRICULUM AND INSTRUCTION REQUIRES ONGOING ATTENTION

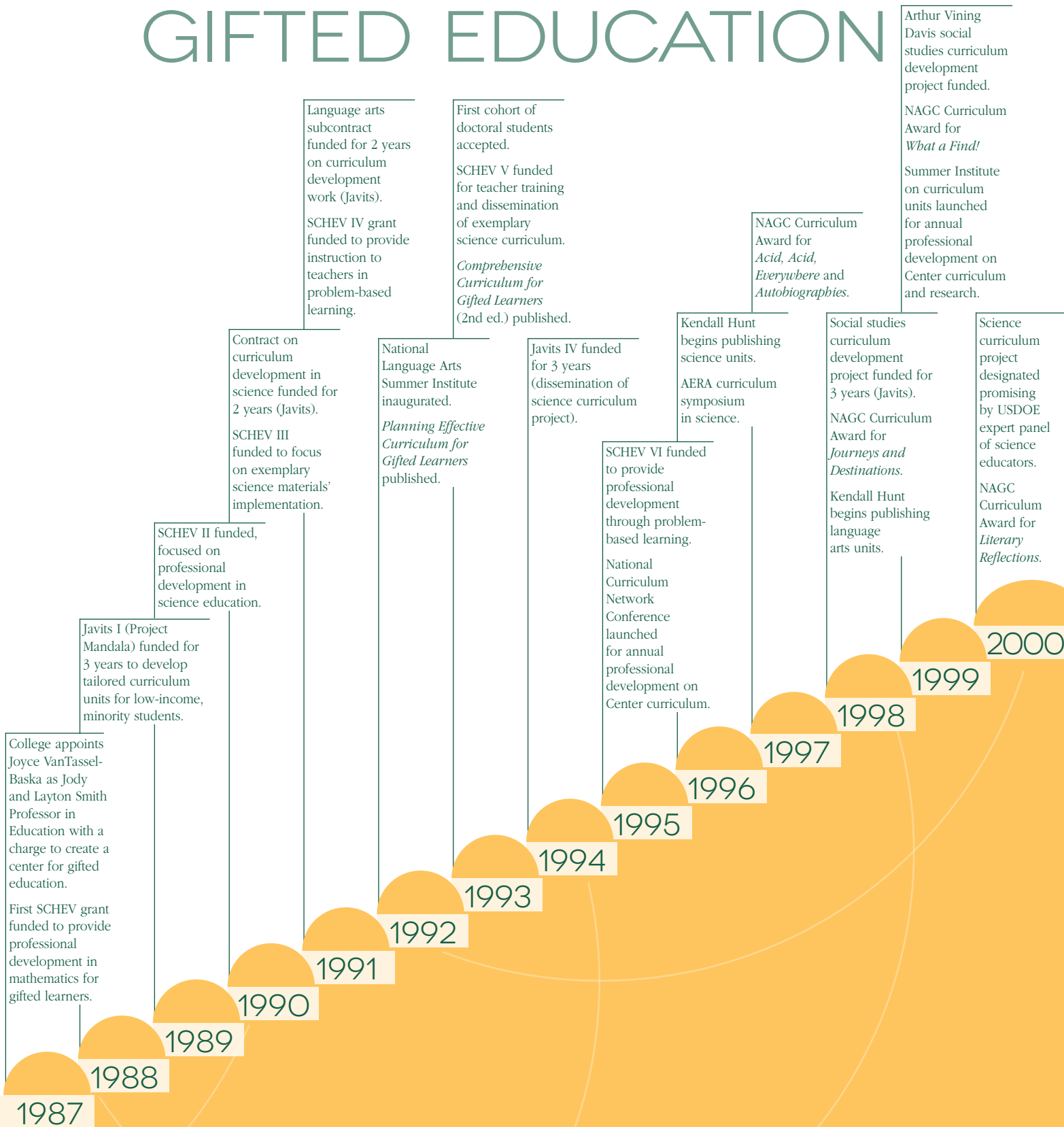
One of the critical issues in conducting curriculum intervention studies is the long-term sustainability of the innovation after the project is completed. There are several factors that are likely to encourage or discourage innovation and change. For example, we have learned that innovation is difficult to maintain after project funding subsides due to competing resources, competing priorities with the overarching school reform agenda, and a lack of monitoring and attention of administrators (Brown, 2007). Schools that have been able to sustain curriculum interventions, particularly for advanced students, have emphasized ongoing assessment and monitoring of high-end student achievement and instituted policies that require the use of research-based curriculum (VanTassel-Baska, Avery, Hughes, & Little, 2000). Schools also have recognized that results in student achievement and changes in teacher behaviors happen over time with guided and intensive professional development and monitoring (Borko, Mayfield, Marion, Flexer, & Cumbo, 1997; VanTassel-Baska et al., 2008).

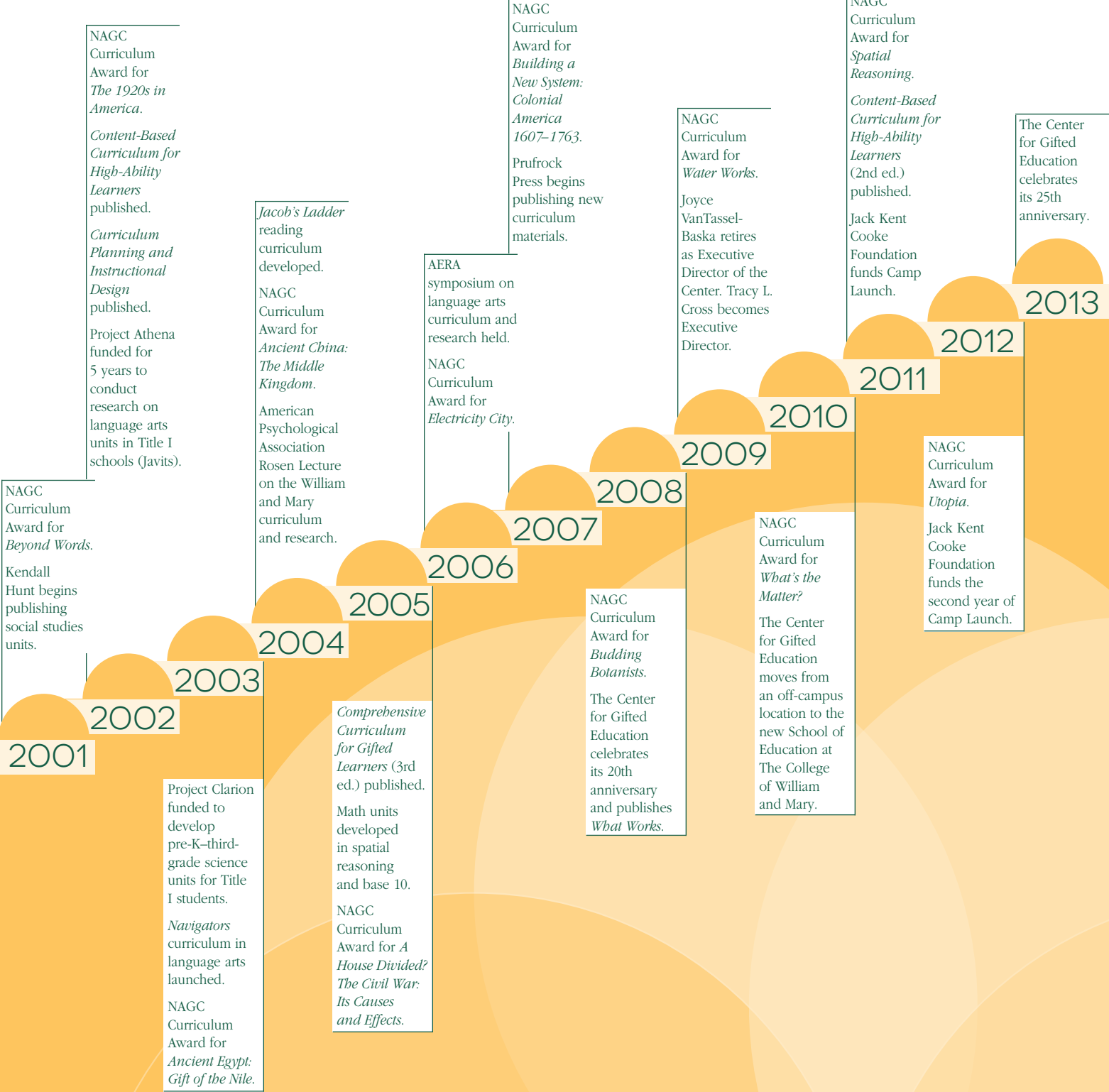
CONCLUSION

This publication has presented research findings about what works in curriculum designed for high-end learning and the tools and processes necessary for implementing such curriculum. Curriculum instruction, assessment, and professional development can make for a cohesive whole to ensure that schools become the true center of authentic learning for students, teachers, and parents. Optimal learning for all students includes a needed emphasis on our best learners, not just for their individual benefit but for the benefits to the total enterprise of schooling by using high-quality curriculum and instruction materials.

A 25-YEAR TIMELINE OF KEY EVENTS IN THE HISTORY OF THE

CENTER FOR GIFTED EDUCATION





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CENTER FOR GIFTED EDUCATION STAFF AND AFFILIATED FACULTY



TRACY L. CROSS, PH.D.

Dr. Cross holds an endowed chair, Jody and Layton Smith Professor of Psychology and Gifted Education, and is the Executive Director of the Center for Gifted Education at The College of William and Mary. Previously he served Ball State University as the George and Frances Ball Distinguished Professor of Psychology and Gifted Studies and as the founder and Executive Director of both the Center for Gifted Studies and Talent Development and the Institute for Research on the Psychology of Gifted Students. He has published more than 150 articles, book chapters, and columns; made more than 200 presentations at conferences; and has published six books. He has previously edited four journals in the field of gifted studies (*Gifted Child Quarterly*, *Roeper Review*, *Journal of Secondary Gifted Education*, *Research Briefs*) and is the current editor of the *Journal for the Education of the Gifted*. He received the Distinguished Scholar Award in 2011 from the National Association for Gifted Children (NAGC) and Distinguished Service Awards from The Association for the Gifted (TAG) and NAGC. He also received the Lifetime Achievement Award from the MENSA Education and Research Foundation. He begins his term as President of NAGC in September of 2013.



JOYCE VANTASSEL-BASKA, ED.D.

Dr. VanTassel-Baska is the Jody and Layton Smith Professor Emerita of Education and founding director of the Center for Gifted Education at The College of William and Mary in Virginia where she developed a graduate program and a research and development center in gifted education. She also initiated and directed the Center for Talent Development at Northwestern University. Prior to her work in higher education, Dr. VanTassel-Baska served as the state director of gifted programs for Illinois, as a regional director of a gifted service center in the Chicago area, as coordinator of gifted programs for the Toledo, OH, public school system, and as a teacher of gifted high school students in English and Latin. She has worked as a consultant on gifted education in all 50 states and in 30 countries. She is past-president of The Association for the Gifted of the Council for Exceptional Children, the Northwestern University Chapter of Phi Delta Kappa, and the National Association for Gifted Children. During her tenure as NAGC president, she oversaw the adoption of the new NCATE standards for gifted education, and organized and chaired the National Leadership Conference on Promising and Low-Income Learners. Dr. VanTassel-Baska has published widely, including 29 books and more than 575 refereed journal articles, book chapters, and scholarly reports. She has directed more than 60 funded grants and contracts, many of which have involved curriculum development for the gifted. Her major research interests are on the talent development process and effective curricular interventions with the gifted.

Bruce Bracken, Ph.D., obtained his bachelor of science degree from the College of Charleston and master's and doctoral degrees from the University of Georgia. He is currently a professor at The College of William and Mary. During his career, Bruce has published more than 200 articles, books, and related professional materials. Bruce has held elected offices and chaired committees for the American Psychological Association, the International Test Commission, and the National Association of School Psychologists. He is a Fellow of the APA in two divisions and a Charter Fellow of the American Educational Research Association. Bruce received a Senior Scientist award from the American Psychological Association in 2009 and received the 2012 career contribution Lifetime Achievement Award from his doctoral alma mater, the University of Georgia.

Kimberley L. Chandler, Ph.D., is the Curriculum Director at the Center for Gifted Education and a clinical assistant professor. Kimberley completed her Ph.D. in educational policy, planning, and leadership with an emphasis in gifted education administration at The College of William and Mary. Her professional background includes teaching gifted students in a variety of settings, serving as an administrator of a school district gifted program, and providing professional development training for teachers and administrators nationally and internationally. Currently, Kimberley is the Network Representative on the NAGC Board of Directors, Member-at-Large Representative for the AERA Research on Giftedness and Talent SIG, and newsletter editor of the CEC-TAG newsletter *The Update*. Her research interests include curriculum policy and implementation issues in gifted programs, the design and evaluation of professional development programs for teachers of the gifted, and the role of principals in gifted education.

Jennifer Riedl Cross, Ph.D., is the Director of Research at the Center for Gifted Education. With a doctorate in educational psychology, specializing in cognitive and social processes, Jennifer has served as the assistant or managing editor of several gifted education research journals, including *Gifted Child Quarterly*, *Roeper Review*, and *Journal for the Education of the Gifted*. She is also the coeditor, with Tracy L. Cross, of the *Handbook for Counselors Serving Students With Gifts and Talents*. In 2013, she served as guest editor, with James Borland, of a special issue of *Roeper Review* on the topic of gifted education and social inequality. Her research in the field emphasizes the social aspects of gifted education, from individuals coping with the stigma of giftedness to attitudes toward giftedness and gifted education.

Laura Ionescu is the Conferences and Special Events Coordinator at the Center for Gifted Education. She has a bachelor's degree in organization psychology from University of Bucharest, Romania and is currently an MBA student at The College of William and Mary.

Mihyeon Kim, Ed.D., is the Center for Gifted Education's Director of Pre-Collegiate Learner Programs. She received her Ed.D. in gifted education from the College of William and Mary. She is responsible for academic enrichment services to precollegiate students and services for international students. Prior to her educational positions, she was on the development team of library services for virtual universities and distance programs in Korea and worked for the Learning Systems Institute at Florida State University for a year. Dr. Kim also received a Ph.D. in library and information studies from Florida State University.

Jennifer H. Robins, Ph.D., is Director of Professional Development and Publications at the Center for Gifted Education and a clinical assistant professor. She received her doctorate in educational psychology with an emphasis in gifted education from Baylor University. Prior to receiving her doctorate, she taught elementary gifted and talented students in Waco, TX. For 9 years, she was senior editor at Prufrock Press Inc., focusing on the development of scholarly materials, including gifted education textbooks and professional development books, as well as classroom materials for teachers of gifted and advanced students. She currently serves as secretary on the board of The Association for the Gifted and is managing editor of the *Journal for the Education of the Gifted*. Her areas of interest include underrepresented populations and the history of gifted education.

Carol Tieso, Ph.D., associate professor of gifted education, currently teaches graduate courses in gifted education at The College of William and Mary. Dr. Tieso served as co-principal investigator on a USDOE-funded Javits demonstration grant, *Project Civis*. Prior to joining the faculty at The College of William and Mary, she served as program coordinator for gifted programs at the University of Alabama. She earned her Ph.D. in educational psychology with an emphasis in gifted and talented education at the University of Connecticut in June of 2000. Dr. Tieso recently served as a member of the NAGC Board of Directors. Her research interests include examining the impact of flexible grouping and curriculum differentiation models on students' achievement and investigating patterns of Dabrowski's overexcitabilities in gifted, talented, and creative students. Her teaching interests focus on meeting the socioemotional needs of talented students and improving the quality of curriculum and instruction for gifted students.

CONTRIBUTORS TO WILLIAM AND MARY CURRICULUM DEVELOPMENT

Content Consultants

Linda Neal Boyce Dana T. Johnson Dr. Jerre Johnson Dr. Colleen Kennedy	Dr. Kim Phillips Dr. Donna L. Poland Dr. Beverly T. Sher
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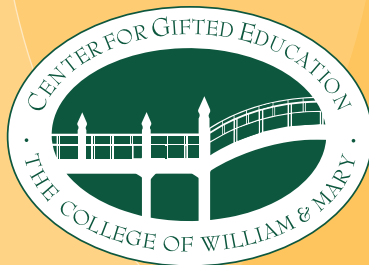
Unit and Materials Developers

Carrie Beth Adams Jeanette Adkins Ariel Baska Ruth E. Beeler Dawn Benson Dr. Elissa F. Brown Meghan Carey Carol Cawley Francis T. Cawley Dr. Kimberley L. Chandler Sandra Coleman Elizabeth O. Crawford Rebecca F. Crossett Dr. Joy L. Davis J. Denise Drain Judi Ellis Brandy L. Evans	Dr. Ellen Fithian Mandy Fordham Dr. Heather M. French Dr. Paula Kay Ginsburgh Deborah Green Dr. Valerie Gregory Dr. Suzanna E. Henshon Cindy Holub Peggy Jaquot Dana T. Johnson Emily Johnson Lisa M. Kaenzig R. Brigham Lampert Dr. Catherine A. Little Dr. Bronwyn MacFarlane Dr. Susan McGowan Connie Moody	Kathy Morrison Mary Pleiss Dr. Donna Poland Dr. Janice I. Robbins Dr. Valija C. Rose Gary Sandling Molly M. Sandling Dr. Beverly T. Sher Dr. Tamra Stambaugh Dr. Jeanne M. Struck Elizabeth B. Sutton Michael Clay Thompson Dr. Kimberly Tyler Dr. Joyce Van Tassel-Baska Barbara Weaver Dr. Bess B. Worley II Mary Ann Yedinak
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CENTER FOR GIFTED EDUCATION PROJECT STAFF AND RESEARCH ASSISTANTS

Dr. Linda D. Avery Dawn Benson Dr. Lori Bland Dr. Bruce A. Bracken Dr. Elissa F. Brown Dr. Kimberley L. Chandler Dr. Steve Coxon Dr. Victoria B. Damiani	Dr. Heather French Dr. Shelagh A. Gallagher Sharron G. Gatling Dr. Valerie Gregory Dr. Claire Hughes Dana T. Johnson Dr. Kyung Hee Kim Dr. Catherine A. Little	Dr. Susan McGowan Dr. Bronwyn MacFarlane Dr. Janice I. Robbins Dr. Tamra Stambaugh Elizabeth Sutton Dr. Joyce VanTassel-Baska Dr. Li Zuo
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P.O. Box 8795 • Williamsburg, VA 23187 • (757) 221-2362 • <http://cfge.wm.edu>
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