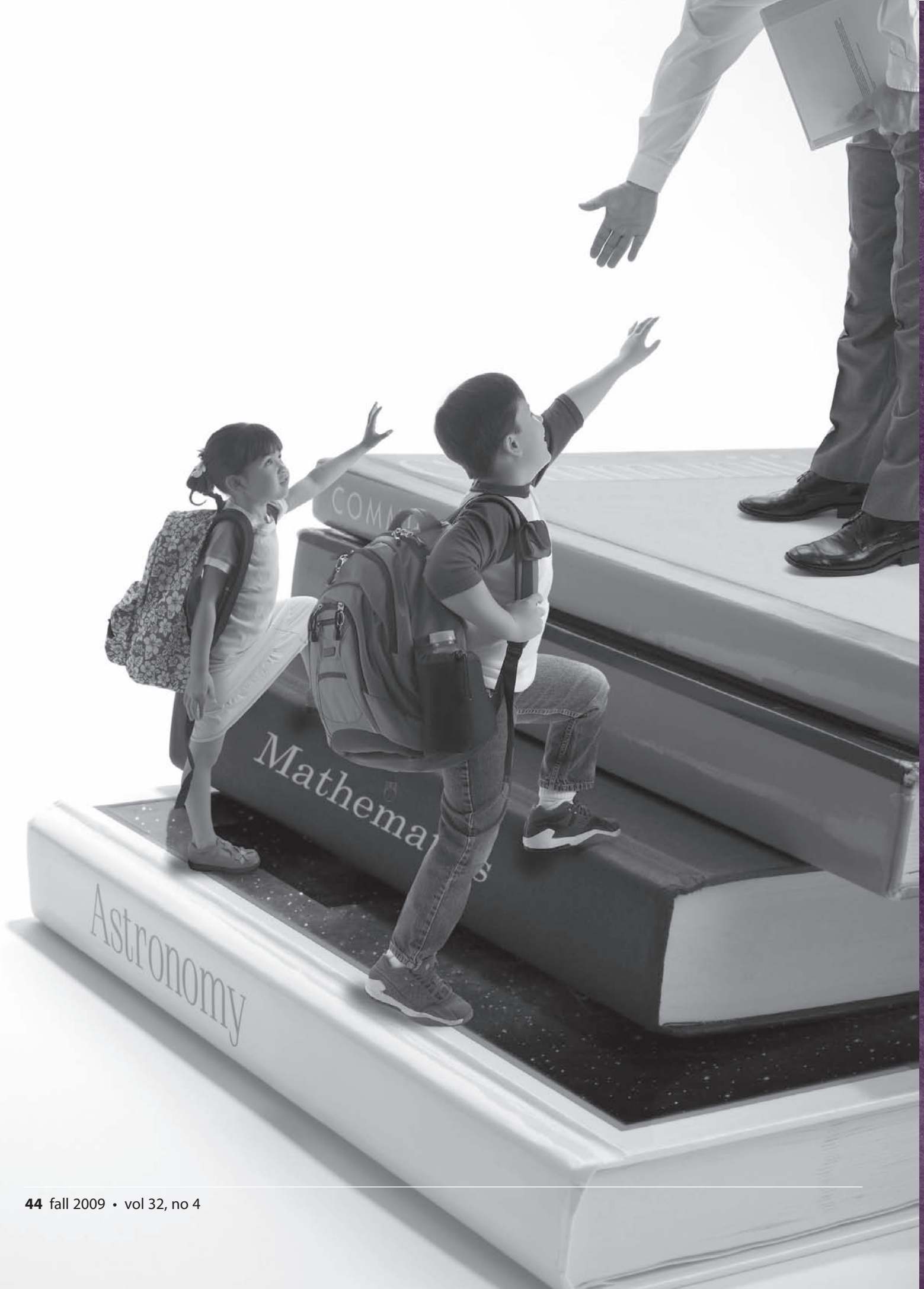

Astronomy

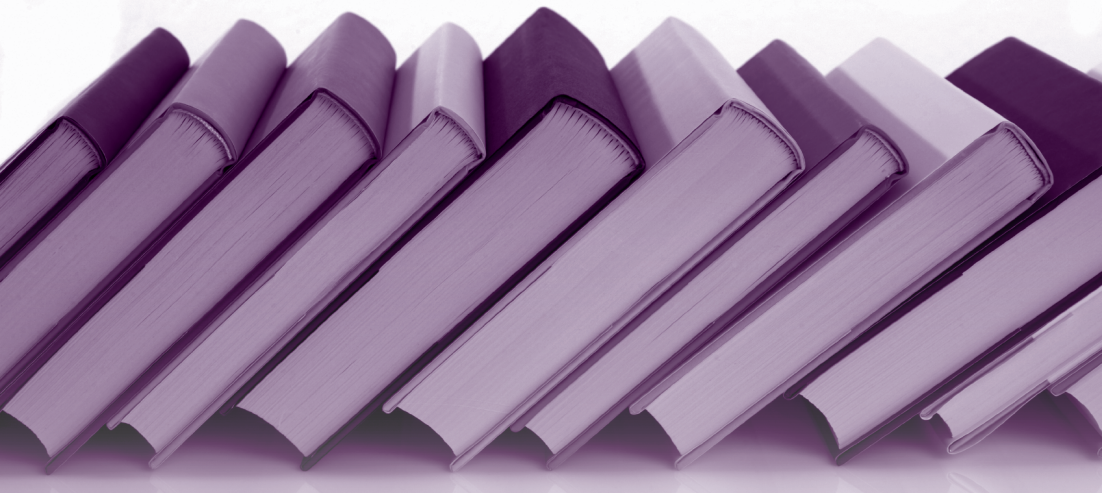
THE NONNEGOTIABLES OF ACADEMIC RIGOR

by Melissa N. Matusevich, Katherine A. O'Connor, and Mary "Valorie" P. Hargett

Academic rigor is not a new concept and has long been advocated as an important component of educational programs for gifted learners. More than 70 years ago, John Dewey (1938; Archambault, 1964) first called for education that included rigorous content, and in 1936 Leta Hollingworth created rigorous curriculum for gifted children in her New York City School (Klein, 2002). The conversation about rigor continues to the present day. Recently, Pfeiffer (2003) reported that increased academic-content rigor is one focus of current research in gifted education, so much so that Wagner (2006) referred to rigor as "the new reform de jour" (p. 28). Even students themselves recognize the need for academic rigor. According to a survey conducted by Peter D. Hart Research Associates in August of 2005, almost 90% of high school students stated that they would work harder if more was expected of them and less than 33% said their school set high academic expectations. The survey demonstrated that most students would favor ideas that "might add some hassle to their life, such as more rigorous graduation standards and additional high-stakes testing" (Associated Press, 2005, para. 2).

Cooper (1995) stated:

> The acid test for appropriate curriculum for bright students is "Could or would every student at this age commit to this type of study that is long-range, rigorous, filled with trial and error, and has the potential to contribute significantly to extant knowledge in a given field?" When the answer is "yes," the curriculum is unequivocally defensible; it meets all the criteria for creative production." (p. 69)



When they are challenged students learn to use the full range of their talents and intellectual abilities to address authentic and complex academic tasks in professional and real-life events.

Kaplan (2004) noted that if educators hold the belief that "gifted students need to have learning experiences that are academically rigorous" then we must provide a specific definition for "academic rigor" (p. 124). One way to do this, according to Kaplan, is by "developing criteria and rubrics to define academically rigorous curriculum for gifted students" (p. 125). Despite the fact that rigor is generally advocated for gifted learners, how it should be measured is not well defined. This lack of specificity in defining academic rigor often makes it difficult to determine if curriculum for gifted learners met their learning needs. With this need in mind and in response to the challenge of the North Carolina State Board of Education (NCSBoE) Mission Statement goal that every student be provided with rigorous and relevant core curriculum reflecting what students need to know and demonstrate in a global 21st-century environment, the Academically or Intellectually Gifted (AIG) Program at the North Carolina Department for Public Instruction (NCDPI) set out to create a rigor rubric. It was believed that such a rubric should be applied to educational programs and instruction to determine if an appropriate level of challenge is evident. As a result, a rigor rubric was developed. Following is a description of how the rubric was developed as well as how it has been utilized to analyze the appropriateness of curriculum and instruction for gifted learners.

Development of the Rigor Rubric

On May 5, 2005, the NCSBoE passed into law High Student Performance Bill F16 requiring that all students graduate from a rigorous academic program that equips them with the knowledge, skills, and dispositions necessary to succeed in both postsecondary education and 21st-century careers and to be participating, engaged citizens. The NCSBoE moved to establish a committee headed by Valorie Hargett, North Carolina State Consultant for Academically or Intellectually Gifted (AIG), that developed these policy recommendations about academic rigor:

- Academic rigor and relevance are based on established expectations that ensure that all students develop the capacity to master content that is complex and challenging.
- In every subject, at every grade level, instruction and learning must include commitment to a knowledge core and application of that knowledge core to solve complex and real-world problems.

Believing that gifted pedagogy could and should be used with all students, especially with the demands of the 21st century, the committee began by defining rigor. Academic rigor is an essential characteristic of effective curriculum, instruction, and assessment. When they are challenged students learn to use the full range of their talents and intellectual abilities to address authentic and complex academic tasks in professional and real-life events. All students should have the opportunity to participate in

qualitatively different academic environments that build upon their interests, strengths, and personal goals. These environments should engage them actively and consistently in sophisticated investigations of materials, texts, interactive technologies, and learning activities, requiring students to understand and apply advanced critical and creative processes. Rigorous academic environments represent true communities of learning, encouraging both students and teachers to be risk-takers engaged in experimental, investigative, and open-ended learning processes. Together, members of inquiry-based learning communities can utilize effectively their existing knowledge while striving to create new knowledge. In these rigorous learning environments, students accept greater responsibility for developing and applying a deep understanding of significant concepts, generalizations, essential questions, and skills and procedures to problem finding and problem solving for which there are no predetermined limits. An education reflecting these "nonnegotiables," will result in students becoming lifelong learners and thinkers, capable of independent reflection, self-evaluation, and reasoning.

Next, using the above criteria, the committee developed a rubric that can be applied to determine if a lesson or unit is, indeed, rigorous. The goal was to provide local educational agencies across North Carolina with a common language and road map that would help teachers and administrators view where they are on the rigor journey and to define the next steps they need to take as they develop and revise programs. Underpinning the rubric's development was the belief that gifted education must change and reflect the paradigm shift from identifying gifted students to identifying gifted behaviors in all students. In addition, the committee believed that teachers must design learning environments that focus on developing or "growing" these intelligent behaviors in all children if our country is to remain a leader in the 21st century.

The rubric committee focused on the main areas for which educators are held accountable—curriculum, instruction, and assessment. As shown in Figure 1, they defined four levels at which an educator may be functioning. The baseline—the rubric's Level One—focuses on what the rubric developers had witnessed and documented in more than 100 onsite, state-conducted, K–12 AIG program reviews over a 3-year span in public school districts across North Carolina and what they believed would be found in the majority of classrooms across the nation. The subsequent rubric levels are on a continuum from less to more rigorous. At Level Four, appropriate rigor is defined, a goal that educators should aspire to reach (see Figure 1).

To provide rigorous experiences for her students, a teacher should begin by focusing on curriculum, instruction, or assessment by analyzing her practice in one area using the rubric as her guide. Once the teacher has determined where she is functioning, she can increase rigor by moving to the next level on the rubric. As an example, if a teacher analyzes her practice in assessment as being at Level One, then moving to Level Two would naturally be the next step with the ultimate goal of reaching Level Four.

Under Hargett's leadership, the final rubric was disseminated for review and comment. Feedback from national and state curriculum experts both in gifted and regular education (see Appendix for a list of reviewers) was instrumental in revising the rubric. Additionally, the rubric was distributed throughout the state to those involved with gifted education, and resulting feedback was positive. When the process was concluded, the rigor rubric was adopted by the state AIG program for use in North Carolina. Six regional training sessions about the use and benefits of the rigor rubric were then conducted. As a result of these trainings, many school districts expanded the rubric's use. Gifted education specialists from Moore County, NC, twice presented their work about the rigor rubric at the Association for Supervision and Curriculum Development (ASCD) national conference. Another school district that chose to use the rigor rubric extensively was Wake County, the North Carolina school district with the largest population of identified gifted students. Wake County Public Schools has done extensive work supporting their teachers in designing rigorous curriculum for both regular and gifted classes using the rubric as a guide. The rubric also has been extremely helpful in the development of curriculum for the Bright IDEA (Interest Development Early Abilities) project, a $2.4 million Javits program funded to train K–2 teachers to develop rigorous concept-based curriculum for underserved populations. Finally, the rigor rubric became one of many tools used in the development of the North Carolina Honors Course Rubric (Hargett, 2007). Thus, the rigor rubric has impacted K–12 educational design for rigorous curriculum and classroom environments throughout North Carolina. As evidenced in the above examples, the rigor rubric has been and continues to be a highly successful and useful tool for educators to assess where they are on the rigor journey and to help them plan their next steps.

Application of the Rigor Rubric

Concurrent to the development of the rigor rubric, North Carolina's

	LEVEL FOUR	LEVEL THREE	LEVEL TWO	LEVEL ONE
CURRICULUM	Advanced, sophisticated curriculum consistently builds upon and extends beyond a standard course of study through universal concepts, complex levels of generalizations, and essential questions from multiple perspectives within the topic. Students consistently engage in multiple, complex, thought-provoking, and ambiguous texts/materials that challenge their thinking and feelings.	Curriculum occasionally attempts to build upon and to extend beyond a standard course of study through universal concepts, generalizations, and essential questions from a few perspectives within the topic. Students occasionally engage in multiple complex, thought-provoking, and ambiguous texts/materials that challenge their thinking and feelings.	Curriculum focuses on multiple discrete concepts and ideas with little if any articulated connection or overt relationship, particularly as they relate to the design and structure of a standard course of study rather than unifying concepts, generalizations, and essential questions. Students rely primarily on one or two textbooks that may or may not be provided by the instructor.	Curriculum develops around topic(s) and exploration occurs through activities. Student outcomes lack articulation. A superficial attempt exists to provide rigor through quantity rather than quality. An overreliance on the textbook as the predominant curriculum is evident. Readings superficially address the topic.
INSTRUCTION	Instructional delivery of the teacher employs a large canon of research-based advanced instructional strategies and methods within curricular models. Opportunities for understanding the "whys" through scholarly dialogue/discussions are regularly provided and students reflect daily on concepts, complex levels of generalizations, and essential questions encountered with rigorous texts. Teacher consistently probes students to deepen meaning and to provide rationale for positions explored.	Instructional delivery of the teacher uses multiple instructional strategies and methods within lessons and sometimes larger curricular models of study to understand complex and sophisticated materials/texts. Opportunities for understanding the "whys" through discussions are frequently provided and students frequently reflect on concepts, generalizations, and essential questions encountered with rigorous texts.	Instructional delivery of the teacher uses one or two instructional management strategies (learning and/or interest centers, learning styles, etc.) within lessons to understand complex and sophisticated materials/texts. Opportunities for understanding the "whys," the metacognition of such strategies, may or may not be addressed.	Instructional delivery of the teacher assumes students will independently construct meaning from sophisticated materials/texts through appropriate mental models (processes/graphic organizers). Teacher provides little, if any, support and is primarily engaged in delivering content and coverage.
ASSESSMENTS	Multiple types of assessment are used consistently to monitor students' growing understanding of increasing complexity of materials, ideas, issues, and problems encountered throughout the year. The teacher regularly provides for students' daily reflections on their understanding and growth within advanced curricular studies.	Assessments are ongoing, focused, and evident through the complexity of materials, ideas, issues, and problems encountered within curricular studies throughout the year. The teacher frequently provides for reflections on students' understanding and growth within curricular studies.	Assessments are focused and evident through some materials encountered throughout the year. The teacher sporadically provides for reflections on students' understanding and growth within curricular studies.	Assessments reflect a "one shoe fits all" approach with an emphasis upon end-of-unit tests comprised largely of short answer, multiple choice, true/false, and/or fill-in-the-blank responses at the conclusion of unit(s). Little or no opportunity exists for the learner to refine skill(s) or major ideas/concepts.

Figure 1. Rigor rubric, 2006. Reprinted with permission from the North Carolina Department of Public Instruction.

Department of Public Instruction altered a state policy for gifted education returning gifted licensure classes to institutions of higher education. Effective July 1, 2006, the North Carolina Licensure Section in the Human Resource Management Division no longer accepted field-based courses toward meeting requirements for AIG add-on licensure. In other words, local school districts were no longer able to offer their teachers courses in which they could earn credits toward licensure for teaching gifted students. For more consistency, all courses required for gifted licensure in North Carolina would be taught at 4-year institutions of higher

education. As a result, 12 hours of college credit became a requirement for earning a license to teach gifted learners. On August 23, 2005, all AIG Directors and Coordinators were notified of this change.

One institution of higher education, East Carolina University, quickly met this challenge. Through a blended approach of online and face-to-face instruction, East Carolina led the way in helping teachers obtain gifted licensure. In response to this new state policy, the Department of Curriculum and Instruction at East Carolina University created a four-course sequence available for students choosing to earn the AIG licensure as a strand in their Master of Arts in Education program in elementary education or by enrolling in the courses as non-degree-seeking students. All of the courses required for the AIG licensure program at East Carolina University are taught online, with the exception of two face-to-face weeks during which teachers are involved in a summer camp working directly with gifted elementary and middle school children. Faculty members Matusevich and O'Connor, who planned the program, quickly realized that an important component of the courses should be the application of the recently developed rigor rubric. As they planned the four courses as seen in Figure 2, they determined that the rubric should be introduced and applied in the second course when students analyze gifted units for academic rigor and then used again in the third course when students create and analyze their own rigorous instructional units.

To effectively utilize the rubric in graduate coursework, Matusevich and O'Connor created questions based on the rubric (see Figure 3). Graduate students use these questions as a tool for analyzing the rigor of a lesson or unit. The first application of the

Course 1
SPED 6104: Introduction to Gifted Education (online with 1 week face-to-face): An introduction to the education of gifted students emphasizing definitions, characteristics, theories of intelligence, and methods of identification.

Course 2
SPED 6401: Methods & Materials in Gifted Education (online): An in-depth investigation of the materials, programs, and theories of educating the gifted.

Course 3
SPED 6402: Differentiated Curriculum for the Gifted (online): An in-depth study of student and program assessment and the development of differentiated curricula for gifted students.

Course 4
SPED 6403: Practicum in Gifted Education (online with 1 week face-to-face): Actual classroom experience with gifted children. Students will be responsible for planning and implementing instructional programs.

Figure 2. Sequence of courses for gifted education licensure at East Carolina University.

Questions Derived From the Rigor Rubric

1. In what ways does this lesson or unit have qualitatively different academic environments?
2. In what ways does this lesson or unit focus on more in-depth, complex concepts and ideas?
3. In what ways does this lesson or unit build upon students' interests, strengths, and personal goals?
4. In what ways does this lesson or unit engage students consistently in sophisticated investigations?
5. In what ways does this lesson or unit employ advanced critical processes? (Critical processes include finding, inventing and sharing solutions to real-world problems as well as identifying problems [problem finding], determining accuracy, analyzing alternate solutions, making decisions, etc.)
6. In what ways does this lesson or unit employ advanced creative processes? (Creative processes include purposeful analysis, imaginative idea generation, and critical evaluation.)
7. In what ways does this lesson or unit employ investigative and open-ended learning processes? (These include exploration, experimentation, etc.)
8. In what ways does this lesson or unit encourage students to be risk takers?
9. In what ways does this lesson or unit utilize existing knowledge and require students to create new knowledge?
10. In what ways does this lesson or unit utilize and apply significant concepts and essential questions to problem finding and problem solving?
11. In what ways does this lesson or unit set no predetermined limits?
12. In what ways does this lesson or unit foster lifelong learning?
13. In what ways does this lesson or unit foster thinkers capable of independent reflection?
14. In what ways does this lesson or unit foster student self-evaluation?

Figure 3. Questions derived from the rigor rubric.

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Definition	Examples
Teachers prepare and provide students with multiple opportunities to do the following:	
Has qualitatively different academic environments (more in-depth, complex, and abstract concepts and ideas).	(a) To identify, develop and nurture the growth and understanding of Habits of Mind (behaviors and dispositions) through curriculum, instruction, and assessment that prepare students to live in a complex society where solutions are not immediately available (e.g., today's economic recession). (b) To extend and enrich through a conceptual lens standard courses of study by "unpacking" the cognitive levels of the standards using the Revised Bloom's Taxonomy (RBT).
Builds upon interests, strengths, and personal goals.	(a) To examine beliefs about the importance of different types of knowledge, beliefs about the efficacy of these types of knowledge, and the emotions associated with learning these types of knowledge from *The New Taxonomy of Educational Objectives* by Robert Marzano. (b) To provide opportunities for students to express why certain interests are important and to support students in checking their logic in reasoning. (c) To provide opportunities for students to explore their emotional response to topics, ideas, concepts, and/or procedures. (d) To provide opportunities for students to explore their interests in new materials, ideas, concepts, and/or procedures, thus motivating them to engage in the learning process.
Engages consistently in sophisticated investigations of materials, texts, interactive technologies, and learning activities.	(a) To create a meaningful and purposeful balance between informational texts and literature through interactive technologies and learning tasks. (b) To create fluid "work teams" engaging learners in meaningfully and purposefully designed work tasks that replicate the 21st-century workplace. (c) To develop strong interdisciplinary courses/units of study to reflect 21st-century thinking that is more robust and complex than 20th-century modes of distributing and receiving information.
Employs advanced and critical and creative processes.	(a) To create and evaluate learning tasks that challenge students to demonstrate fluency, elaboration, flexibility, and originality in their thinking. (b) To identify specific, nonnegotiable lifelong thinking skills and processes so that all students demonstrate mastery through high level cognitive learning tasks (e.g., strategic planning, creating new products, decision making, resolving discrepancies, clarifying ambiguities, conducting research to test theories and hypotheses, and ameliorating polarities).
Constructs investigative and open-ended learning processes.	(a) To develop differentiated learning tasks providing multiple points of entry for all students to explore new investigations, experience more sophisticated levels of knowledge, and create new essential questions based on the outcomes of the selected investigations (e.g., *Six Facets of Understanding* by Grant Wiggins and Jay McTighe). (b) To create opportunities for students to explore how knowledge is effectively used to make decisions, solve problems, generate and test hypotheses, and investigate using appropriate criteria for justification of potential outcomes.
Embraces teachers and students as risk-takers.	(a) To create classroom environments that celebrate responsible risk-taking where students experience both successes and failures and view this as a normal part of learning and building for future successes. (b) To model teacher and student thinking in order for all participants involved to understand how they and others approach similar problems from different perspectives (e.g., thinking maps, graphic organizers, journals, and presentations). (c) To identify, develop, and assess social skills for working in collaborative "work" teams.
Utilizes effectively existing knowledge and creates new knowledge.	(a) To provide individual and group opportunities for students to share existing knowledge on a topic that supports them in transferring the knowledge to unique and novel situations, thus creating new knowledge (e.g., thinking maps, graphic organizers, journals and presentations). (b) To identify, nurture, improve, and assess specific dispositions and behaviors that support students in exploring while remaining open to continuous learning in order to create new knowledge (e.g., risk-taking, persisting, managing impulsivity, thinking flexibly, questioning and posing problems).

Definition	Examples
Develops and applies deep understanding of significant concepts, generalizations, and essential questions to problem finding and problem solving.	(a) To "unpack" the standard courses of study and select content to identify major concepts, principles, theories, issues, perspectives, assumptions, and paradoxes that will be utilized in developing learning tasks through a conceptual lens. (b) To provide opportunities for students to move from a knowledge perspective ("covering" the materials) to a conceptual perspective ("uncovering" of ideas, concepts, and generalizations) and to understand the synergy between these two different types of knowledge.
Sets no predetermined limits.	(a) To create classroom environments seeking to engage students in complex and high levels of generative thinking that create 21st-century lifelong learners and self-reflective thinkers. (b) To construct opportunities for students to specify personal and professional goals and for monitoring these goals for process, clarity, and accuracy.
Creates lifelong learners and thinkers capable of independent reflection, self-evaluation, and reasoning.	(a) To develop two-dimensional rubrics for assessing the growth and improvement in designated Habits of Mind. (b) To provide opportunities through curriculum, instruction, and assessment for students to habituate and deepen their understanding on the importance of the 16 Habits of Mind (Art Costa and Bena Kallick). (c) To provide support for students through teacher modeling in developing a willingness and openness in receiving feedback in order to become a lifelong learner.

Figure 4. Concrete examples for questions derived from the river rubric.

rubric entails students creating a rigorous lesson based on the tenants of *Understanding by Design* (Wiggins & McTighe, 1998). After completing the lesson, students critically evaluate it by answering the questions in Figure 3. Students then revise lessons as needed in order to ensure appropriate rigor. In the next step, students apply the rigor questions to units of study based on three models of gifted education: Carol Ann Tomlinson's Parallel Curriculum Model (Tomlinson et al., 2002), Joyce VanTassel-Baska's Integrated Curriculum Model (VanTassel-Baska, 2003), and Renzulli's Schoolwide Enrichment Model (Renzulli & Reis, 1985). The professors provide exemplar units for each of the three gifted education models, and using the questions, students analyze the units for academic rigor.

In the subsequent course, students create an academically rigorous unit that they teach to gifted students during the summer practicum experience in the fourth course. The students again apply the rubric questions to their own work. They make revisions to their units as needed to ensure that appropriate levels of rigor are provided when they teach them. Postcamp survey results indicate that more than 95% of the parents (n = 136) believe that the goal of providing rigorous curriculum has been achieved.

Despite positive results, the graduate students report that they sometimes are unclear as to how to interpret the questions in Figure 3 when they are asked to apply them. Because of this, the authors have provided concrete examples for the questions derived from the rigor rubric as shown in Figure 4. The examples are not content specific; teachers in any content area can readily apply the rigor rubric to the lessons and units they create and teach.

Discussion and Future Directions

As research clearly demonstrates, academic rigor is important in today's educational landscape (e.g. Kaplan, 2004; Pfeiffer, 2003; VanTassel-Baska, 2003; Wagner, 2006). Kaplan (2004) endorsed the need for the development of a rubric to determine academic rigor that can be widely implemented. North Carolina recognized and met this need by developing a rubric for academic rigor that can be applied in the areas of curriculum, instruction, and assessment. In gifted education courses at East Carolina University, the rigor rubric has been successfully utilized and has proved to be an effective tool for determining whether student-created curriculum, instruction, and assessment are appropriately rigorous. The practical application of the rubric in the context of graduate classes in gifted education as applied to instructional units taught during an annual gifted camp has resulted in positive feedback from campers' parents. Continued use of the rubric at East Carolina University will be ongoing. Based on the experiences described here, learners would benefit from educators' wider use of the rubric. University professors can introduce the rubric and have their students use it to evaluate instructional materials they are

creating. Practicing teachers can utilize the rubric to ensure that their lessons and units are appropriately rigorous. They can begin by assessing instructional materials and work to move along the rubric continuum from Level One to Level Four. Administrators also play an important role; they can provide professional development opportunities so teachers can learn how to effectively use the rubric. An ongoing and systemic process with careful monitoring of the rubric's use is warranted. Finally, further research into the use of the rubric and application outcomes are recommended. GCT

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Appendix
Rigor Rubric Reviewers: State or National Curriculum Experts

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