NGA/ACT Pilot Project: Increasing Course Rigor

Final Report

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ACT is an independent, not-for-profit organization that provides assessment, research, information, and program management services in the broad areas of education and workforce development. Each year we serve millions of people in high schools, colleges, professional associations, businesses, and government agencies, nationally and internationally. Though designed to meet a wide array of needs, all ACT programs and services have one guiding purpose—helping people achieve education and workplace success.

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Introduction and Overview

The Increasing Course Rigor Pilot Project, a joint initiative of the National Governors Association (NGA) Center for Best Practices and ACT, Inc., is one component of Phase Two of the NGA Center for Best Practices Honor States Grant Program. The project, which began in winter 2006 and concluded in summer 2007, was designed to improve the quality of learning experiences in core preparatory high school courses. The project was also a natural extension of ACT's efforts to improve the quality and consistency of high school coursework. In particular, it is a response to empirical evidence demonstrated in the 2004 study *On Course for Success: A Close Look at Selected High School Courses That Prepare All Students for College* (ACT and The Education Trust) indicating the need for increased rigor and relevance in core preparatory courses.

Educators and policy makers from three states (Mississippi, Oklahoma, and Pennsylvania) formed a unique partnership with ACT's test developers, curriculum writers, and professional development specialists to accomplish a twofold goal:

1. To investigate ACT's approach to increasing rigor in English 10, Geometry, and Biology courses
2. To identify the critical policy considerations that support increased course rigor

The Michael and Susan Dell Foundation, The GE Foundation, State Farm Insurance, and ACT, Inc. provided support for this initiative.

This report describes the results of the 17-month pilot. Both qualitative and quantitative findings are presented, along with implications for policy and practice. The report concludes with a discussion of lessons learned and recommendations for next steps.

"Before having the opportunity to use some of the tools and techniques found in the ACT materials ... we looked at the abilities of our students as 'limited' ... we would give up more easily and accept mediocrity, which seemed to be all the students would give."

"Using the lessons and techniques as well as sharing ideas with the other schools in the pilot program proved beneficial."

"We feel that we can set the bar higher and challenge students to do more than the bare minimum. The materials have provided us with many new ways to engage students."

Comments from Pennsylvania English teachers

Project Goal, Deliverables, and Indicators of Success

The NGA Center for Best Practices and ACT, Inc. developed the Increasing Course Rigor Pilot Project to achieve a specific goal and to yield four deliverables. Corresponding indicators of success provide a way to measure the project's effectiveness.

Project Goal

To develop statewide strategies for increasing the rigor of core courses in high school that prepare all students for college and workforce training

Deliverables

1. A professional development support system that is responsive to teacher needs
2. Benchmark and End-of-Course Assessments to monitor student progress and course achievement
3. A data-feedback model to guide intervention and assist in instructional decision making
4. State policies to increase the rigor of core courses in high school

Indicators of Success

1. Increased student readiness for college
2. Increased student knowledge in core-course subject matter
3. Increased teacher appreciation of course rigor and professional development support and increased monitoring of student progress and use of data-driven instructional interventions
4. Improved course alignment to rigorous course objectives
5. Improved consistency in course quality across classrooms within schools and districts
6. Improved collaboration among teachers and school leaders to improve course quality
7. Active state-level consideration of policies to increase the rigor of core courses in high school

The project directly supported the NGA Center for Best Practices' Action Agenda, which includes the following goals:

1. Making all students prepared and proficient
2. Redesigning the American high school
3. Ensuring that high schools have excellent teachers and principals
4. Holding high schools and colleges accountable for student success
5. Streamlining/improving education governance

Project Participants

Through a competitive application process, the NGA Center for Best Practices awarded Increasing Course Rigor Pilot Project funds to three states: Mississippi, Oklahoma, and Pennsylvania. Each state appointed a fiscal agent to handle funds and a state leadership team of policy makers and practitioners to provide advice and oversight. **Appendix A** presents the names and affiliations of state team members and state fiscal agents.

The pilot project was implemented in eighteen high schools: eight in Mississippi, four in Oklahoma, and six in Pennsylvania. **Appendix B** displays student population characteristics for each school. The school names have been removed for confidentiality purposes.

Ninety-eight English 10, Geometry, and Biology I teachers participated in the project, along with twenty district and building administrators. All ninety-eight teachers participated in at least one component of the pilot project. This included attending any of the professional development activities, administering the Benchmark and/or End-of Course Assessments, or completing one of the three project survey tools. **Table 1.1** shows a tally of the teachers by state and subject. **Appendix C** provides a more detailed listing of the participation level by building.

Some teachers were more fully engaged in the project than others. **Table 1.2** provides the breakdown of these sixty-three teachers, considered **full participants** for the purposes of this report. The full-participant teachers (and their students) were isolated for most of the report's data analysis and observational judgments. Full participant teachers completed the *Course*

Table 1.1: All Project Teachers

State	Subject	Teachers
Mississippi	Biology I	17
	English 10	20
	Geometry	18
	Total	55
Oklahoma	Biology I	3
	English 10	7
	Geometry	11
	Total	21
Pennsylvania	Biology I	6
	English 10	7
	Geometry	9
	Total	22
All Project Teachers		**98**

Table 1.2: Full-Participant Teachers

State	Subject	Teachers
Mississippi	Biology I	9
	English 10	9
	Geometry	9
	Total	27
Oklahoma	Biology I	3
	English 10	6
	Geometry	9
	Total	18
Pennsylvania	Biology I	5
	English 10	6
	Geometry	7
	Total	18
Full Participant Teachers		**63**

Analysis for Rigor and Success (CARS) survey in both 2006 and 2007 and also attended at least one of the three major professional development workshops (Summer Institute, fall workshop, spring workshop). The *CARS* results provide both pre- and post-project curriculum alignment data for each teacher. The three major workshops offered vital opportunities to engage the research-based innovations in assessment and instructional methodology that ACT developed for the pilot project. The nature of the *CARS* survey and major workshops made them the logical criteria for narrowing the number of teachers.

Professional Development Activities

The Increasing Course Rigor Pilot Project included an array of activities, all designed to support participants as they worked to meet the stated goal. A time line of project activities appears in **Appendix D**. Participation in some of these activities was often limited due to the need for teacher time off and district scheduling conflicts. Seventy-eight teachers were able to attend at least one of the major workshops. The twenty who did not attend were often involved in the Distance Conferences or On-Site Collaboration meetings.

Orientation Sessions

Formal project activities began in Washington, D.C. on February 14, 2006, when NGA and ACT project staff oriented team leaders from the three participating states. During March and April 2006, staff from the two agencies conducted seven in-state meetings to share information about the project with participating teachers and building administrators.

Summer Institute

The 2006 Summer Institute was the initial professional development experience for project participants. In late July, 114 educators (teachers, administrators, and state officials) gathered in St. Louis, Missouri, to address the essential questions associated with developing and implementing rigorous coursework. **Table 2.1** shows the attendance numbers for this initial event. At the Summer Institute, participants examined the consistency between their current course objectives and ACT's rigorous course objectives. They developed action plans to address existing gaps and learned how to effectively use ACT's research-based teaching

Table 2.1: Summer Institute Participation

State	Biology I Teachers	English 10 Teachers	Geometry Teachers	Administrators and Resource Personnel	State Officials
Mississippi	9	10	10	13	2
Oklahoma	4	7	11	15	4
Pennsylvania	6	7	11	5	0
Total Participants	**19**	**24**	**32**	**33**	**6**

tools, which were the basis for the data-feedback model ACT presented. **Appendix E** shows a graphic representation of ACT's data-feedback model.

Fall Workshops

During October and November 2006, ACT staff and consultants conducted a two-day professional development workshop in each state. Facilitators led a total of sixty-four teachers through focused discussions on four topics related to increased course rigor. **Table 2.2** shows the teacher attendance for the fall workshops, which covered topics such as scoring constructed-response items, using ACT's *Template to Examine Assignments for Rigor and Relevance*, and reviewing research-based strategies. The sessions also featured a demonstration of how to use the project's discussions forum. Participants appreciated the issues explored, the handouts provided, the hands-on activities, and the presenters' expertise. Session participants responded positively to opportunities for collaboration with colleagues: they enjoyed having a chance to interact, to share their thoughts, and to talk about problems that might arise in their classrooms.

Spring Workshops

ACT conducted a second round of two-day workshops in February and March 2007. The agenda for these sessions allowed for more in-depth discussion of student assignments, teaching strategies, and constructed-response items. Seventy-two teachers attended these workshops, as detailed in **Table 2.3**. The spring topics included learning to use the results of constructed-response items, understanding the components of rigorous assignments, and exploring research-based strategies.

Table 2.2: Fall Workshop Participation

State	Subject	Teachers
Mississippi	Biology I	9
	English 10	9
	Geometry	9
	Total	27
Oklahoma	Biology I	2
	English 10	7
	Geometry	11
	Total	20
Pennsylvania	Biology I	6
	English 10	6
	Geometry	5
	Total	17
Fall Workshop Teachers		**64**

Table 2.3: Spring Workshop Participation

State	Subject	Teachers
Mississippi	Biology I	10
	English 10	10
	Geometry	12
	Total	32
Oklahoma	Biology I	3
	English 10	7
	Geometry	11
	Total	21
Pennsylvania	Biology I	6
	English 10	6
	Geometry	7
	Total	19
Spring Workshop Teachers		**72**

Distance Conferences

ACT conducted three rounds of distance conferences designed to support teachers' implementation of the project. Each teleconference brought together all teachers of a given subject in the same state, along with administrators, state officials, and ACT staff. **Table 2.4** shows the teacher participation for each state. In fall 2006, seventy teachers participated in a teleconference focused on their successes and challenges in using ACT's Instructional Units and Benchmark Assessments. The second round of teleconferences, which involved fifty teachers, occurred in early December 2006 and spotlighted teacher use of formative assessment data to inform instruction. In February 2007, the third set of teleconferences consisted of open discussions with ACT's Master Teachers. Only thirty-eight teachers were able to take part in this teleconference. See **Appendix F** for a more detailed summary of the Distance Conferences.

Table 2.4: Distance Conference Participation

State	Distance Conference 1	Distance Conference 2	Distance Conference 3
Mississippi	33	20	11
Oklahoma	21	17	15
Pennsylvania	16	13	12
Total Teachers	**70**	**50**	**38**

An additional collaborative mechanism was available to teachers through seven monthly On-Site Collaboration meetings held at the schools and supported by ACT. A lead teacher or building administrator convened these meetings, which had a dual purpose: to facilitate teamwork that would result in increased course rigor and to begin creating a structure within buildings and districts to sustain these efforts beyond the life of the project. ACT and the NGA intended these conversations to promote refinement of practice as well as to provide support for implementation. **Appendix F** contains a detailed summary of these collaborative meetings with emphasis on the common appraisals (both positive and negative) shared across schools and subjects.

Participants also had access to a discussions forum located on the project website (see **Appendix G**). This communication tool was used throughout the project as a means for teachers to share their experiences and to address questions and concerns to ACT staff and consulting Master Teachers.

Course Alignment and Teacher Practices

At the beginning of the project, participating teachers completed three web-based questionnaires. The *Course Analysis for Rigor and Success* (*CARS*) survey identified gaps in curriculum alignment between each teacher's courses and ACT's objectives. The other two instruments yielded information about teaching practices and course structures. **Table 3** provides a brief description of the surveys, and **Appendix H** presents the teacher completion rates for each instrument. Teachers responded to two of these instruments, the *CARS* and the *Course Information Questionnaire*, at both the beginning and end of the project. The second *CARS* surveys enabled ACT to measure the changes in teacher alignment to rigorous objectives resulting from their experience in the Increasing Course Rigor Pilot Project, whereas the post-project *Course Information Questionnaire* shed light on changes in teaching practices.

Table 3: Web-Based Surveys

Survey	Completion	Description
Course Analysis for Rigor and Success (*CARS*)	• Spring or Fall 2006 • Spring 2007	Determined teacher alignment to ACT's rigorous course objectives
Teacher Background Questionnaire	• Spring or Fall 2006	Gathered information on teacher experience and practices
Course Information Questionnaire	• Spring or Fall 2006 • Spring 2007	Collected information on the students in each selected course and on the teacher's instructional and assessment methods

Course Analysis for Rigor and Success

The *CARS* survey was designed to obtain data on objectives ACT developed as a result of the 2004 study, *On Course for Success*. The survey instructed a teacher to indicate, for each ACT course objective listed, whether or not the objective was included in the teacher's course. "Included" meant the objective was taught and, by the end of the course, students were expected to demonstrate proficiency. "Not included" meant the objective was not taught in the course, was taught in a subsequent course, or was already mastered.

The surveys administered in spring and fall 2006 provided the foundation for evaluating the curriculum and methodology of each teacher. The early surveys helped frame the structure and goals of the project's professional development activities, beginning with the Summer Institute in St. Louis. The spring 2007 surveys informed ACT's analysis of changes in teacher classroom practices and curriculum objectives based on participation in the pilot project.

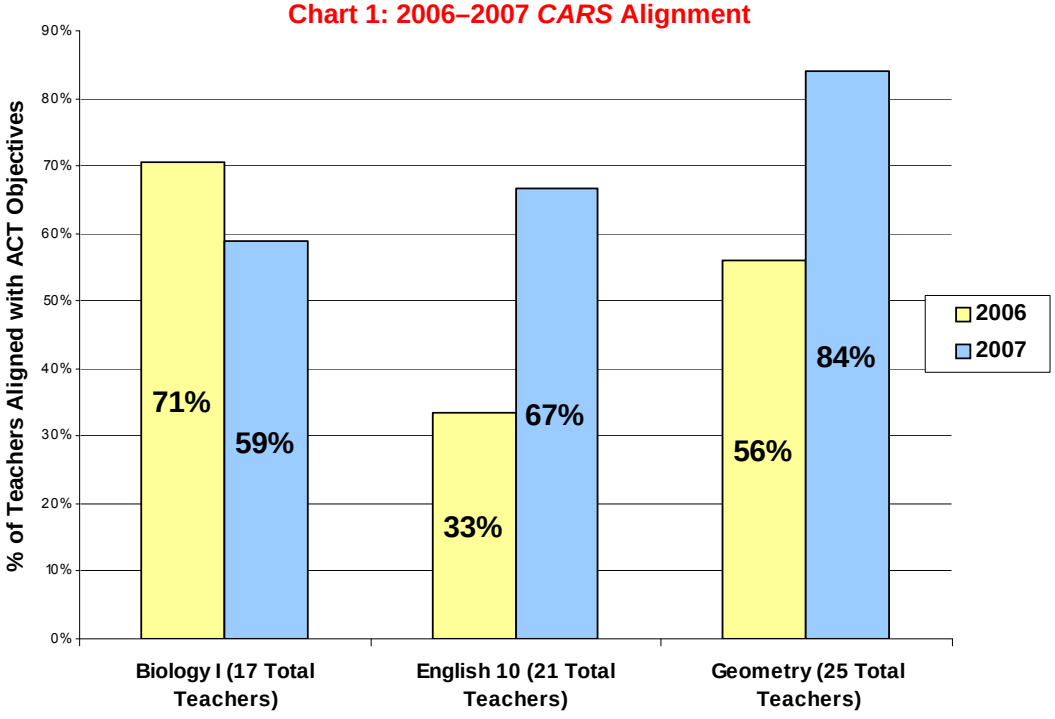
Table 4 presents the change in pre– and post-*CARS* results for all teachers completing both surveys. The percentages reflects the average change in alignment to ACT objectives from Fall to Spring. A more detailed analysis of teachers who demonstrated the greatest increase in alignment is included later in this report.

Table 4: Percentage Change in Teacher-Reported Alignment (Fall 06 to Spring 07)

State	Biology	English 10	Geometry
Mississippi	2%	9%	5%
Oklahoma	2%	14%	-3%
Pennsylvania	2%	10%	4%

For each of the *CARS* surveys, a minimum rate of 75% was used to determine whether a teacher (or group of teachers) was sufficiently aligned to ACT objectives. This metric reflects two aspects of alignment: the degree to which a teacher (or group of teachers) includes ACT objectives in a course and the degree of consistency—relative to course objectives addressed—within a group of teachers at the same building. To meet the 75% criterion, 73 out of 97 Biology I objectives must be taught, 68 out of 90 English 10 objectives, and 52 out of 69 Geometry objectives. **Chart 1** shows the comparison between Fall and Spring alignment to ACT's objectives for each of the three subjects. For more specific building level data, see **Appendix I**. The alignment results contained in both the chart and appendix reflect the number of teachers in each course who reported "inclusion" of at least 75% of the ACT objectives.

Chart 1: 2006–2007 *CARS* Alignment



Seventeen Biology teachers completed both *CARS* surveys, along with twenty-one English 10 teachers, and twenty-five Geometry teachers. As the chart indicates, alignment to English 10 and Geometry objectives increased in spring 2007, while fewer Biology teachers aligned with 75% of the ACT objectives than at the beginning of the project. After a year of working with the ACT material, it was likely that some of the Biology teachers realized their understanding of the rigorous objectives at the beginning of the project had been incomplete.

Instruction and Assessment Tools

ACT Instructional Units

Throughout the school year, teachers used material from ACT's Instructional Units in their classrooms and provided feedback. See **Appendix J** for a complete list of the units released to teachers. These units were developed around high-level, college-oriented course objectives and emphasize flexible pedagogical styles. Six units were released for each of the three courses, with the last set posted to the secure website in March 2007. ACT encouraged the teachers to draw from these model units whenever possible, combining them with their own curriculum or using them as complete units. The Instructional Units provided a framework for the activities at the Summer Institute and the fall and spring workshops, giving teachers the opportunity to model the methods and classroom activities as a group.

Each Instructional Unit was designed to culminate in a Benchmark Assessment. Early in the project, teachers were given concordances that matched the objectives of each unit with the appropriate Benchmark Assessment. They were asked to administer the assessment after completing each unit and to use the resultant data when evaluating the effectiveness of the unit methods and activities.

End-of-Course and Benchmark Assessments

Two major components of the Increasing Course Rigor Pilot Project were its complementary testing tools. The summative (End-of-Course) and formative (Benchmark) assessments were designed to align with the content objectives of the three subject areas. The production of these assessments followed the same research-based development methods ACT uses for all of its testing materials.

The purpose of ACT's End-of-Course program is to ensure that outcomes of core academic courses are aligned with college- and workforce-readiness standards. To that end, ACT conducted several research studies and surveys (e.g., *On Course for Success)* to determine the appropriate teaching objectives for individual high school courses, including English 10, Biology I, and Geometry. These course objectives were developed with input from curriculum specialists, educators, and assessment specialists. Once the course objectives were finalized, ACT test development staff contracted with professional educators (secondary and post-secondary teachers) for the development of test items. These items underwent multiple

content and editorial reviews by ACT staff. In spring 2006, items were field-tested in multiple forms. The resulting data were analyzed, and items were revised and edited as necessary. Operational test forms were then created from the pool of field-tested items. Those forms were reviewed internally by ACT staff and externally by national content and fairness review panels before being administered to participating project schools.

The End-of-Course Assessments were administered from May–June 2007. Ninety-one teachers were sent End-of-Course materials to test their students. Of the estimated 6,700 potential test-takers, approximately 4,200 (63%) took the End-of-Course Assessment, with the highest rate, 69%, in Geometry. Nearly 65% of the Biology students took the test, as did 55% of the English 10 students. The total number of students who took the End-of-Course Assessment in each subject and the mean of their percent-correct score is shown in **Table 5.1**. Mean scores for each building are listed in **Appendix K**.

Table 5.1: End-of-Course Assessment Results

State	Subject	Student Count	Mean % Correct
Mississippi	Biology I	879	40%
	English 10	384	51%
	Geometry	843	34%
Oklahoma	Biology I	231	41%
	English 10	402	57%
	Geometry	401	36%
Pennsylvania	Biology I	248	46%
	English 10	428	58%
	Geometry	381	36%
Total Students Tested	**Biology I**	**1358**	**41%**
	English 10	**1214**	**55%**
	Geometry	**1625**	**35%**

The Benchmark Assessments were designed to give teachers formative data on student mastery of content and skill objectives. Eight Benchmark Assessments were developed for each of the three courses. Each item was aligned to a specific objective in ACT's Increasing Course Rigor curriculum. The items encompassed a range of cognitive levels to enable the students to demonstrate their levels of mastery. The assessments were designed so that analysis of student performance on each individual item would assist the teacher in identifying areas in which an individual student, or group of students, needed additional instruction. Each Benchmark contained both a multiple-choice section (20–30 items) and a constructed-

response section (2–5 prompts). The Benchmark items required a complex understanding of the targeted objective and were designed to complement the rigorous course curriculum and facilitate innovative pedagogical practices.

The initial goal of the project was for each teacher to administer at least four out of the eight Benchmarks developed for their subject. Due to many factors (planning and scoring time required, lack of schedule alignment, and commitments to state-mandated curriculum), the Benchmarks were not administered as frequently as intended.

As **Table 5.2** indicates, only twenty-nine of the ninety-eight teachers reported grades to ACT for at least two of the Benchmark Assessments. Twenty-one of the sixty-three full-participant teachers reported scores for at least two Benchmarks. Since they were given the corresponding first Instructional Units at the Summer Institute, a larger number of teachers administered the corresponding first Benchmark than any of the other seven. Forty of the sixty-three full-participant teachers administered Benchmark 1. **Table 5.3** includes the number of reported test-takers and their mean percent-correct scores for the Benchmark 1 multiple-choice section.

Table 5.2: Teachers Reporting Scores for at least Two Benchmarks

State	Subject	Teachers
Mississippi	Biology I	3
	English 10	5
	Geometry	3
Oklahoma	Biology I	2
	English 10	3
	Geometry	6
Pennsylvania	Biology I	4
	English 10	2
	Geometry	1
Total Number of Teachers		**29**

Table 5.3: Benchmark 1 Results (Multiple Choice)

State	Subject	Student Count	Mean % Correct
Mississippi	Biology I	412	44%
	English 10	267	65%
	Geometry	313	60%
Oklahoma	Biology I	206	48%
	English 10	373	63%
	Geometry	366	57%
Pennsylvania	Biology I	195	47%
	English 10	234	67%
	Geometry	122	67%
Total Students Tested	**Biology I**	**813**	**46%**
	English 10	**874**	**65%**
	Geometry	**801**	**60%**

Pre- and Post-Test Data

As part of the project design, students in participating teachers' courses took assessments at the beginning and end of the project in an attempt to gather baseline measures of college readiness. In fall 2006, students took the PLAN® assessment. These students then took one of three post-test options (PLAN, ACT® or Practice ACT®) in spring 2007, allowing ACT to compare the two data points to determine changes in readiness. The English scale score was used for the English 10 students, the Math scale score for Geometry, and the Science scale score for Biology. Composite scores were not used in data analysis.

All eighteen schools administered the fall 2006 PLAN to students in project teacher classes. ACT then isolated the rosters of the full-participant teachers (those who had taken the first *CARS* survey and attended at least one of the three major workshops). Post-test materials were shipped to the project schools in spring 2007 with directions to test only the students who were listed on the full-participant rosters. Fifteen of the eighteen buildings were able to administer the PLAN, ACT, or Practice ACT during May and June 2007. It should be recognized that these students were also taking course-based assessments, state end-of-instruction tests, and ACT's End-of-Course Assessment. It is likely that testing fatigue and motivation became factors affecting student performance. Because of this, ACT refined the test-data analysis to isolate the students who performed better than "chance" on the tests. These students were more likely to have put forth genuine effort when taking the three-hour long post-test. **Table 6** shows the change in scores for all test takers who scored greater than chance.

Table 6: Change in Scores from Pre-test to Post-test

State	Scale Score	Student Count	">Chance" Count	Mean Score Change
Mississippi	Science	409	303	−.43
	English	353	317	−.16
	Math	282	252	+.61
Oklahoma	Science	176	135	+.60
	English	288	263	−.09
	Math	363	294	+.56
Pennsylvania	Science	96	83	+.37
	English	252	222	+.24
	Math	201	175	+.36
Total Students Tested	**Science**	**681**	**521**	**−.12**
	English	**893**	**802**	**−.03**
	Math	**846**	**721**	**+.45**

Common Characteristics of Successful Participants

The assessments used in this project yielded mixed results when looking at the aggregation of all students, thus making it difficult to interpret comprehensive findings relative to the first two indicators of success:

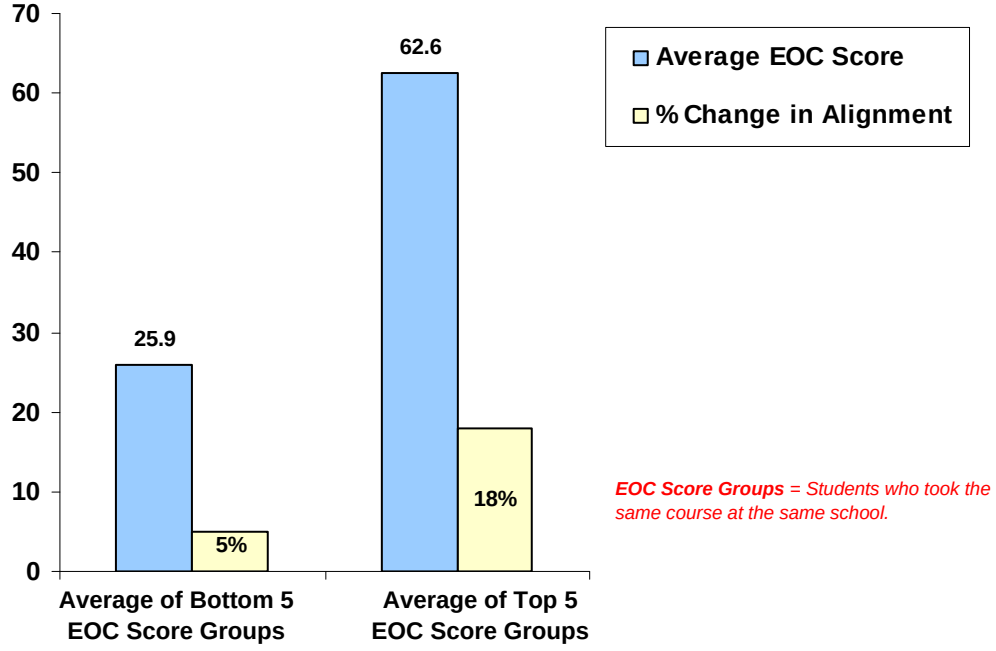
1. Increased student readiness for college
2. Increased student knowledge in core-course subject matter

However, using the test data in conjunction with other selected aspects of the project helps to sharpen the analysis of project outcomes and focus on areas where common characteristics of success become visible. The two main areas of focus used for this purpose are alignment to ACT's rigorous course objectives and participation in the project's professional development activities.

Correlation Between *CARS* Alignment and End-of-Course Assessment Scores

Bringing schools and teachers into alignment with ACT's rigorous course objectives was a fundamental goal of the Increasing Course Rigor Pilot Project. Results of this goal are visible using a focused analysis of the *CARS* survey results and End-of-Course Assessment data. The rate of change in alignment with the ACT objectives from fall to spring illustrates the impact of that component of the project on student test performance. A measurable connection exists between a teacher's change in alignment with ACT objectives and student performance on the End-of-Course (EOC) Assessment. **Chart 2** compares the alignment rates of the groups with the top five and bottom five average EOC scores across all three subjects.

Chart 2: Lowest and Highest Average End-of-Course Scores

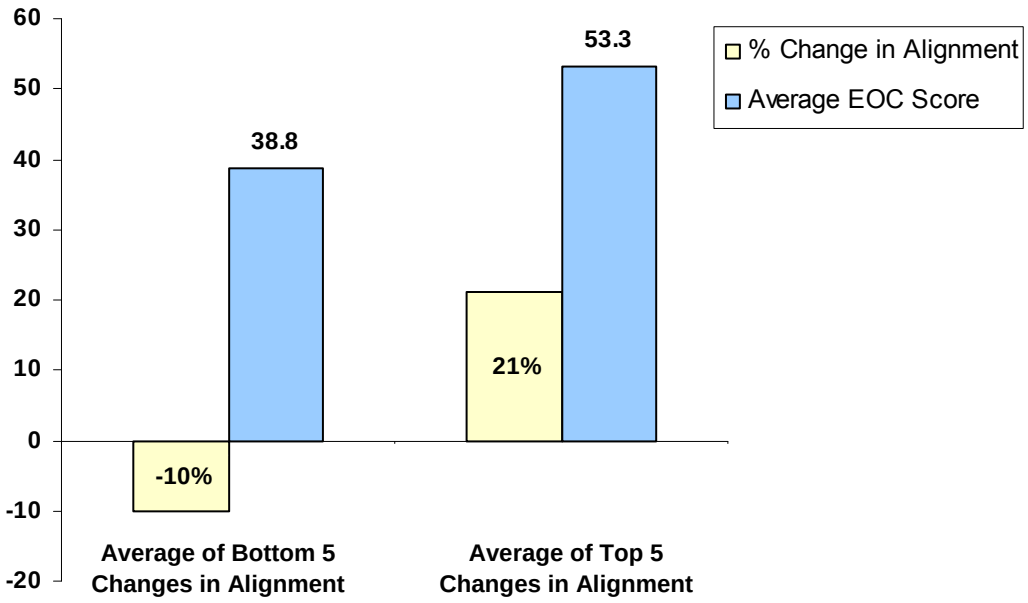


EOC Score Groups *= Students who took the same course at the same school.*

Viewing these scores alongside the change in *CARS* alignment from Fall to Spring, a 13% increase in the alignment with ACT objectives is seen among those teachers whose students performed better on the End-of-Course Assessment.

Conversely, students of teachers showing the highest level of correlation to ACT objectives performed better on the test than students in classrooms where teacher alignment actually decreased. **Chart 3** compares the End-of-Course Assessment scores of the groups with the top five and bottom five average rate of change in alignment to ACT objectives.

Chart 3: Lowest and Highest Change in Alignment Percentage

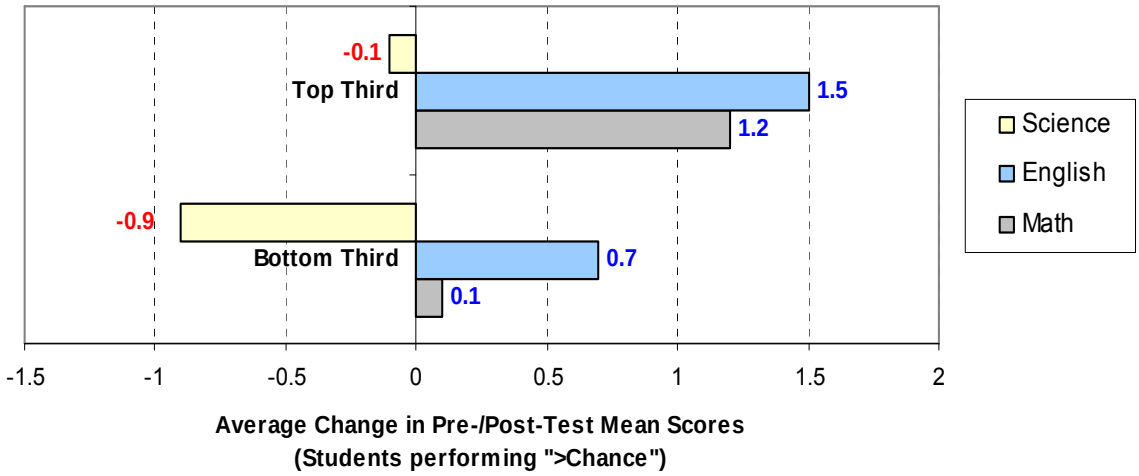


Project Participation and Pre-/Post-Testing Results

Additional analyses focusing on the participation of schools and teachers in professional development activities were selected as a reasonable approach to mining the project data. Using this strategy, a noticeable difference was observed in the change in the pre-test and post-test mean scores when the participation level of the schools and teachers was taken into account. School-level data were analyzed based on professional development participation rates, End-of-Course and Benchmark results, and *CARS* alignment rates. **Chart 4** shows the difference in change in mean scores between schools that ranked in the upper third based on participation and alignment factors and schools that ranked in the bottom third. The results of the analyses revealed a difference in scores between the groups at both ends (students who scored less than chance were not included in the analyses).

The students of teachers who participated at a higher rate in the professional development activities scored higher on the Benchmark Assessments as well as the End-of-Course Assessment than students of teachers less engaged and with lower participation indicators.

Chart 4: Comparison of Mean Score Change Based on Participation and Alignment



Similarly, students in classes whose teachers had indicated a higher degree of alignment between their local efforts and ACT's rigorous curriculum objectives performed slightly better on the post-test than students of teachers, indicating a lesser degree of alignment.

From these analyses, it is possible to discover distinct characteristics of the teachers who were more aligned with ACT objectives, who participated more enthusiastically in the pilot project, and who ultimately improved their teaching practices. Exploring the common characteristics of these teachers is the key to understanding how the pilot project succeeded in achieving the following indicators of success:

3. Increased teacher appreciation of course rigor and professional development support and increased monitoring of student progress and use of data-driven instructional interventions
4. Improved course alignment to rigorous course objectives
5. Improved consistency in course quality across classrooms within schools and districts
6. Improved collaboration among teachers and school leaders to improve course quality

A profile of successful teachers and schools emerged as a result of these comparisons. ACT interviews and observations, testing data, *CARS* survey results, and teacher feedback gathered from the Distance Conferences and On-Site Meetings were all used to make these judgments. **Appendix L** presents the resulting ranking system applied as a foundation for this evaluation. This ranking system helped illuminate three characteristics common to schools where students received the most benefit from teacher participation:

- Established capacity to teach rigorous content
- Strong instructional leadership
- Professional communities and mentoring relationships

Established Capacity to Teach Rigorous Content

In several instances, the departments and teachers who were more actively engaged in the work had participated in other projects that shared goals with the Increasing Course Rigor Pilot Project. They referenced these parallel efforts during the project's observational and collaborative activities. These experiences built upon what was already present in many of the teachers: an established capacity to teach more rigorous content. This alignment in belief and practice was evident by the feedback (both positive and negative) that these teachers provided to ACT. The teachers had a foundation of skill and experience that enabled them to more actively engage the project. They implemented the instructional and assessment components of the project with a critical eye already focused by their established belief in the need for more rigor and the benefits it produces. They accepted the difficulty involved in working toward the project goal and were appreciative of the innovative strategies, particularly ACT's *Template to Examine Assignments for Rigor and Relevance.*

> I think the research-based strategies were the best (part of the project). Now I can pull out one of my units and say, 'What strategies can I use in this?' It's so nice to have someone give you something that you can actually use. I will basically use the constructed-response items for my students when they take the (state assessments).
>
> –Pennsylvania Biology I teacher

Teachers who frequently criticized the reading level of materials or the difficulty of the assessments were less likely to commit a high level of effort to project implementation. For example, these teachers were not inclined to view the presence of constructed-response items on the Benchmark Assessments as an important tool for instructional improvement, but instead saw them as an unfair strain on time and resources. Teachers with an openness to using the Benchmarks were appreciative of the value of formative assessments in monitoring student progress and adjusting their instructional planning.

> "To get some of the formative assessment strategies that were offered—to be able to look at those and say, that's really easy and I can spot-check along and see where my kids are—that has definitely helped me to develop better final assessments. ... and to know where I need to shift my instruction instead of just throwing it at them and hoping that it sticks."
>
> – Mississippi Geometry teacher

It became evident throughout the project that a high capacity among the educators (both in content knowledge and teaching practice) and an openness to new methodology are prerequisites for the introduction of increased rigor in the classroom.

Strong Instructional Leadership

A commitment to change curriculum content and instructional practice requires leadership both at the building and district level. The teachers who most benefited from the opportunities the project provided were part of departments, buildings, and districts where leaders had made long-term commitments to increase rigor. Department heads, principals, and curriculum specialists at these schools were more likely to be directly involved in assisting individual teachers with implementing the project. They demonstrated an appreciation of student achievement centered around the project's long-term goal of increasing student readiness for college and workforce training. This goal is shared by educators who recognize that change needs to be rooted in longitudinal curriculum development.

> "It will take our students more time to adapt to the rigor of the new material. Incorporating this method includes raising expectations of their participation and performance. This can be accomplished, but in order to have it truly take root and develop, it will take more than one year."
>
> –Mississippi Biology teachers

At the schools that lacked strong leadership, teachers complained that their students did not have the content background needed before introducing ACT's rigorous materials. However, teachers at schools where strong instructional leadership was present shared the project materials with non-project colleagues (including teachers in lower grades) in a collaborative effort to raise the bar for all students. Schools in the upper tier of **Appendix L** have environments focused on long-term student achievement and a desire to meet changing student needs and increasing accountability demands. At least two of these schools held planning sessions in summer 2007 to more fully incorporate the ACT materials and strategies into their 2007–2008 curriculum.

Teachers also needed support from their administrators to commit time to the pilot project. When administrators actively supported project participation, teachers made the best use of the professional development sessions and were more likely to pilot multiple Instructional Units and Benchmark Assessments in the classroom. Teachers who were given extra time to plan together were better able to adapt the ACT material to their own course design.

Professional Communities and Mentoring Relationships

Departments that engaged the pilot project on every level and obtained some of the best assessment results had mentoring environments between experienced and inexperienced teachers. A teacher with twenty or more years of experience implementing the project alongside a colleague with five years or less presented an opportunity for them both to capitalize on ACT's units and assessments as tools for professional growth. Within the mentoring environment, the younger teachers had access to both the new instructional material as well as the experience

of the veteran teachers to assist them in applying the innovations to their classrooms. When the more experienced teachers were receptive to ACT's units, assessments, and methodology, a collaborative enthusiasm for the project was evident to all observers.

> "We are beginning to have conversations within our professional learning communities about how to best use information garnered from all types of assessments. As we have seen the value of collaboration, we will need to continue to share strategies and build connections among and between departments. Our administrators are more aware of the need to build and sustain professional learning communities, and that has already contributed to a change in the structure of our in-service time."
>
> –Pennsylvania English teacher

The pilot project facilitated a level of collaboration that was new to many teachers, and their positive response to the potential of that type of professional environment cannot be overstated. Administrative support for this activity was key, and the schools that lacked active administrative involvement were the schools where teachers had difficulty finding time for internal collaboration. It was the teachers at these schools who were unable to maintain a minimum level of participation. The lack of collaborative support placed them on an island in their implementation efforts. Many of them gave up on the project rather than commit the individual time and effort without local encouragement or logistical support. This underscores the crucial importance of improved collaboration among teachers in any effort to increase course rigor or redesign the American high school. Administrative commitment to fostering collaborative environments is essential for future progress.

> "This whole project experience has created a camaraderie that is a distinct advantage in teaching. A comfort zone and confidence with each other encourages us in our work with the Geometry students. We plan to see that new teachers in Geometry will be given the materials that we have decided to use and are shown what our goals are for the students."
>
> –Oklahoma Geometry teachers

Lessons Learned

At the conclusion of the project, leadership from ACT and the NGA Center for Best Practices collaborated on a joint list of lessons learned. They reflected on the results that could be discerned from data and observations, and identified the areas that would be key to successful future efforts to increase the rigor and relevance of core high school courses. Recommendations for improving the approach and methods used in accomplishing the project goal are listed under each heading.

Site Leadership/Communication

1. Identify a "leadership team" at each site (to consist of district/building administrators, curriculum staff, and classroom teachers) for constant dialogue and the mechanism for sustaining the work at the conclusion of ACT's intervention.

2. To enhance communication, appoint a site liaison who will serve as the direct contact to ACT and relay all information to participating teachers. This liaison would also serve on the leadership team.

3. Conduct special workshops for building and district administrators, but also require them to attend teacher workshops.

4. Provide teachers with guides for integrating ACT's units with the texts they already use, or for using them in lieu of their usual material.

Sequencing

5. Early orientation meetings are critical, but they need to include explicit conversations about project activities and expectations. Hold the individual state meetings after the orientation meetings, but prior to a large-group institute.

6. Conduct teacher observations and interviews at the beginning of the project. Devote adequate resources to the review and evaluation of course objectives, assessments, and other instructional materials that teachers submit at the beginning of the project to better understand participants' practices.

Professional Development Strategies

7. Be more explicit about the meaning of the *Course Analysis for Rigor and Success* (*CARS*) results and how to align curriculum and instruction to ACT's rigorous course objectives. Introduce *CARS* survey results to principals first, then to teachers. Address alignment throughout the project, not just at the beginning. Demonstrate a linkage between the *CARS* results and student test data.

8. Provide teachers with all instructional materials (e.g., course objectives, instructional units, Benchmark Assessments) at the beginning of the project. Make every effort to ensure that materials are relevant and timely to local instructional sequence. (The spring workshop based on the teachers' classroom experiences was seen as the richest and most valuable professional development experience.)

9. Require teachers to teach at least a portion of a unit then use resultant experiences (perhaps even videotapes of lessons) as the focus of follow-up professional development sessions.

10. Do not underestimate the need to instruct teachers on how to use student answers to constructed-response items to inform instruction. Project teachers did not understand how to score these items, and they also struggled with how to use the results to guide day-to-day teaching.

11. Emphasize and nurture the formation of professional communities within schools and districts from the onset. By the end of the project, teachers were excited about the collaborative relationships they formed and the benefits to their teaching.

On-Site Modeling/Coaching/Contact Time

12. As often as possible, send Master Teachers to sites to model best practices and to coach and give feedback to participating teachers. On-site professional development is more effective than off-site sessions.

13. The professional development program needs to include more time with teachers. Communication from a distance was difficult; teachers were not strongly connected to the project, despite efforts (e.g., distance conferences, frequent emails). ACT staff need to be on-site at least twice a year to better understand participants' situations and to establish strong connections with them.

Recommendations

Follow Up with Project Participants

The list of lessons learned is not exhaustive, but it highlights specific areas to improve upon when implementing a professional development and curriculum redesign project of this size. Important lessons remain to be learned from the project participants—ideas they can share from a new perspective now that the project is complete and they are in the middle of a new school year. To that end, ACT plans to contact the project participants for both the broad level of feedback they can offer now and to learn how their work in the Increasing Course Rigor Pilot Project is influencing their current curriculum and teaching practices.

Emphasize the Importance of Alignment with Rigorous Objectives

The rigorous course objectives presented many challenges to the project participants. Existing frameworks often preoccupied teachers, and if the ACT objectives did not exactly match those at the state or local level, it was a challenge to get people to embrace them. In some cases, the importance of preparing students for a particular state assessment blueprint limited teacher willingness to incorporate ACT objectives they did not believe were aligned. State leadership is needed to reassess the rigor of course objectives and facilitate innovative curriculum changes at the district level.

Highlight Teaching Strategies that Work

The teachers observed by ACT who had the most success with the project materials were those whose daily practices kept students constantly involved in their own learning. The following strategies should be promoted to increase course rigor and student achievement:

- "Bell-to-bell" instruction
- Instruction that is connected to prior learning
- Instruction that is relevant to the real world
- Instruction that incorporates probing questions, group work, and higher-level reasoning
- Instruction that focuses on "the big picture" and that utilizes essential questions
- Sharing the objectives and goals of daily lessons with students
- Mandatory student notebooks
- Incorporation of research-based strategies
- Routine method for reporting progress to students and parents
- Personal commitment to each and every student

Continue to Develop and Promote Rigorous Course Content

The consensus among teachers was that if all of the course materials had been available at the beginning of the project, they would have incorporated more of the units and assessments into their course planning. They were committed to the goal of more rigorous content, but were limited in their implementation efforts by schedule and local curriculum demands. However, their receptiveness to the value of this challenging work should be viewed as an encouraging sign and spur efforts to increase course rigor nationwide.

Continue to Promote Innovative Use of Assessments

Research-based assessment tools are needed to evaluate whether instructional methods are helping students develop critical learning skills and master rigorous content objectives. The pilot project provided teachers with a variety of assessments (Benchmark Assessments, End-of-Course Assessments, and assessments embedded in the Instructional Units). Teachers were encouraged to use these tools in new ways. More effort should be made to emphasize the value of using different types of assessments as well as analyzing assessment data to modify instruction on a regular basis. While this project did not provide definitive support for the use of End-of-Course assessments, there are already many established reasons for continued development in that area. The correlation between End-of Course performance and an increase in alignment to rigorous objectives is encouraging.

Emphasize the Need for Teacher Collaboration

The most resounding lesson drawn from this pilot project is the understanding that when teachers are encouraged to form professional learning communities (and given the time and resources to do so) the benefits to students will be significant. Collaboration within a department improves teacher relationships and strengthens curriculum. Collaboration across departments helps teachers know their students better and coordinate activities that enhance overall student learning. Teacher collaboration is a crucial part of efforts to redesign curriculum, to develop innovative teaching strategies, and to address the needs of students in ways that best enable them to learn.

Appendix A:
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Appendix B:

Student Population Characteristics

High School	Total Enrollment*	Student/ Teacher Ratio	Ethnic Minority	Free/ Reduced Lunch
A1	1,215	15.4	20%	22%
A2	627	15.4	15%	28%
A3	354	11.1	NA	NA
A4	1,262	17.2	21%	17%
A5	236	12.2	NA	NA
B1	171	10.4	NA	NA
B2	210	12.6	NA	NA
B3	414	13.1	20%	39%
B4	820	14.6	40%	42%
B5	480	15.6	84%	48%
C1	1,634	15.3	26%	47%
C2	617	15.5	30%	50%
C3	638	19.0	4%	19%
C4	685	18.3	2%	22%
C5	1,193	12.4	39%	68%
D1	1,056	17.5	64%	66%
D2	813	17.8	46%	58%
D3	651	15.6	2%	61%

*Enrollment figures based on 2004–2005 data from *The National Center for Education Statistics.* **NA** indicates *NCES* data reflected grades prior to 9–12, so data specific to high school years cannot be determined.

Appendix C:

Teacher Participation Details

High School	Project Teachers	Summer Institute	Fall Workshop	Spring Workshop	Distance Conference #1	Distance Conference #2	Distance Conference #3	On-Site Meetings	Average Activities per Teacher
A1	12	6	5	6	12	4	4	11	*4.00*
A2	7	6	5	7	5	3	3	3	*4.57*
A3	4	1	1	1	1	1	0	0	*1.25*
A4	18	6	7	7	4	4	1	15	*2.44*
A5	3	2	2	3	2	0	3	0	*4.00*
B1	3	1	1	2	3	2	0	0	*3.00*
B2	3	2	3	3	3	2	0	0	*4.33*
B3	5	3	3	3	3	4	0	4	*4.00*
B4	4	4	4	4	4	3	3	4	*6.50*
B5	4	3	4	4	4	3	4	3	*6.25*
C1	8	8	8	8	8	7	4	8	*6.38*
C2	5	5	4	5	5	4	4	4	*6.20*
C3	3	3	3	3	3	2	3	3	*6.67*
C4	6	6	5	6	5	5	2	6	*5.83*
C5	1	1	1	1	1	0	1	0	*5.00*
D1	3	2	0	1	0	0	0	0	*1.00*
D2	3	2	2	2	1	1	2	3	*4.33*
D3	6	6	6	6	6	5	4	2	*5.83*
All Schools	**98**	**67**	**64**	**72**	**70**	**50**	**38**	**66**	***4.36***

Appendix D:
Project Activity Time Line

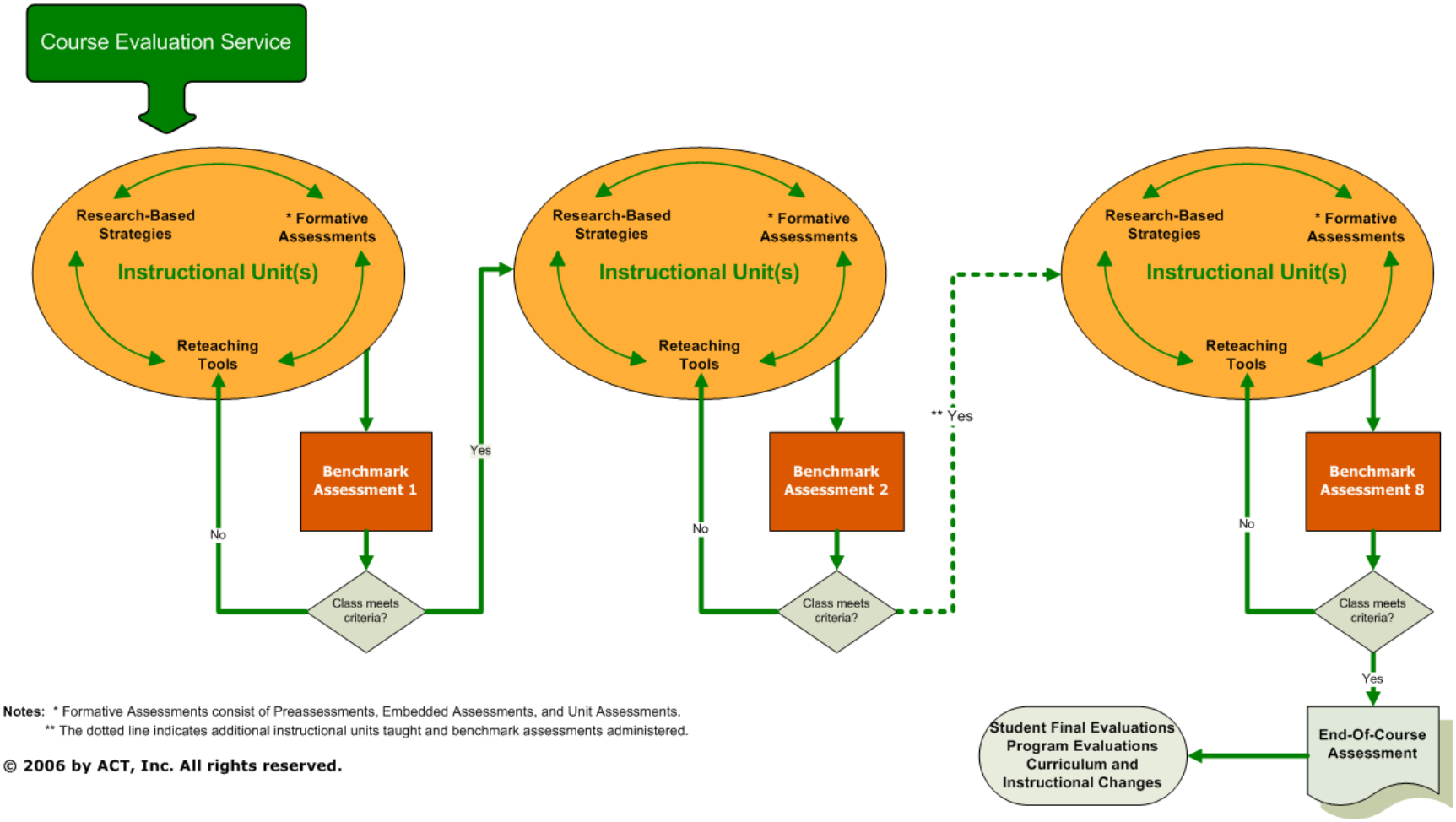
	Professional Development	Survey Research	Assessment	Project Direction and Evaluation
February 14, 2006				Kick-Off meeting with state team leaders, NGA Center for Best Practices staff, and ACT held in Washington, D.C.
March–April 2006	In-state orientation meetings for participating teachers and administrators			
Spring (or Fall) 2006		Teachers took 1st *CARS Survey*		
May–June 2006			End-of-Course item tryout	
July 24–27 2006	Summer Institute held in St. Louis, Missouri			
August–September 2006	Discussions Forum created for project collaboration purposes		Electronic Gradebook sent to Teachers	
September 2006	• Distance Conference #1 • Posted 1st set of Instructional Units	Administration of *Teacher Background Questionnaire* and *Course Information Questionnaire*	Posted 1st set of Benchmark Assessments	
October–November 2006	• On-site Collaboration Meetings begin • Held three in-state professional development workshops		Students took PLAN to measure initial college-readiness	
November 2006	Posted 2nd set of Instructional Units		Posted 2nd set of Benchmark Assessments	
December 2006	Distance Conference #2			

Appendix D (cont.)

	Professional Development	Survey Research	Assessment	Project Direction and Evaluation
January 2007	Posted 3rd set of Instructional Units		Posted 3rd set of Benchmark Assessments	Reported baseline data and project summary to NGA Center for Best Practices
February 2007	Distance Conference #3			
February–March 2007	• Held three in-state professional development workshops • Conducted on-site observations and interviews of project teachers			
March 2007	Posted final set of Instructional Units		Posted final set of Benchmark Assessments	
April–May 2007		• Teachers completed 2nd *CARS Survey* • Teachers completed 2nd *Course Information Questionnaire*		
May–June 2007			• Administered End-of-Course Assessments • Administered PLAN, ACT, or Practice ACT (college-readiness post-test)	
June–August 2007	Observational data is coded and analyzed	Project survey results are analyzed	Assessment data is collected and analyzed	Prepared Final Report

Appendix E:

ACT's Data-Feedback Model



Notes: * Formative Assessments consist of Preassessments, Embedded Assessments, and Unit Assessments.
** The dotted line indicates additional instructional units taught and benchmark assessments administered.

Appendix F:
Distance Conferences and On-Site Collaboration Meetings

Distance Conferences

Distance Conference #1: September 2006—Participants conveyed specific insight and criticism regarding their building-level implementation of the pilot project. Teachers were enthusiastic about their early use of the ACT Instructional Units and described their experience with piloting them in the classroom. During this discussion, ACT staff strongly encouraged teachers to experiment with the material and be creative in integrating it into their lesson plans. This practice was advocated throughout the project, and the teachers who followed this advice reported positive results. One issue that originated in this conference was the perception that the reading level of ACT's materials was too challenging for the 9th and 10th graders in many of the classrooms. While teachers recognized that raising the reading level of students was important, they were concerned that it hindered their efforts to teach the content objectives in Geometry and Biology. It was during this conference that it first became apparent that teachers would have difficulties administering the Benchmark Assessments. Concern was expressed over the length of the tests, the inclusion of constructed-response items, and most importantly, the order in which ACT released the Benchmarks. The release order did not always conform with the order teachers taught the objectives, and this ultimately hindered a more comprehensive administration of the Benchmark Assessments.

Distance Conference #2: December 2006—These teleconferences centered on the results of early administrations of the Benchmark tests and approaches to different types of assessments. The teachers found the Benchmarks to be useful tools for targeting the specific needs of students. The tests were helpful in identifying students who required individual help in content learning as well as assistance in developing reading comprehension skills. The rigor of the questions, although making the tests more difficult overall, actually resulted in some students feeling greater accomplishment when they answered the questions correctly, as opposed to doing very well on an easier test. The teachers agreed that the constructed-response items presented students with the most difficulty, but the items were also an excellent opportunity for instructional reinforcement. Some teachers had students review their responses with the scoring rubrics to see what type of response the question was looking for and how their responses differed. Teachers discussed the value of various assessment tools in achieving instructional objectives. They shared examples from their experiences in piloting the embedded assessments within the ACT model units, including successful styles of assessments they had used in the past.

Distance Conference #3: February 2007—The third distance conference built on the relationships begun at the Summer Institute and the fall and spring workshops and gave the teachers a chance to discuss their project experiences with one of ACT's Master Teachers. Each teleconference involved a discussion of student motivation, specifically the methods used to engage students who had difficulty adjusting to the increased rigor of the curriculum. The Master Teachers and the project participants discussed ideas to address these situations, along with other content-specific areas of concern. A thought-provoking discussion during an English 10 teleconference centered on the difficulties faced when teaching racially and ethnically themed literature in primarily homogeneous classrooms.

On-Site Collaboration Meetings

October 2006: Successes and Challenges—After over a month of piloting the material in their classrooms, the teachers and administrators met to discuss their impressions of the project. Many teachers mentioned the difficulty their regular level (non-honors, non-accelerated) students had adjusting to the rigorous content. It was also difficult for the teachers to adjust to using the rigorous material in those classes. However, the benefits of introducing rigor into those sections were clear to them: interest generated by the unit activities, use of higher-order thinking skills and questioning strategies to develop an "academic mentality." English teachers found that developing annotation skills was particularly valuable. Geometry teachers liked the incorporation of logic and deduction while introducing proofs. Biology teachers appreciated the goal of teaching students to differentiate between theoretical and empirical concepts. The time involved in implementing the project was a universal topic

of concern. The material (both instructional and assessment) was in many ways drastically different from current practices, and the time the teachers had to prepare was insufficient for incorporating the material into their instruction. Participants found the goals and content of ACT's materials very challenging. This reality underscored the need for preparation time and increased teacher collaboration—an area that would be emphasized as the project moved forward.

November 2006: Template for Evaluating Student Assignments—The use and value of the professional development materials from the fall workshops were the focus of the November meetings. Teachers agreed that ACT's *Template to Examine Assignments for Rigor and Relevance* helped pilot new ways of presenting material and made them aware of new approaches to instruction. It helped them to spot weaknesses in their methods and forced them to create more rigorous lessons and activities. They again expressed need for more collaboration time to make the most of the material. Teachers felt there would be more benefit if they were able to review each others' assignments using the template. It was good to use individually, but the template would be more valuable if used in a group.

December 2006: Value of Assessments—The project's formative assessments (both embedded and Benchmarks) were the focus of the third on-site meeting. Teachers discussed how assessments inform changes in both group and individual instruction. The rigorous Benchmark Assessments, while often frustrating to students and teachers, were seen as providing valuable specific information on what key concepts and reasoning strategies the students were not learning. This supports the main concept behind the data-feedback model: if a class or group is not retaining knowledge or applying new skills, those areas need to be readdressed and instructional changes contemplated. Many Biology and Geometry teachers cited their inexperience in using constructed-response items like those in the Benchmarks. These items gave teachers the opportunity to help students view learning from different perspectives. Teachers taught students how to score their constructed-response items as a means to develop new writing and analytical skills. Another important goal they emphasized was a commitment to using a variety of assessment types (tests, quizzes, embedded exercises).

January 2007: Research-Based Teaching Strategies—During the fourth on-site meeting, the participants discussed the various research-based teaching strategies presented by ACT, particularly those contained in the *Educator's Toolbox* offered at the fall workshops. Among the strategies and activities the participants found most fruitful were reflective questioning, annotation, Cornell note-taking, KWL charts, designing exam questions, and fishbowl discussions. They were also enthusiastic about using technology innovations such as whiteboards and classroom "clickers." However, not all teachers had completely positive experiences. One teacher attempted a group exercise but was unable to keep the students from falling into predictable patterns of either dominating or observing. These experiences reinforced the need for teachers to be aware of their classroom dynamics and to target activities they know will work versus what may be difficult for a particular group of students. Teachers also expressed concerns about the literature used in ACT's English units. Certain racial and ethnic themes were not viewed as a good fit for every classroom. In diverse classroom environments, there existed the possibility that some students may find themselves in uncomfortable situations. In homogeneous classrooms, students may lack a personal, tangible connection to the literature being presented, and some teachers felt this introduced obstacles to achieving key instructional goals. Overall, the participants were excited and impressed by all the options in the toolbox. However, they stressed a desire for more modeling and training in how to employ these techniques in their classrooms.

February 2007: Changes in Beliefs about Teaching—Many teachers responded somewhat defensively to this topic. Some pointed out that ACT's materials were not in their final form at the start of the project; therefore, it was a difficult and artificial task to pilot as many of them as possible. One school labeled its focus as *content* driven and ACT's as *concept* driven. Other teachers maintained they were already practicing rigorous teaching techniques, especially those who were preparing students for state tests in their subject areas. However, teachers in Pennsylvania and at Northwest Rankin High School in Mississippi acknowledged that the pilot project forced them to view their teaching practices from different perspectives, and by doing so, expanded the goals and content of their courses. One school saw this as

Appendix F (cont.)

especially useful with those non-honors students who are prone to do the minimum and for whom teachers are reluctant to raise the performance bar.

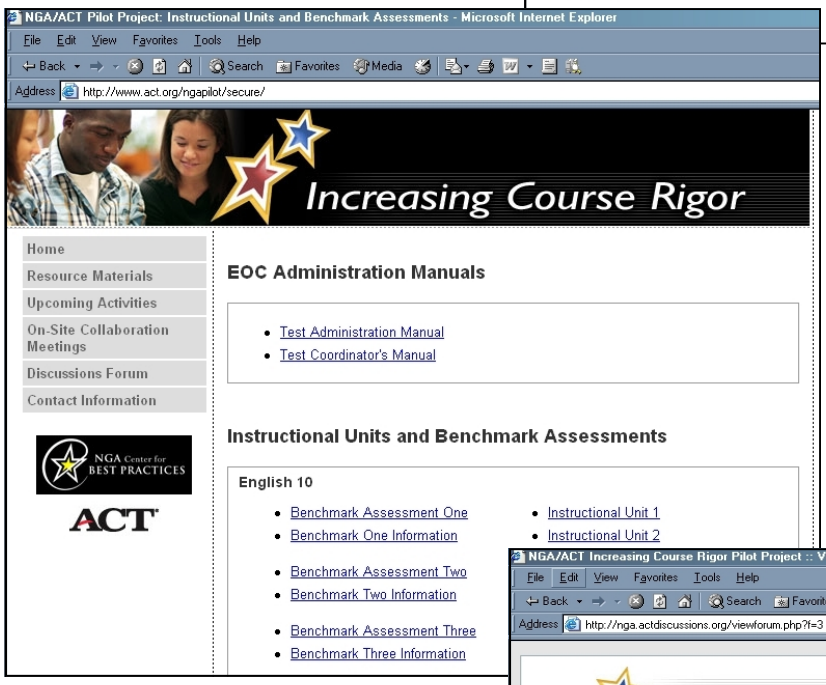
March 2007: Changes in Beliefs about Course Rigor—Several participants changed their perception of rigor as a result of this pilot project. Teachers who operated under the assumption that rigor dealt only with the difficulty of the course content learned that this is a narrow understanding. They discovered that increasing course rigor also involves the implementation of new strategies to develop and enhance active student participation in their own learning. But this discovery came with the realization that much more planning and collaboration are necessary to effectively raise rigor across classrooms and departments. This requires more preparation time with comprehensive planning. It also requires understanding the makeup of each class, especially those with IEP or learning support students, and targeting the rigorous instruction accordingly. Support from administrators is necessary, as is a commitment to apply these strategies in a longitudinal manner. In a rigorous course (especially mathematics), students need to refer to prior objectives and to apply prior knowledge. One teacher emphasized that course rigor is not completely dependent on the teacher or content; it also requires (at the same time it seeks to nurture) students to explore subjects in depth and take ownership of their learning.

April 2007: Applying the Strategies Learned during the Increasing Course Rigor Pilot Project—The teachers' final discussion evaluated their experiences with the project and discussed how they will apply what they have learned. A common frustration centered around two linked issues: the lack of time (both before and during the project) and the staggered release of materials. Ideally, the teachers would have received a panoramic view of the scope and sequence of the project that included access to all materials. The orientation meetings held at the buildings in spring 2006 were a basic introduction, but they did not present any of the actual materials and assessments the teachers were to use during the 2006–2007 academic year. They expressed enthusiasm about the introduction of these materials during the Summer Institute, but the timing did not allow them to plan integration of ACT's materials into their courses. It was also difficult to incorporate material that was released in intervals throughout the year. In Biology and Geometry, there were significant differences in the sequencing of ACT's objectives and the order that many of the teachers cover content. This limited the teachers' ability to adequately pilot ACT's units and assessments.

Even though such issues affected project implementation during the pilot year, the teachers were excited to more fully utilize ACT's rigorous material in their planning for 2007–2008. This summer, Ponca City High School teachers were paid to collaborate on a plan for integrating as much of the material as possible into their courses next year. Teachers lauded the strategies presented in the toolbox and template, and they expressed genuine excitement at the opportunity to use those practices in different courses with new groups of students, as well as sharing them with other teachers and departments. One obstacle to increasing the rigor in all classrooms that many teachers face is requiring more from their "lower-level" classes, but teachers recognized the benefits of working toward this goal, for both the students and themselves.

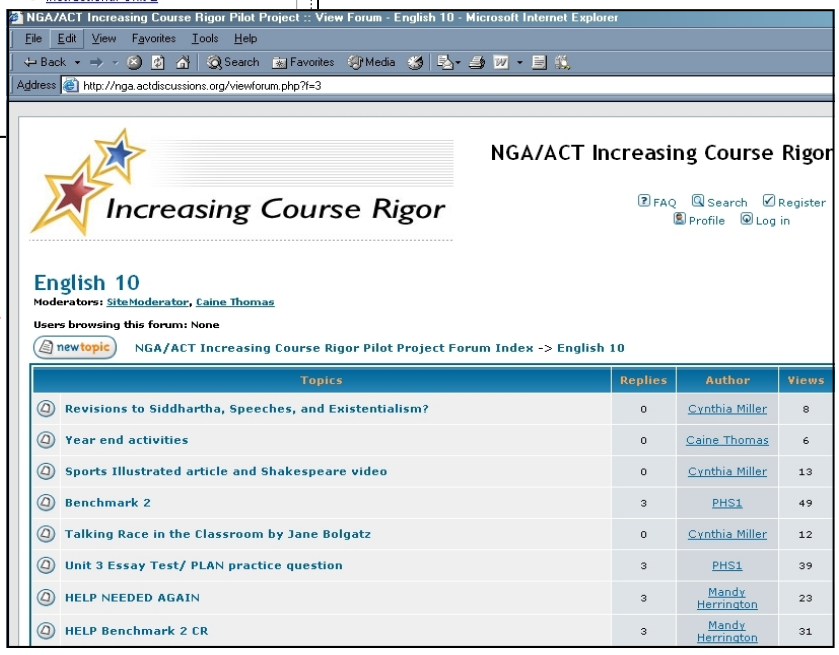
Appendix G:
Project Web Resources

The home page listed the project goal, deliverables, and indicators of success.



Instructional Units and Benchmark Assessments were available on a secure site.

Educators and ACT staff communicated throughout the project using the discussions forum.



Appendix H:

Number of Teachers Responding to Surveys

Survey	Status	Spring 2006	Fall 2006	Spring 2007	Reports
***Course Analysis for Rigor and Success Survey* (CARS)**		The initial group of teachers involved in the project were contacted.	New teachers joining the project were contacted.	All participating project teachers were contacted.	School Overview Reports provided teacher-level responses for use during the Summer Institute 2006. ACT provided Summary Reports of school-level data after each administration.
Overall	**Response Rate**	**93%**	**67%**	**83%**	
	Teachers Contacted	89	27	78	
	Surveys Completed	83	18	65	
English 10	Teachers Contacted	26	11	26	
	Surveys Completed	25	7	23	
Geometry	Teachers Contacted	36	8	31	
	Surveys Completed	34	5	25	
Biology I	Teachers Contacted	27	8	21	
	Surveys Completed	24	6	17	
Course Information Questionnaire		Survey items created by Development Staff were formatted in EZSurvey.	All project teachers (Summer Institute attendees plus new teachers) were contacted.	All participating project teachers were contacted.	ACT provided data after each administration; a spring 2007 comparison report was provided.
	Response Rate		**67%**	**78%**	
	Teachers Contacted		101	78	
	Surveys Completed		68	61	
Teacher Background Questionnaire		Survey items created by Development Staff were formatted in EZSurvey.	All project teachers (Summer Institute attendees plus new teachers) were contacted.		ACT provided fall 2006 data.
	Response Rate		**65%**		
	Teachers Contacted		100		
	Surveys Completed		66		

Appendix I:

CARS Alignment Results

High School	BIOLOGY I CARS ALIGNMENT 2006	BIOLOGY I CARS ALIGNMENT 2007	ENGLISH 10 CARS ALIGNMENT 2006	ENGLISH 10 CARS ALIGNMENT 2007	GEOMETRY CARS ALIGNMENT 2006	GEOMETRY CARS ALIGNMENT 2007		BIOLOGY I CHANGE	ENGLISH 10 CHANGE	GEOMETRY CHANGE
A1	2/2	0/2	0/3	0/3	0/2	2/2		-2	–	+2
A2	1/1	1/1	0/2	2/2				–	+2	
A3					1/1	1/1				–
A4	3/3	3/3	0/2	2/2	2/2	2/2		–	+2	–
A5	1/1	0/1	0/1	1/1	1/1	1/1		-1	+1	–
B1										
B2	1/1	1/1			1/1	1/1		–		–
B3	1/1	1/1	0/1	1/1	0/2	2/2		–	+1	+2
B4	1/1	1/1	1/1	1/1	2/2	2/2		–	–	–
B5	1/1	1/1	0/1	1/1	1/1	1/1		–	+1	–
C1			0/2	0/2	0/5	0/5			–	–
C2	0/1	1/1	2/2	2/2	1/1	1/1		+1	–	–
C3			2/2	2/2	1/1	1/1			–	–
C4	0/2	0/2	0/2	2/2	2/2	2/2		–	+2	–
C5	1/1	1/1						–		
D1					1/1	1/1				–
D2					0/1	1/1				+1
D3	0/2	0/2	2/2	0/2	0/2	2/2		–	-2	+2
Aligned/Total Teachers	**12/17**	**10/17**	**7/21**	**14/21**	**14/25**	**21/25**		**-2**	**+7**	**+7**

Appendix J:
ACT Instructional Units Released to Project Participants

English 10

Introduction to English 10: The First Days of School *11 Class Periods*

Students will be introduced to several concepts that will be important for their entire year's schoolwork, and they will begin a conversation about the value of reading and writing. Students will become aware of and learn to use metacognitive strategies when reading difficult works; they will begin to learn the skill of annotation. Students will also increase their vocabularies by learning the Greek and Latin derivatives of everyday words. Finally, students will begin learning how to write, ask, and answer literal, interpretive, and beyond-the-text questions about texts they read. Overall, students will begin thinking about themselves as readers and writers.

Where Do I Fit In? Exploring Identity and Culture Through Literature *20 Class Periods*

Students will explore the concepts of identity and culture through reading poetry and three nonfiction selections. Students will gain a deeper understanding of the concepts of identity and culture, which will be useful to them as they read and interpret texts throughout the remainder of the course. Students will analyze poetic structures and devices and follow thematic links within a work and across works covered in the unit.

Warriors Don't Cry: Explorations of Culture, Identity, and History *25 Class Periods*

Students will continue their exploration of the intersection between identity and culture by reading a variety of nonfiction works centered around the civil rights movement of the 1950s and 1960s; an autobiography, excerpts from an essay, an executive summary, and a partial history of the desegregation of Little Rock Central High School in 1957. Students will also discuss themes of history, culture, and identity as they read one short story. Through reading, role playing, and viewing photographs and a documentary film, students will investigate aspects of the desegregation of public schools after the landmark education decision, *Brown v. Board of Education* (1954). Students will also write an essay about culture, heritage, and identity, in which they will describe an object, event, or story of importance to them.

I Need a Hero: Joseph Campbell and *Siddhartha* *22 Class Periods*

Students will learn about and work with Joseph Campbell's concept of the hero's journey. They will practice applying the structure of the hero's journey to stories and films with which they are familiar, to the short story "The Man to Send Rain Clouds," and to the complex novel *Siddhartha*. Students will develop the ability to identify similarities and differences in various pieces of literature. In a final essay, students will compare two characters' journeys.

Existentialism: Questions Without Answers *15 Class Periods*

After practicing active reading and note taking on a dense critical essay about existentialism, students will use close reading techniques to construct deeper meanings of two short stories, a poem, and an excerpt from an autobiography. To gain insight into both the essay and the other literature, they will connect the existentialist principles described in the essay to the texts. Meanwhile, students will write a three-page informational essay that explains the basic concepts of existentialism. In this paper, students will focus more on communicating to an audience than they have in previous essays.

Analysis of Speeches *13 Class Periods*

In this unit, students will learn about the art of persuasion as they analyze and interpret five persuasive speeches and write one letter to the editor. Students will also learn to identify logical fallacies and to distinguish fact from opinion. They will present their interpretations of modern speeches at the end of the unit.

Appendix J (cont.)

Geometry

Beyond a Shadow of a Doubt: Logic and Proof *9 Class Periods*

Logic can be defined as the science of reasoning. In high school geometry, students focus on producing and presenting logical arguments to explain and justify conjectures about geometric figures and real-world experiences. This unit begins with an understanding of conditional and biconditional statements that leads to both inductive and deductive reasoning. Students will begin to learn formal proof techniques using both algebraic and geometric ideas. Students will refine these techniques throughout the course.

What's So Special About Angle Pairs? *10 Class Periods*

This unit introduces students to the special pairs of angles formed by two coplanar lines and a transversal. Students will solve problems and complete proofs involving congruent and supplementary angle pairs formed by parallel lines. They will also use various angle pairs to prove that two lines are parallel.

Congruent Triangles: Shortcuts *7 Class Periods*

To explore congruence and the properties of congruent geometric figures, students will discover five methods for proving that triangles are congruent through an inductive approach. Then, using all five methods, along with previously studied properties of triangles, students will prove that triangles and parts of triangles are congruent. Proving that triangles are congruent allows students to practice their deductive reasoning skills and to communicate mathematically while using the properties of triangles.

What's Your Angle on Polygons and Quadrilaterals? *10 Class Periods*

The following activities are designed to help students generate and apply formulas to find the measures of the exterior and interior angles of convex polygons and to explore the properties of special quadrilaterals. Students will practice solving both algebraic equations and real-life problems and completing proofs.

What's So Right About Right Triangles? *6 Class Periods*

Using the Pythagorean Theorem and its converse, students will investigate how to solve mathematical and real-world problems involving right triangles, Pythagorean triples, geometric mean, and the relationships among the sides of special right triangles.

Going in Circles *9 Class Periods*

Students will investigate the relationships between angle measures, intercepted arc measures, and segment lengths formed by lines and line segments associated with circles. The equation of a circle will be introduced, and students will solve problems involving inscribed and circumscribed polygons.

Appendix J (cont.)

Biology

Demystifying the Nature of Science *7 Class Periods*

Students will examine the characteristics that define science as a unique way of study.

The Five-Second Rule: A Rule to Live by or a Myth to Bust *10 Class Periods*

To reach the goals of the National Science Education Standards, students must be encouraged to investigate the natural world and be taught methods of scientific inquiry. This unit is designed to engage students in developing these important skills. It is intended to introduce students to the study of biology through scientific inquiry.

Beaks, Beans, and M&M's: A Study of Natural Selection *8 Class Periods*

This unit will help students investigate the components of natural selection through the process of scientific inquiry.

Atomically Correct *10 Class Periods*

Students will use models to learn about the subatomic particles that compose atoms and how to distinguish between electrically neutral atoms and their ions. Then, students will determine how the valence electrons of atoms are involved in the formation of ionic and covalent bonds. Finally, they will investigate the behavior of ionic and covalent compounds in solution and the effect of pH on enzyme action.

The Organization of the Biosphere *11 Class Periods*

This unit will help students define ecology and develop an understanding of the organization of the biosphere. Students will analyze different types of communities and study the effect of interactions within ecosystems and the role of such interactions in the process of succession.

Mendel's Peas: A Study of Mendelian Genetics *11 Class Periods*

The mechanism through which traits are passed down from generation to generation confounded biologists, as well as farmers, philosophers, and parents, for many years. Gregor Mendel, an Austrian monk and biologist, developed a model of inheritance that predicted how traits were passed from parent to offspring in most organisms. In this unit, students will investigate the science behind Mendel's conclusions and replicate his results.

Appendix K:

End-of-Course Assessment Mean Scores

School	Subject	Student Count	Mean
A1	Biology I	293	34.74
A2	Biology I	54	37.08
A4	Biology I	294	42.21
A5	Biology I	30	46.89
B2	Biology I	49	56.71
B3	Biology I	159	40.29
B4	Biology I	60	29.34
B5	Biology I	99	50.49
C2	Biology I	72	38.89
C5	Biology I	116	42.21
D2	Biology I	55	54.59
D3	Biology I	74	43.69
A1	English 10	101	47.78
A2	English 10	43	54.93
A4	English 10	81	58.38
A5	English 10	13	28.74
B2	English 10	47	53.22
B3	English 10	99	46.89
B4	English 10	103	57.76
B5	English 10	110	66.42
C1	English 10	44	67.37
C2	English 10	145	46.66
C4	English 10	119	62.85
D2	English 10	120	54.58
D3	English 10	81	53.07
A1	Geometry	194	33.89
A2	Geometry	117	41.97
A3	Geometry	83	29.20
A4	Geometry	170	35.28
A5	Geometry	20	17.63
B2	Geometry	25	25.76
B3	Geometry	57	35.18
B4	Geometry	73	28.37
B5	Geometry	43	42.96
C1	Geometry	219	38.17
C2	Geometry	66	31.22
C3	Geometry	86	28.73
C4	Geometry	33	34.32
D1	Geometry	13	32.79
D2	Geometry	47	36.59
D3	Geometry	80	44.18

Appendix L:

Rankings Based on Participation Levels and Testing Data

These tables show which groups of teachers participated at higher rates in project activities, whose students performed relatively better on the assessments, and whose curriculum was aligned at a higher rate to ACT course objectives. The departments and teachers in the upper tier of these rankings correspond to observational judgments of which teachers were more committed to the project goal and which will most likely engage in continued efforts to increase course rigor. The tables represent the average of rankings (with 1 being the highest and 20 assigned to null values) of each subject area based on data for the following:

1. Fall 2006 Pre-Test Mean Scores
2. Spring 2007 Post-Test Mean Scores
3. Change in Pre– Post-Test Mean based on ">chance" scores
4. Professional Development Activities per Teacher
5. Benchmark 1 Mean Scores
6. End-of-Course Assessment Mean Scores
7. Spring 2007 *CARS* Alignment Rates

Only schools with subject teachers that had data for at least one of the above activities are presented in these tables.

Biology I

School	Average Rank
B5	2.6
D3	4.6
A4	5.0
A1	6.0
B4	6.0
C4	7.1
C2	7.7
B2	8.4
A2	8.6
A5	9.6
B3	9.7
C5	11.0
D2	15.3
B1	18.3

English 10

School	Average Rank
C4	2.4
A4	3.9
B5	4.1
D3	5.7
B4	6.1
C1	6.6
A2	7.0
A1	7.1
C2	7.7
B3	9.3
A5	9.7
C3	10.0
D2	15.1
B2	16.7
B1	18.9

Geometry

School	Average Rank
D3	2.4
A4	3.9
B5	5.7
B4	6.0
A1	6.1
C1	6.6
B3	6.9
A3	7.0
D2	7.6
C4	8.6
C2	8.7
C3	10.0
B2	10.9
A5	12.1
D1	15.0
A2	15.9
B1	18.4