The Northeast Tennessee College and Career Ready Consortium

Online Learning and Advanced Placement

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IRM-2014-U-007317 Final
April 2014

CNA
ANALYSIS & SOLUTIONS

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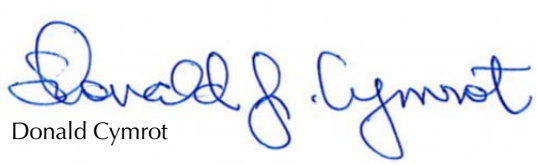

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Executive Summary

The Northeast Tennessee College and Career Ready Consortium (NETCO), composed of 15 school systems and 30 high schools, is working (1) to ensure all students, especially students from underrepresented populations, graduate high school ready for college or career and (2) to increase the likelihood that students successfully complete college. Many of the NETCO initiatives focus on improving and expanding student access to academically rigorous courses through dual enrollment, Advanced Placement (AP), distance learning, and online learning.

This report focuses on two of NETCO's course-related strategies: increasing the number of Advanced Placement courses offered and increasing the number of rigorous online learning courses offered at each of NETCO's 30 high schools. The report answers the following research questions:

1) What changes have occurred since school year 2012/13 in online learning courses and enrollment, including grade level and type of course?

2) What changes have occurred since school year 2012/13 in Advanced Placement courses and enrollment, including grade level participation and AP exam participation and pass rates?

3) What are the important drivers of, and challenges to, the growth of online and Advanced Placement courses?

Data from CNA's biannual enrollment survey of NETCO's schools were used to answer the first research question, supplemented by data from the student information system supporting the Niswonger Foundation Learning Center's online course portal (NFLC Online). Data from the Tennessee Department of Education were used to answer the second question; and qualitative data from focus groups held by CNA in February and March 2014 were used to answer the last research question.

Online Learning

NETCO's efforts to increase students' access to and enrollment in academically rigorous coursework online are beginning to yield results. Enrollment in online learning has consistently met or exceeded the goals that were set at the start of the project. By the end of fall 2013, NETCO had exceeded the 2013/14 enrollment goal. Every school in the consortium now offers online courses to its students.

Two thirds of all online enrollments in fall 2013 were in courses offered by the Niswonger Foundation Learning Center. For online dual enrollment courses, Walters State Community College and Northeast State Community College continue to account for the greatest number of enrollments. English, social studies, and mathematics are the course subjects with the most enrollments.

Drivers for increasing participation in online learning

- Large schools use online courses to expand course offerings for electives, while small schools tend to use them for required coursework.
- Counselors and online liaisons play a large role in the selection and recruitment of students for online courses.

Challenges to online learning

- Schools are hesitant to use online courses when an end-of-course (EOC) assessment is required.
- New online facilitators need experienced mentors.
- Students in the smaller schools lack computers and high-speed Internet access at home.
- Students lack familiarity with the technology used in online courses.

Advanced Placement

While AP enrollment is not meeting NETCO's goals, it is steadily catching up. At the end of fall 2013, enrollment in AP had reached 49 percent of the total enrollment for 2012/13. The percentage of students taking at least one AP course has been increasing each year, while the average number of courses offered per school has re-

mained about the same. While almost all grade levels have at least some students taking multiple AP courses, a pattern is emerging: freshmen and sophomores primarily take one AP course, juniors take one or two courses, and many seniors take three.

NETCO's AP exam pass rate dropped in 2012/13; until then its rate had exceeded those across Tennessee and nationwide. This is likely due to 30 percent more students taking the exam that year. That same year, almost 8 percent of NETCO's graduating seniors had passed at least one AP exam while in high school, approximately 3 percent had passed at least four AP exams (equivalent to one semester of college credit), and less than 1 percent had passed eight or more AP exams (equivalent to two semesters).

Drivers for increasing participation in Advanced Placement courses

- Schools develop a culture of AP course taking.

Challenges to Advanced Placement courses

- Individual recruitment for the AP program is largely dependent on AP teachers in the schools.
- Schools need to continue to develop and maintain qualified AP teachers.
- AP teachers lack networking opportunities to build resources and share knowledge.
- Students lack additional support (e.g., out-of-class instruction, study materials) in AP programs.

Recommendations

As NETCO plans for the final grant-supported school year, it can look for opportunities that can result in increased enrollments in online learning and AP courses. Using the findings from our analysis, we offer the following recommendations.

Recommendations for online learning

- Encourage schools to open online learning to all interested students.
- Develop a mentoring system for online facilitators.

- Provide professional development around blended instruction.

Recommendations for Advanced Placement courses

- Support AP teachers in their recruitment efforts.
- Implement NETCO-wide student study and review sessions.
- Build interest in AP exam participation at the administrative level.
- Encourage AP teachers to apply to become readers for the open-response portion of the AP exam.

Introduction

The Northeast Tennessee College and Career Ready Consortium (NETCO) is a consortium of 15 neighboring Tennessee school systems that govern a total of 30 high schools.[1] The consortium is funded by a five-year Investing in Innovation Fund (i3) grant from the U.S. Department of Education awarded in 2010 and managed by the Niswonger Foundation. Currently in year 4, the grant focuses on two aims: ensuring that all students who graduate from high school are college or career ready, and increasing the likelihood that students will successfully complete college.

Among its initiatives, NETCO is helping high school students graduate better prepared for college or careers by expanding their access to academically rigorous courses—Advanced Placement (AP); dual enrollment; science, technology, engineering, and mathematics (STEM); foreign language; and career and technical education (CTE)—through the use of online and other distance learning course delivery methods. This report focuses on two of NETCO's course-related strategies for achieving that goal: increasing the number of Advanced Placement courses offered and increasing the number of rigorous online learning courses offered at each of NETCO's 30 high schools.

NETCO engaged CNA Education to provide an ongoing external evaluation of the program. CNA Education designed a two-pronged evaluation. The first component is a formative evaluation intended to provide regularly updated information on the progress of and impediments to implementation, helping NETCO leaders respond to challenges on the ground and thus increasing the chances of program success. The second component, not discussed in this report, is summative and will assess how well NETCO has advanced in its objectives over the performance period of the grant.

1. The consortium began with only 29 high schools in the region. University School was included in the consortium as of the 2013/14 school year. Previously, it had not participated in NETCO activities.

This report is the third quarterly formative report for grant year 4 and builds on analysis of online learning and Advanced Placement efforts in the July 2013 Formative Report (Holian, 2013). In this report, we describe how online learning and Advanced Placement courses and enrollments in NETCO high schools have changed since 2012/13 and note NETCO's progress in year 4 toward meeting its interim goals; and we provide feedback from stakeholders about impediments and how to remove them.

Research questions

To help inform NETCO planning, this report answers the following research questions:

1) What changes have occurred since school year 2012/13 in online learning courses and enrollment, including grade level and type of course?

2) What changes have occurred since school year 2012/13 in Advanced Placement courses and enrollment, including grade level participation and AP exam participation and pass rates?

3) What are the important drivers of, and challenges to, the growth of online and Advanced Placement courses?

Data sources

To answer the first research question, we use data from enrollment surveys of NETCO and comparison schools. These surveys, conducted by CNA during each fall and spring semesters, collect enrollment data for online learning, dual enrollment, distance learning, and Advanced Placement courses. Data collected for online learning include course name and code, provider, number of students taking the course, and course type (i.e., regular, Advanced Placement, dual enrollment). We supplement the survey data with data from the Niswonger Foundation Learning Center's (NFLC's) student information system (OpenSIS™), which provides enrollment information for online courses offered through the NFLC Online course portal.

To answer the second research question, we analyze Advanced Placement course enrollments and AP exam results using data pro-

vided by the Tennessee Department of Education (TDOE) and data collected from our fall 2013 enrollment survey. Data collected for Advanced Placement include course name and code, method of delivery (e.g., regular, distance learning), and number of students taking the course. Advanced Placement courses that are delivered online are included in the analysis of online course data.

The last research question we analyze using qualitative data collected from four focus groups conducted by the CNA Education team in late February and early March 2014 with online liaisons, online course facilitators, and Advanced Placement teachers.

The position of online liaison was created at the schools by the NETCO team for the 2013/14 school year, with the aim of helping to sustain online learning after the i3 grant is over. The purpose of the online liaison is to provide someone at the school with decision-making authority to formulate a plan for online learning (e.g., who takes it, how grades get distributed, etc.), identify and register students, monitor their progress, and act as a point of contact for the online facilitators when issues arise that need to be addressed with a student. The school determines the most appropriate person to be its online liaison, which can be a principal, assistant principal, lead counselor, or other designate.

Two online liaison focus groups addressed three areas: participation in online learning (both school and student), NETCO support to online learning in the school, and successes and challenges of online learning. The discussion about participation focused on understanding how schools use online learning to support student course needs (remediation, regular coursework, AP, etc.), whether students are aware of online learning opportunities and the criteria used to target them for participation in online courses, monitoring student progress in an online class, and the supports to help students successfully complete the class. The online liaisons described the types of supports that NETCO provides to schools that offer online courses and suggested areas where NETCO could provide further support. Lastly, the group discussed the successes and challenges of online learning.

The online course facilitator (teacher) focus group talked about their efforts to prepare for and teach online courses. The teachers we met provide their courses through the Niswonger Foundation Learning

Center. The discussion focused on three areas; professional development, delivery of content, and challenges of online teaching. Some of the facilitators in the focus group had previous experience teaching online courses before they began working with the NFLC. The group discussed the types of professional development they had received prior to teaching an online course and what additional training would be useful. There was discussion on how they interact with students and monitor progress online. The focus group ended with a discussion of the successes the teachers had and the challenges they and their students face in the online environment.

We also conducted a focus group with Advanced Placement teachers from several NETCO schools. The participants in the AP teacher focus group all conducted classes face-to-face in a traditional classroom setting, though at least one teacher also taught an online AP class. Like the online facilitators', the AP teachers' discussion revolved around the preparation and teaching of courses at the schools. The focus group discussed the types of professional development they received prior to teaching an AP course and what additional opportunities they have received since. There was discussion around the selection of students into the AP program, the types of supports students receive, and AP exam participation. As with the other two focus groups, the meeting ended with a discussion of successes and challenges.

Online Learning

Online learning (or virtual, cyber, or e-learning) refers to a course delivery method in which instruction and content are delivered primarily over the Internet (Watson & Kalmon, 2005). The literature around online instruction (teaching) is extensive, but the research related to student outcomes, especially for advanced courses, is limited to descriptive analysis (U.S. Department of Education [ED], 2007, 2010).[2] Nevertheless, a growing body of evidence suggests that online education may be as effective as traditional face-to-face delivery options, even for advanced courses such as Advanced Placement.

Online learning is one of the strategies used by NETCO to provide students access to rigorous academic coursework. A wide range of courses are offered through online learning in the NETCO high schools, including dual enrollment courses where students are able to receive both high school and college credit for a single course, and Advanced Placement courses, as well as credit recovery programs offered by other providers to support students in completing the set of courses required for a high school diploma.

NETCO efforts in online learning focus on providing access to upper-level (junior- and senior-level courses) and advanced coursework (dual enrollment and Advanced Placement). Perhaps the best evidence for the effectiveness of online advanced coursework is a recently released study by Regional Educational Laboratory Northeast and Islands. This experimental study examined differences between students who took Algebra I online in grade 8 and a comparison group who took grade 8 math in a traditional classroom because their schools did not offer Algebra I. The study found that taking Algebra I online resulted in better course grades and higher enrollment in advanced math courses once students were in high school (Heppen et al., 2012). The caveat, however, is that the comparison was not direct-

2. The U.S. Department of Education cautions that "this is not the kind of experimental research that can provide valid causal claims about what works" (ED, 2007, p. 8).

ly between online algebra and algebra taught in the traditional classroom.

Several nonexperimental research studies have attempted to compare the outcomes of students taking AP courses online with those of students in other settings. These studies have frequently found that students in online courses do as well or better than students in traditional settings, though the studies cannot claim that online delivery caused the superior outcomes (Barbour & Mulcahy, 2006; Florida TaxWatch, 2007; Linkenhoker, 2009).

Online courses are important for expanding the curriculum of smaller NETCO schools, and many of the school online liaisons believe that *all* students (not just those high-performing students traditionally targeted) benefit from taking a course online, since so much of life today is conducted online (e.g., filing income taxes, e-commerce). Research suggests that benefits of online course taking may go beyond traditional measurable skills. For example, a U.S. Department of Education (2007) research summary suggests that online courses may promote 21st-century skills (e.g., critical thinking, collaboration, and information literacy), improve course-completion rates, and increase student satisfaction. The courses examined spanned grades 9 through 12, covered multiple subjects, and ranged in rigor from remedial to Advanced Placement.

In the following analysis, we examine the changes in online learning since 2012/13 with respect to total enrollments, number of courses, and number of schools participating. In addition, we examine enrollment in terms of the course type to determine whether growth occurred in online rigorous academic coursework (i.e., dual enrollment, Advance Placement, and upper-level high school courses). Lastly, we look in detail at both dual enrollment and Advanced Placement online course offerings to understand changes in enrollment by course and provider.

Enrollment in online learning

Prior to the grant not all NETCO high schools provided students the opportunity for online learning, much less access to rigorous academic coursework in an online environment. The Niswonger Foundation used a portion of the i3 grant funds to update and expand an

online learning center (NFLC Online) as a means of providing rigorous, upper-level courses to all NETCO high schools. It has also supported Tusculum College and Walters State Community College in the development of online dual enrollment courses.

In fall 2013, 27 NETCO schools offered online courses and the remaining three schools likely will offer online courses in spring 2014,[3] as seen in Table 1. Since the first year, there has been steady increase in the number of schools offering online courses; by the third year of the grant, all schools offered at least one online course.

Total enrollment also increased each year, and the trend of increasing enrollments will continue in the 2013/14 school year. Data from the fall 2013 enrollment survey indicate that NETCO has already reached 89 percent (2,079) of last year's enrollment.

Table 1. Summary of online learning (2010/11–fall 2013)

	2010/11	2011/12	2012/13	2013/14 (as of fall 2013)
Total enrollment	426	711	2,346	2,079
Number of schools participating	11	20	29[a]	27

Source: CNA enrollment surveys for 2010/11 through fall 2013.

a. Data for University School, NETCO's 30th high school, was not collected in the first three years of the grant.

NETCO has met or exceeded the goals for online learning set by the Advisory Board in each of the past three years, as seen in Table 2. At the end of the fall 2013 semester, NETCO had already exceeded this year's goal. If the yearly trend in enrollment continues, NETCO's five-year goal for online course enrollment likely will be met with only minimal yearly increases.

3. As of March 31, at least one of the remaining three schools is offering an online course in spring 2014. Data are not available for the other two schools at the time of this report.

Table 2. Progress toward yearly enrollment goals for online courses (2010/11–2014/15)

	2010/11	2011/12	2012/13	2013/14	2014/15
Actual enrollment in online courses	426	711	2,346	2,079[a]	
NETCO goal for online enrollment	–[b]	706	1,266	1,826	2,826
Difference	**–**	**+5**	**+1,080**	**+253**	
Actual vs NETCO goal	–	101%	185%	114%	

Sources: NETCO Advisory Board and CNA enrollment surveys for 2010/11 through fall 2013.

a. Data as of summer/fall 2013 only.

b. 2010/11 was the baseline year and therefore had no associated goal.

Online enrollment by course type

To understand changes in students' access to rigorous courses online, we examine the distribution of course enrollments across course types for school years 2011/12 and 2012/13 and fall 2013.[4] In particular, we focus on dual enrollment and AP courses. It should be noted that in some cases, AP, dual enrollment, upper-level (junior, senior), and career and technical education coures may overlap in terms of course type. In this analysis, however, we did not allow for this overlap, instead categorizing by the highest level of the course. For example, if a CTE course is also a dual enrollment course, it is counted only once, as a dual enrollment. (Detailed information about course offerings within each type can be found in appendix A.)

In fall 2013, dual enrollment and Advanced Placement courses represented 5 percent (106 enrollments) of total online course enrollments. Enrollment in online dual enrollment courses has reached 69 percent of the previous year's enrollment; however, enrollment in Advanced Placement has been small (Table 3).

4. Due to missing data for the 2010/11 school year, we are unable to include it in analyses where enrollments are examined at the course level.

Table 3. Summary of student online enrollment by course type (2011/12–fall 2013)

	2011/12	2012/13	2013/14 (as of fall 2013)
Dual enrollment courses	44	144	100
Advanced Placement courses	8	31	6
Upper-level courses (junior, senior)	310	987	777
Career and technical education courses (high school)	85	233	151
Other courses	264	950	1,045
Total enrollment	**711**	**2,346**	**2,079**

Source: CNA enrollment surveys for 2011/12 through fall 2013.

It should be noted that the online liaisons have some concern about the difficulty of taking dual enrollment and AP courses online. They believe that students who aren't prepared for the rigor, combined with the inherent challenges of online learning (self-motiviation, etc.), have difficulty successfully completing these courses. But one online facilitator who has taught several online AP courses told us that a class of students in an online course is like any class in a traditional classroom: some students are very engaged and do well, other students have problems completing assignments on time and keeping up, but most students are able to follow the coursework and complete it.

Online dual enrollment course enrollment

In the following analysis, we examine the change in the number of dual enrollment courses offered for school years 2010/11 to 2012/13 and fall 2013. We also examine enrollment and number of courses offered by postsecondary institutions. Our analysis with respect to postsecondary institutions is limited to 2012/13 and fall 2013 due to incomplete data in the prior years.

English, social studies, and mathematics continue to be the subject areas with the greatest number of enrollments (Table 4). This is likely because students are required to have four credits each of English, social studies, and mathematics to graduate; the associated dual enrollment courses fulfill those requirements. The remainder of the enrollments is spread across a range of courses and is dependent on student interests, which change from year to year.

Table 4. Enrollment in online dual enrollment courses by subject (2011/12–fall 2013)

	2011/12	2012/13	2013/14 (as of fall 2013)
English	**3**	**58**	**15**
Composition I	3	31	3
Composition II	0	21	11
Literature	0	2	1
World Literature	0	4	0
Social studies	**35**	**18**	**17**
U.S. History	35	18	15
Western World Civilization	0	0	2
Mathematics	**0**	**35**	**46**
Bridge Math (SAILS)	0	0	44
Probability & Statistics	0	16	2
Calculus I	0	14	0
College Algebra	0	5	0
Career and technical education	**4**	**23**	**4**
Introduction to Public Safety	0	0	2
Global Health Issues	0	0	1
Information Technology	0	0	1
Licensed Practical Nursing	0	19	0
Medical Dosage and Calculations	0	2	0
Nursing Trends and Issues	1	1	0
Medical Coding	1	0	0
Computer-Aided Design	1	1	0
Applied Technology	1	0	0
Foreign language	**0**	**1**	**2**
Spanish I	0	1	1
Spanish II	0	0	1
Other	**2**	**9**	**16**
Psychology	0	6	10
Music Appreciation	0	1	5
Art History	0	1	1
Sociology	0	1	0
Public Speaking	1	0	0
Speech	1	0	0
Total enrollment	**44**	**144**	**100**

Source: CNA enrollment surveys for 2011/12 through fall 2013.

The largest percentage of enrollments in fall 2013 is at Northeast State Community College (NESCC), as seen in Table 5. This fall NESCC began offering Bridge Math (SAILS) online for students to earn developmental college credit. Students who successfully complete the first three modules of SAILS can fulfill the Bridge Math high school credit that is required for students scoring less than 19 on the math ACT. If a student completes all five modules of the SAILS program, she or he is eligible to take a college mathematics course.

Walters State Community College (WSCC) and NESCC continue to have the largest number of enrollments in online dual enrollment courses; however, efforts made by Tusculum College to provide more online offerings and enroll students in online courses is beginning to show results, with an increase in the number of high schools using its courses and a corresponding increase in enrollments.

Table 5. Online dual enrollment providers (2012/13–fall 2013)

	2012/13			2013/14 (as of fall 2013)		
	# of schools	Total enrollment	# of courses	# of schools	Total enrollment	# of courses
Northeast State Community College	1	39	3	2	44	1
Walters State Community College	6	56	8	5	34	13
Tusculum College	2	10	3	5	21	6
Milligan College	0	0	0	1	1	1
Tennessee Technology Center at Elizabethton	1	19	1	0	0	0
East Tennessee State University (ETSU)	3	16	3	0	0	0
Tennessee Tech University	1	4	3	0	0	0
Total	**8**[a]	**144**	**21**	**11**[a]	**100**	**21**

Source: CNA enrollment surveys for 2012/13 and fall 2013.

a. This total (8 and 11, respectively) represents the number of NETCO schools offering students one or more online dual enrollment courses. As some schools partner with more than one postsecondary institution, this total is less than the sum of those partnerships (14 and 13).

Online Advanced Placement course enrollment

While NETCO schools offer online AP courses to their students, there are only a small number of enrollments per year (Table 6). In

the fall, only one AP course was being taken online; but we expect additional offerings in the spring semester, when AP enrollment usually increases. The majority of online AP courses are provided by the Niswonger Foundation Learning Center and Florida Virtual School.

Table 6. Enrollment in online Advanced Placement courses by subject (2011/12–fall 2013)

	2011/12	2012/13	2013/14 (as of fall 2013)
AP English Language & Composition	0	17	6
AP English Literature & Composition	0	9	0
AP Biology	0	1	0
AP U.S. History	6	2	0
AP Art History	0	2	0
AP Calculus	0	1	0
AP Computer Science	2	0	0
Total	**8**	**32**	**6**

Source: CNA enrollment surveys for 2011/12 through fall 2013.

Online course providers

Subject area and course type aside, online offerings from the grant-funded Niswonger Foundation Learning Center and from Grade Results™ accounted for almost 73 percent (1,712) of all enrollments for the 2012/13 school year and 80 percent (1,665) of all enrollments in fall 2013 (Table 7).

Because NFLC is the one of the major providers to NETCO schools for online courses (some 60 percent of enrollments in the last two years), sustainability of the online course program will be an issue for the consortium after the end of the i3 grant. In our focus groups with the online liaisons, we heard of cases where more than one provider is available for a particular course, but schools routinely choose NFLC over other providers, such as Florida Virtual School, due to the quality of the NFLC's courses and NETCO support.

Table 7. Enrollment by provider (2012/13–fall 2013)

	2012/13	2013/14 (as of fall 2013)
NFLC Online	58%	66%
Grade Results	15%	14%
A+ UCHS	0%	7%
Compass Learning	5%	4%
Sullivan County Virtual Learning	9%	3%
Northeast State Community College	2%	2%
Walters State Community College	2%	2%
Tusculum College	0%	1%
Florida Virtual School	2%	<1%
BYU	0%	<1%
THS eLearn	1%	<1%
Keystone	<1%	0%
Milligan College	<1%	0%
Unidentified	2%	0%
Tennessee Technology Center	1%	0%
East Tennessee State University	1%	0%
Edison Learning	<1%	0%
Tennessee Tech University	<1%	0%
TOPS	<1%	0%

Source: CNA enrollment surveys for 2011/12 through fall 2013.

The Niswonger Foundation intends to continue hosting online content on its servers after the grant expires for use by teachers in the NETCO schools. It is not clear at this time, however, whether online teachers will also be available; Niswonger is exploring options for fee-for-service. If no online teachers are available, it is likely that many schools will turn to Florida Virtual School to fill student needs. That NFLC course content will continue to be available on its servers provides an opportunity for schools to use blended learning—where classroom teachers use the online course content in class or have students access it outside of class, then supplement their instruction with in-class activities.

As the NFLC prepares for the final year of the grant, it is working with the NETCO schools to identify which of its courses are of highest priority with respect to student needs. Given the feedback at the February 2014 NETCO Course Review Meeting and from the online

liaison focus groups, these courses will likely be a mix of required courses (such as English, mathematics, and social studies) and electives.

Drivers and challenges for online learning

Discussions in our focus groups with the online liaisons and online facilitators that identified drivers for online learning improved our understanding of how online course participation can be increased in the final year of the grant. The discussions also identified challenges that schools and students face in successfully completing online courses.

Increasing participation in online learning

Large schools use online courses to expand course offerings for electives, while small schools tend to use them for required coursework. Large NETCO schools use online courses to provide opportunities for students to complete required coursework earlier in their high school careers or to provide electives. For example, one liaison mentioned students taking Geometry during the summer term so they had more flexibility during the school year to take other courses.

However, online liaisons from the smaller schools mentioned that online courses were how they provide many upper-level courses, due to limited availability of faculty. For example, one of the smaller NETCO schools has almost every junior or senior participating in at least one online course in order to complete diploma requirements. In addition, the school is using online courses to meet science needs in physics or chemistry. The liaison from another small school mentioned that it would be unable to offer certain courses to students without these online courses.

Counselors and online liaisons play a large role in the selection and recruitment of students for online courses. School counselors in the schools and the NETCO College and Career Ready Counselors are the typical points of contact regarding the online program and do most of the recruiting for the program for many NETCO schools. It was mentioned in the online liaison focus groups that some school counselors are not as aware of online opportunities as they should be, which may be resulting in less use of the program by some schools.

Facing challenges to online learning

School challenges

Schools are hesitant to use online courses when an end-of-course (EOC) assessment is required. Online courses come with a unique set of challenges in terms of providing instruction and keeping students engaged. If a course that has a required EOC assessment is available in a traditional format, schools prefer students take the course in the classroom. As a result, there may be more demand for online courses from schools for courses without EOC assessments, such as Personal Finance, Psychology, Economics, or Government.

Teacher challenges

New online facilitators need experienced mentors. Many of the online facilitators with less than a year of experience teaching online courses have difficulty finding a more experienced facilitator who can act as a sounding board or guide them in such things as developing or revising an online course, interacting with students, or managing the online course software. The NETCO-sponsored professional development for online facilitators in May 2013 gave them the opportunity to network with peers, and they naturally sought out experienced teachers to help answer their questions.

Student challenges

Students in the smaller schools lack computers and high-speed Internet access at home. Online courses fill many of a school's needs; but students who take the online courses in smaller, less affluent, or rural schools may not have a computer at home or may be able to access the Internet only through dial-up. When this is the case, schools have to either make time during the school day or provide computer/Internet access to students after school in order for them to be able to complete their online coursework. Some schools schedule class time for students taking online courses; others are using their in-school enrichment periods for this. The online liaisons mentioned that the Niswonger Foundation–provided laptops have been helpful in providing students access to computers, and that the laptops are always checked out.

Students lack familiarity with the technology used in online courses. While high school–age students may be extremely capable with, say,

smartphones and Internet browsers, such abilities do not automatically make them capable of using the software or technology providing their online courses. For example, students may routinely text on their phone, but they may not use email or even understand that it needs to be checked regularly for class information and grades. The online liaisons pointed out that the online courses are often the first time that students are required to upload documents to another server for a teacher to review. Some schools have students take a test to demonstrate their ability to use the technology. One online liaison mentioned that her school brought together all students taking an online course at the beginning of the semester to walk them through the online software and explain how an online class works, where students should look for grades, and how to communicate with the teacher.

Advanced Placement

The national Advanced Placement (AP) program, created by the College Board, offers high school students college-level curriculum in a wide range of subject areas, as well as culminating proprietary examinations. Colleges often grant course credit to students who achieve a certain score on these AP exams.

Increasing the number of AP courses offered is one of NETCO's strategies to improve access to academically rigorous courses, ensure students graduate college ready, and increase the number of students graduating high school with college credit. Since award of the i3 grant, each summer the Niswonger Foundation provides teachers across the NETCO region the opportunity to attend the College Board Summer Institute to obtain certification as an AP instructor or, for current AP teachers, to update their knowledge about content and materials. Offering more AP courses is step one; step two is to increase students' access to and enrollment in AP classes.

A large body of research examines the role of AP coursework in improving college enrollment, persistence, grades, credits earned, and graduation rates. Many studies show associations between students' AP performance and college outcomes (Hargrove, Godin, & Dodd, 2008; Mattern, Marini, & Shaw, 2013; Mattern, Shaw, & Xiong, 2009); however, these studies cannot claim that AP courses lead to those outcomes, due to the research methods used. Other studies do not find such associations (Ackerman, Kanfer, & Calderwood, 2013; Dougherty, Mellor, & Jian, 2006).

Our focus group indicated that there is concern in some NETCO schools that when a student takes but does not pass an AP exam; it discourages the student and other students from taking that or other AP courses. Must students take the AP exam (and risk not passing) to benefit from the program?

Approximately 40 percent of students in NETCO participate in an AP course each year but do not take the AP exam. In the literature, we found mixed evidence for associations between college outcomes and

participation in AP coursework without an exam. Some studies observed higher college enrollment and graduation rates, higher college GPA, and more credits earned for AP students (Hargrove et al., 2008; Speroni, 2011). On the other hand, several studies have not identified an association between taking an AP course but not the exam and college outcomes (Adelman, 2006; Dougherty et al., 2006; Geiser & Santelices, 2004).

Is *passing* the AP exam what's important? Again, the research is mixed. Jackson (2011), for example, conclusively attributed positive college outcomes to an AP program, based on a quasi-experimental design. He found that students in a specific AP program that offered incentives for passing AP exams had higher college enrollment rates, higher college grades, and higher persistence rates to the second year than students in comparison schools, whether the students actually passed the exam or not. Additional studies suggest that taking an AP exam is associated with positive college outcomes compared with not taking an exam, regardless of the score (Hargrove, Godin, & Dodd, 2008; Mattern et al., 2009, 2013). Other studies, however, did not find such an association (Ackerman et al., 2013; Dougherty et al., 2006).

In the following analysis, we examine the changes in Advanced Placement since 2012/13 with respect to total enrollment, number of courses, and number of schools participating. In addition, we examine enrollment at the grade level to determine when students begin taking AP courses and identify course-taking patterns. Lastly, we estimate the college credit that could be earned by graduating seniors in 2012/13.

Enrollment in Advanced Placement courses

Total enrollment in AP courses at NETCO schools increased steadily from 2010/11 to 2012/13 (Table 8, below). In fall 2013, Advanced Placement enrollment to date reached 49 percent of the previous year's total enrollment, with 22 schools offering at least one AP course. It is likely the trend in yearly increases will continue through 2014, since more students take an AP course in the spring semester because AP exams are given at the end of that semester.

Table 8. Summary of Advanced Placement (2010/11–fall 2013)

	2010/11	2011/12	2012/13	2013/14 (as of fall 2013)
Total enrollment	3,308	3,831	4,622	2,257
Average number of AP courses per school	6	6	6	6
Number of schools participating	22	22	25	22
Students participating in at least one AP course in NETCO schools	8%	9%	10%	–

Sources: Tennessee Department of Education. Data for 2013/14 come from our fall 2013 enrollment survey and from the Niswonger Foundation.

NETCO has consistently fallen short of the goals it set for itself in AP course enrollment. Still, the number of AP enrollments has steadily increased over the years, gradually closing the gap (Table 9). If student enrollment in spring 2014 is similar to last spring, then total enrollment for the school year will likely be similar; to meet the 2013/14 goal, however, will require an additional 15 percent increase over 2012/13 enrollment (another 689 students).

Table 9. Progress toward yearly enrollment goals for Advanced Placement courses (2010/11–2014/15)

	2010/11	2011/12	2012/13	2013/14	2014/15
Total enrollment in AP courses	3,308	3,831	4,622	2,257[a]	–
NETCO goal for enrollment in AP courses	4,471	4,471	4,891	5,311	5,731
Difference	**-1,163**	**-640**	**-269**	**-3,054**	
Actual vs NETCO goal	74%	86%	95%	42%[a]	

Sources: NETCO Advisory Board, Tennessee Department of Education, and CNA's enrollment survey for fall 2013.

a. Data for fall 2013 enrollments only.

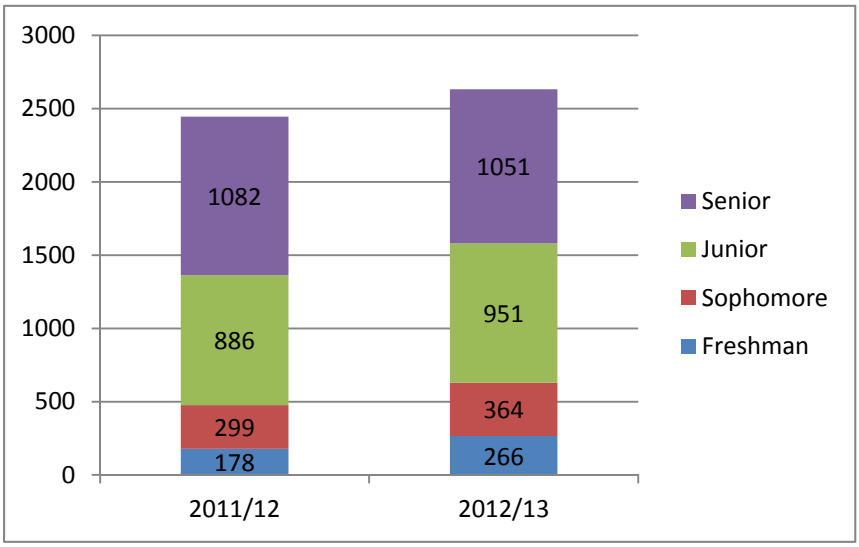
The AP course-taking pattern of the student population in NETCO schools, however, indicates that increasing enrollments in AP courses requires a two-pronged approach: (1) bring more new students into the program each year and (2) encourage students already taking a course to enroll in more than one.

Regarding the first strategy, the majority of NETCO students take AP courses in grades 11 and 12. One change in course taking that may help NETCO reach its enrollment goal for the 2014/15 school year

would be for students to begin taking AP courses earlier in their high school careers. We therefore examine the distribution of enrollment by grade for the 2011/12 and 2012/13 school years.[5]

Enrollment rates in AP courses have risen over the last two years for grades 9, 10, and 11, and dropped for grade 12, as seen in Figure 1. Some NETCO high schools are already offering AP Human Geography to students in grade 9 and U.S. Government to students in grade 10. The AP teachers tell us they believe that as more students take AP courses, enrollment will continue to rise as friends and family (e.g., siblings) continue the AP course-taking trend.

Figure 1. Enrollment in AP courses by grade level (2011/12–2012/13)



Source: Tennessee Department of Education.

Regarding the second strategy, we examine the total number of students by grade level and number of courses taken. The number of students in grade 9 taking an AP course increased in 2012/13, although freshmen are taking only one AP course. As early as grade 10, however, we begin to see a small number of students taking more than one course; and by senior year, many more students are taking multiple courses (Table 10).

5. Data related to Advanced Placement for 2010/11 cannot be matched at the student level to administrative data to allow for this analysis.

Table 10. Total number students in AP program by grade level and number of courses (2011/12–2012/13)

	# of students enrolled	
	2011/12	**2012/13**
Freshmen		
One course	178	266
Sophomores		
One course	263	328
Two courses	31	26
Three courses	5	8
Four or more courses	0	2
Juniors		
One course	542	616
Two courses	256	246
Three courses	48	49
Four or more courses	40	40
Seniors		
One course	549	592
Two courses	318	247
Three courses	162	137
Four or more courses	53	75
Total enrollment	**2,445**	**2,632**

Source: Tennessee Department of Education.

Advanced Placement exam participation

While NETCO wants to increase enrollment in Advanced Placement courses, it also has a goal to increase the number of college credits students have earned by graduation from high school. AP is one means of gaining college credit. However, a student is eligible to receive college credit only if she or he passes the AP exam with a score of 3 or higher.[6] In the following analysis, we examine AP exam participation and pass rates (i.e., the percentage of students in the class who take the AP exam and those who pass with a score of 3 or higher).

6. Most state colleges in Tennessee will grant students college credit for AP courses if they score at least 3 on the AP exam, although some colleges may require a higher score.

AP exam participation rates fluctuated over the past three years. Most recently, 60 percent of NETCO students who took an AP course actually took the exam (Table 11); and 58 percent of the students who took the exam in 2012/13 received a score of 3 or above and were eligible for college credit.

Table 11. Advanced Placement enrollment, exam participation and exam pass rates (2010/11–2012/13)

	2010/11	2011/12	2012/13
Total enrollment	3,308	3,831	4,622
AP exam participation rate	63%	56%	60%
AP pass rate (exam participants)	68%	66%	58%

Source: Tennessee Department of Education.

AP teachers in the focus group said they would like all students who take their course to take the AP exam, and they work hard to get students registered. Some schools pay a portion of the exam fee, and the Niswonger Foundation provides funds to students with financial need. Several schools will change the course name from "Advanced Placement" to "Honors" on the high school transcript if a student takes the course but not the exam. Even with these incentives, or disincentives, many students still do not take the exam.

NETCO AP exam pass rates exceeded both Tennessee and nationwide AP pass rates in the first two years of the grant, but not in school year 2012/13 (Table 12). This drop is likely caused by the large increase in students taking the AP exam.

Table 12. AP exam pass rates for NETCO, Tennessee, and nationwide (2010/11–2012/13)

	2010/11	2011/12	2012/13
NETCO	68%	66%	58%
Tennessee	59%	60%	60%
Nationwide	58%	59%	59%

Source: Tennessee Department of Education and College Board AP participation and performance data retrieved March 17, 2014, from http://research.collegeboard.org/programs/ap/data/participation/2013/.

We also look at AP exam participation rates with respect to course subject area. We understand that some students don't take Advanced Placement because they are concerned they may not pass the exam and do not want the result to appear on their school transcript. This suggests that courses that students consider hard might have lower participation rates. In the case of foreign languages, AP teachers in the focus group said they believe students often receive more college credits from taking the placement test at the college than from the AP exam in high school. Therefore, they did not push students to take AP language exams.

English and social studies AP courses had the highest exam participation rates in all three school years (Table 13), exceeded only by the 2012/13 foreign language rate (85 percent). Science has the lowest exam participation rates each year. AP English and mathematics courses had the highest exam pass rates each year, joined by fine arts in 2011/12. (For AP enrollments and exam participation and pass rates by individual course, see appendix B.)

Table 13. AP course enrollment, exam participation and pass rates by subject area(2010/11–2012/13)

	2010/11			2011/12			2012/13		
	Enroll.	Exam Partic. Rate	Exam Pass Rate	Enroll.	Exam Partic. Rate	Exam Pass Rate	Enroll.	Exam Partic. Rate	Exam Pass Rate
English	701	67%	73%	906	60%	67%	1,001	64%	58%
Mathematics	449	59%	74%	498	54%	71%	672	53%	67%
Social studies	1,343	65%	67%	1,609	59%	65%	2,037	64%	56%
Fine arts	71	58%	68%	64	42%	74%	66	38%	52%
Foreign language	58	47%	59%	43	44%	32%	33	85%	54%
Science	686	43%	54%	711	32%	61%	813	38%	55%
Total enrollment	**3,308**	**63%**	**68%**	**3,831**	**56%**	**66%**	**4,622**	**60%**	**58%**

Source: Tennessee Department of Education.

College credit earned from Advanced Placement exams

NETCO has a goal that 10 percent of its 2014/15 seniors will graduate high school having earned one year of college credit from dual enrollment and/or Advanced Placement courses. If we assume that a year of college credit is equivalent to 24 credits and that each credit-

bearing AP course carries the possibility of at least 3 college credits, then a senior will have to take and pass the AP exam for eight courses during his or her high school career or take and pass an equivalent combination of AP exams and dual enrollment courses.

Table 14. Estimated college credits earned by 2013 graduates

# AP courses taken	Students with AP exam score of 3 or above		Estimated # of college credits earned
	# of students	% of 2013 graduates	
1	157	2.7	3
2	80	1.4	6
3	54	0.9	9
4	49	0.8	12
5	30	0.5	15
6	25	0.4	18
7	18	0.3	21
8	9	0.2	24
9	9	0.2	27
10	3	0.1	30
11	1	0.0	33
14	1	0.0	42
Total	**436**	**7.5**	

Source: Tennessee Department of Education.

Looking at data for the 2013 high school graduates,[7] we can examine the effect the AP program may have on college credit earning. Almost 8 percent of NETCO high school graduates in 2013 could earn[8] at least 3 college credits through AP courses—that is, that students

7. The AP exam file for 2012/13 contains a record of all exams a student took while in high school. There are data limitations, in that students must have taken an exam in 2013 to appear in the file (i.e., if a 2013 graduate took an AP exam in any of grades 9–11, but did not take one in grade 12, he or she would not be included in the data).

8. "Could earn" because the actual credits awarded is not known and will vary depending on the college/university entered: students could be awarded more than 3 credits depending on their score and the particular AP course taken, or they could be required to score higher than 3 to receive any college credit. Our analysis does not include those considerations.

took at least one AP course in high school and passed the exam (Table 14, above). Not quite 3 percent could earn 12 hours or more of college credit (one semester's worth), and less than 1 percent could earn 24 college credits (two semesters') or more. This suggests that some NETCO graduates will have college credit as a result of taking AP courses, although it will be difficult for the NETCO goal of two semesters' worth of college credit to be met by AP enrollment alone.[9]

Drivers and challenges for Advanced Placement courses

In the last year of the grant, NETCO has the challenge of continuing to increase enrollment in AP courses sufficient to meet its goals. Talking with AP teachers in NETCO, we identified the drivers for increasing participation and the challenges that schools and students face in the AP program.

Increasing participation in Advanced Placement courses

School drivers

Schools develop a culture of AP course taking. AP teachers believe students will take an AP course if they know that others have taken it and succeeded; negative student feedback on an AP course can significantly reduce student interest. The teachers say they are working hard to ensure that students who take AP courses have a positive experience and will pass that positivity along to their peers and siblings. They also believe that once one student in a family takes an AP course, the rest are more apt to because AP course taking becomes something children in that family are expected to do.

One effective recruiting strategy would be to have graduates who took one or more AP courses, whether they received college credit or not, come back and talk to students in the high school. Once they

9. The AP teacher focus group mentioned that students who intend to go to a four-year state college are more likely to take AP courses rather than dual enrollment courses, since they know they will receive college credit if they pass the AP exam, but they are not guaranteed their dual enrollment (community college) credit will be accepted by the four-year institution.

begin taking college courses, even students who did not pass the AP exam can speak positively about how taking an academically rigorous course in high school can benefit their readiness for the college experience. One teacher in the focus group based his recruiting strategy on the cost of college, showing how much money students could save when they passed the AP test and received credit.

The Niswonger Foundation is using funds from the i3 grant to support AP camps this summer, which are designed around activities that demonstrate what an AP class is like.

Facing challenges to Advanced Placement courses

School challenges

Individual recruitment for the AP program is largely dependent on AP teachers in the schools. Not all schools use the same recruitment approach; but across all schools, it appears the individual AP teachers are primarily responsible for recruiting students to their course(s). Some teachers talk about their course(s) at the school's AP night to encourage students to register; others visit classrooms containing a target student group. Some teachers are selective and pre-identify a particular subset of students (e.g., top performers); others cast a wider net. The AP nights supported by the NETCO grant have brought awareness of AP to a larger body of students, but it is still up to the teachers to get students into the seats.

Schools need to continue to develop and maintain qualified AP teachers. NETCO provides training for teachers each summer in order to build a cadre of teachers that can be drawn upon to teach AP courses. This has been instrumental in building the AP program in the NETCO schools. But as time progresses, a trained teacher may move away from the area, be recruited by a larger school system, or be promoted. This means the school will have to either find another qualified instructor to teach the course or no longer offer it. Some schools have turned to online and distance learning to provide AP courses if they don't have an AP teacher on campus.

Teacher challenges

AP teachers lack networking opportunities to build resources and share knowledge. There have been very few opportunities for subject area teachers to collaborate and interact with one another outside of the

Niswonger-sponsored collaborative days offered in the past. The collaborative days were an opportunity for the AP teachers to meet informally, which they thought was very useful in building a peer network within specific subject areas for sharing resources and lesson plans. Some teachers mentioned that these meetings were the first time they had met another teacher in northeast Tennessee who taught their same AP course. One AP teacher reported she continues to be in contact with her College Board instructor, from whom she receives valuable advice and feedback throughout the year.

Student challenges

Students lack additional support in AP programs. Teachers report there have been adequate supports (e.g., training, materials, etc.) to help them with content and materials for their AP course. Additional support for students would be beneficial, however, both in additional time with the instructor outside the class and in materials for the courses. The Niswonger Foundation has been working to provide materials, equipment, and textbooks when needed, which has been useful in getting new AP courses, especially science, into NETCO schools.

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Conclusions and Recommendations

Over the past three years, NETCO's efforts to increase students' access to academically rigorous coursework are beginning to yield results. Enrollment in online learning has consistently met or exceeded the goals that were set at the start of the project; and at the end of the fall semester, the 2013/14 enrollment goal has already been met. Every school in the consortium now offers online courses to its students.

Offerings of online dual enrollment and online Advanced Placement courses increased, with corresponding increases in enrollment. Walters State Community College and Northeast State Community College have the largest total enrollment in dual enrollment courses, and both colleges are working hard to increase course offerings for this and following years. The majority of all online enrollments are associated with the Niswonger Foundation Learning Center (NFLC Online).

While AP enrollment is not meeting NETCO's goals, it is rapidly catching up. In fall 2013, enrollment reached 49 percent of total enrollment for 2012/13. If spring enrollment is similar to last year, then the same level of enrollment could be obtained. Freshman and sophomore AP enrollment rose in 2012/13 as students were steered into the AP program earlier in their high school careers. Almost all grade levels have at least some students taking AP courses, although a pattern is emerging: freshmen and sophomores primarily take one AP course, juniors take one or two courses, and many seniors take three.

NETCO's AP exam pass rate dropped in 2012/13; until then, however, its rate had exceeded those across Tennessee and nationwide. That same year, almost 8 percent of 2013 NETCO high school graduates passed at least one AP exam, less than 3 percent passed at least four AP exams (equivalent to one semester of college credit), and less than 1 percent passed eight or more AP exams (equivalent to two semesters).

Recommendations

As NETCO plans for the final grant-supported school year, it can look for opportunities that can result in increased enrollments in online learning and AP courses. Using the findings from our analysis, we offer the following recommendations.

Online learning

Our recommendations for online learning focus on two areas.

Improving participation

Encourage schools to open online learning to all interested students. Many schools have been selective about which students to target for online courses. Successful online students have good time-management skills and are self-motivated. School counselors or the online liaisons have acted as gatekeepers, registering students they believe would do well in an online course (e.g., top performers), rather than offering all interested students the opportunity. This approach to student recruitment is starting to change in many schools. One online liaison mentioned that she has begun letting any interested student take an online course, and finds that students she previously would not have considered good candidates do just as well as those she would have targeted in the past. This fact is particularly important for small schools that are beginning to rely on online courses as a way to provide required courses when faculty are unavailable.

Professional development

Develop a mentoring system for online facilitators. Matching long-time online facilitators as mentors with less-experienced facilitators, or simply developing a single facilitator to be a knowledgeable point of contact, would help teachers get answers to their questions about teaching online courses. Many new online facilitators are already reaching out on their own to their peers, but they told us they thought it would be beneficial if the process were formalized for future teachers.

Provide professional development around blended instruction. We found that the online liaisons believe that for some courses, such as Personal Finance, the online content is better than what is taught in the traditional classroom course. They would like classroom teachers to

draw more on the online course's available multimedia, selected readings, homework questions, and other content. Online content could also supplement instruction by teachers who are teaching outside their specialty, by improving the content of their courses. The NETCO Learning Resource team should consider designing professional development around blended learning, to help teachers from across the consortium to integrate online content into the physical classroom.

Advanced Placement

Our recommendations for Advanced Placement focus on three areas.

Student recruitment and support

Support AP teachers in their recruitment efforts. AP teachers will likely continue to be the primary way students learn about the AP program and are encouraged to enroll. NETCO could provide additional supports to the teachers, however, by ensuring school counselors make students aware of what AP courses are available and identify students to participate in AP nights at their school. This would be in addition to NETCO continuing its financial support.

Implement NETCO-wide student study and review sessions. There was significant discussion in the AP teacher focus group of the AdvanceKentucky Student Study Sessions (SSS) program that one AP teacher participated in last year.[10] The program brought together AP students within a region three times during the school year for study and review sessions. These sessions led students through a review of material, and in the case of science, additional labs. One benefit of these sessions for the students' AP teachers was learning new ways of presenting concepts that they could use in their own classrooms. NETCO could support similar sessions in the NETCO region, which would provide opportunities for not only students but teachers, as well. Instructors for the sessions could be drawn from experienced teachers in NETCO schools or from outside the NETCO region. These sessions would be particularly useful for students who participate in AP through online learning.

10. For more information: http://www.advancekentucky.com/trainings/sss.

AP exam participation

Build interest in AP exam participation at the administrative level. Many schools that are still in the early years of implementing an AP program are reluctant to require students to take the AP exam. The concerns are that if enough students didn't pass, other students would not take the course; and that it puts too much pressure on students not used to such rigorous coursework. Interestingly, all of the AP teachers we talked with wanted the school administration to support and encourage AP exam participation, even in schools where the AP program was relatively new. They believe that this encourages students to put forth their best effort and ensures students have an opportunity to earn college credit—since not taking the exam guarantees a student cannot receive college credit for the course.

Professional development

Encourage AP teachers to apply to become readers for the open-response portion of the AP exam. In our discussion with AP teachers, we heard that one of their best professional development opportunities was to register to be a reader for the open-response portion of the AP exam. Teachers who had participated in this program talked about how much they learned grading the students' responses, about scoring and what makes up a good response. The exam readings take place in June and typically last for a week, with readers' travel and expenses paid for by the College Board. AP readers must have three years of AP teaching experience before applying.

Appendix A: Online learning by school

Table 15. Online course offerings by course type

Course type	Courses
Advanced Placement	AP Biology, AP Calculus, AP Chemistry, AP Computer Science, AP English Language & Composition, AP English Literature & Composition, AP Geography, AP U.S. History
Dual enrollment	Art History, Bridge Math (SAILS), Calculus I, College Algebra, Composition I, Composition II, Literature, Music Appreciation, Probability & Statistics, Psychology, Public Speaking, Sociology, Spanish I, Speech, U.S. History, World Literature
Upper-level courses	Algebra II, Algebra IIA, Algebra IIB, Bridge Math, Chemistry I, Ecology, Economics, English III, English IV, Geometry, Latin III, Physics, Pre-Calculus, Probability & Statistics, Trigonometry I, Trigonometry II, U.S. Government, U.S. History
Career and technical education courses	Accounting I, Accounting II, Applied Technology, Business & Legal Systems, CAD, Career Management Success, Child & Lifespan Development, Computer Applications, Computer Literacy, Computer Programming, Cosmetology, LPN, Medical Coding, Medical Dosage and Calculations, Medical Terminology, Microsoft Excel, Microsoft Outlook, Microsoft PowerPoint, Microsoft Publisher, Microsoft Word , MS Excel/Word, Nursing Trends & Issues, Principles of Cosmetology, Programming & Logic, Teaching as a Profession, Web Design
Other courses	ACT English Prep, ACT Math, ACT Science, African-American History, Algebra I, Algebra IA, Algebra IB, Ancient History, Art History, Basic Biology, Biology I, Chinese I, Chinese II, Contemporary Issues, Creative Writing, Earth Science, English I, English II, Environmental Science, Global Studies, Journalism, Latin I, Latin II, Lifetime Wellness, Modern History, Music Appreciation, Online Advanced PE, Personal Finance, Psychology, Sociology, Spanish I, Spanish II, World Geography, World History

Appendix B: Advanced Placement

Table 16. AP course enrollment, test participation and pass rates (2010/11–2012/13)

	2010/11			2011/12			2012/13		
	Enroll.	Exam Part. Rate	Exam Pass Rate	Enroll.	Exam Part. Rate	Pass Rate	Enroll.	Exam Part. Rate	Exam Pass Rate
U.S. History	558	58	61	607	53	61	825	54	49
Literature and Composition	450	49	80	565	48	72	660	51	67
Biology	323	47	56	325	36	52	337	36	58
Calculus AB	259	44	65	304	41	61	404	45	59
Language and Composition	251	100	67	341	77	62	341	90	48
Chemistry	222	47	45	181	37	73	286	41	55
Psychology	188	62	64	189	53	68	233	68	67
Government and Politics	178	52	67	270	53	60	261	67	63
Economics[a]	154			188			179		
Macroeconomics exam	*154*	*73*	*81*	*188*	*59*	*77*	*179*	*64*	*72*
Microeconomics exam	*154*	*71*	*83*	*188*	*57*	*78*	*179*	*64*	*70*
European History	147	82	73	164	73	71	190	49	72
Calculus BC	110	84	77	104	75	87	159	56	82
Human Geography	90	104	63	179	85	65	310	94	46
Physics B	86	9	50	113	11	92	99	30	24
Statistics	66	74	80	71	72	65	86	74	61
Music Theory	61	57	74	59	44	73	62	37	48
Environmental Science	41	27	64	86	33	50	59	36	48
Spanish	33	36	75	21	76	25	16	106	47
World History	28	50	86	12	50	33	35	69	25
Physics C	14	100	93	6	116	86	32	69	82
Computer Science	13	92	100	19	89	94	23	87	95
Studio Art	10	60	33	5	20	100	4	50	100
French	10	60	33	10	0	–	0	–	–
Latin	8	38	67	11	18	50	12	50	33
German	7	86	50	1	100	0	5	100	100
Calculus AB/BC	1	–	–	0	–	–	0	–	–
World Geography	0	–	–	0	–	–	4	–	–

a. Prepares students for both the AP Macroeconomics and AP Microeconomics exams.

References

Ackerman, P. L., Kanfer, R., & Calderwood, C. (2013). "High school Advanced Placement and student performance in college: STEM majors, non-STEM majors, and gender differences." *Teachers College Record, 115*(10), 1–43.

Adelman, C. (2006). *The Toolbox revisited: Paths to degree completion from high school through college.* Washington, DC: U.S. Department of Education.

Barbour, M., & Mulcahy, D. (2006). "An inquiry into retention and achievement differences in campus based and web based AP courses." *The Rural Educator, 27*(3), 8–12. Retrieved December 21, 2011, from http://www.ruraleducator.net/archive/27-3/27-3_Barbour.pdf.

Dougherty, C., Mellor, L., & Jian, S. (2006, February). *The relationship between Advanced Placement and college graduation* (2005 AP Study Series, Report 1). Austin, TX: National Center for Educational Accountability.

Florida TaxWatch Center for Educational Performance and Accountability. (2007). *Final report: A comprehensive assessment of Florida Virtual School.* Tallahassee, FL: Florida TaxWatch. Retrieved December 21, 2011, from http://www.inacol.org/research/reports.php.

Geiser, S., & Santelices, V. (2004). *The role of Advanced Placement and honors courses in college admissions* (Research and Occasional Paper Series: CSHE.4.04). Berkley, CA: Center for Studies in Higher Education, University of California-Berkeley.

Hargrove, L., Godin, D., & Dodd, B. (2008). *College outcomes comparisons by AP® and non-AP high school experiences.* New York: The College Board.

Heppen, J. B., Walters, K., Clements, M., Faria, A., Tobey, C., Sorensen, N., & Culp, K. (2012). *Access to algebra I: The effects of online mathematics for grade 8 students* (NCEE 2012–4021). Washington, DC:

National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education.

Holian, L. (2013, July 8). *The Northeast Tennessee College and Career Ready Consortium: The 2012/13 school year. July 2013 formative report.* CNA Research Memorandum IRM-2013-U-005131.

Linkenhoker, A. (2009). *The effect of online learning on academic achievement in AP calculus courses: A causal-comparative Study.* ProQuest: University of Phoenix. Retrieved February 24, 2012, from http://gradworks.umi.com/33/70/3370940.html.

Mattern, K., Marini, J., & Shaw, E. (2013). *Are AP students more likely to graduate from college on time?* New York: The College Board.

Mattern, K., Shaw, E., & Xiong, X. (2009). *The relationship between AP exam performance and college outcomes.* New York: The College Board.

Speroni, C. (2011, November). *Determinants of students' success: The role of Advanced Placement and dual enrollment programs.* (NCPR Working Paper). New York: National Center for Postsecondary Research.

U.S. Department of Education, Office of Innovation and Improvement. (2007, December). *Connecting students to advanced courses online.* Washington, DC: Author. Retrieved December 21, 2011, from http://www.ed.gov/admins/lead/academic/advanced/index.html.

U.S. Department of Education, Office of Planning, Evaluation, and Policy Development Policy and Program Studies Service. (2010, September). *Evaluation of evidence-based practices in online learning: A meta-analysis and review of online learning studies* (Rev. Ed.). Washington, DC: Author. Retrieved on March 17, 2014, from http://www2.ed.gov/rschstat/eval/tech/evidence-based-practices/finalreport.pdf.

Watson, J. F., & Kalmon, S. (2005). *Keeping pace with K–12 online learning: A review of state-level policy and practice.* Naperville, IL: Learning Point Associates. Retrieved on March 17, 2014, from http://www.learningpt.org/pdfs/tech/Keeping_Pace2.pdf.

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