



# Virginia's 2008 On-Time Graduation Rate Cohort

## Four year college enrollment, persistence, and completion

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# Table of Contents

Executive summary.....1

Introduction.....4

1 Data and methods used in this study ..... 4

1.1 Methods .....5

1.2 Key variables.....6

Results..... 13

2 How many and what percent of 2008 cohort graduates enrolled in college in the 2008/09 school year, and remained in college for the first four years after high school graduation? ..... 13

3 How many and what percent of 2008 cohort graduates earned college credentials within four years of graduating high school? ..... 15

4 Are high school achievement outcomes associated with outcomes in the second to fourth year of college? ..... 16

4.1 Outcomes for students who earned Standard and Advanced Studies diplomas ..... 17

4.2 Outcomes for students based on Algebra II participation and proficiency level ..... 21

4.3 College outcomes based on end-of-course writing proficiency level ..... 26

5 Summary and recommendations..... 30

6 Works Cited..... 32

## Table of Figures

Figure 1. Percent of 2008 high school cohort graduates who enrolled and persisted in college over time .....	14
Figure 2. Percent of DTC-enrolled high school graduates who persisted for four years .....	14
Figure 3. Percent of high school graduates who earned one or more college credential within four years .....	16
Figure 4. Percent of 2008 high school graduates who enrolled and persisted in college by high school diploma type.....	19
Figure 5. Percent of DCTC-enrolled high school graduates who were still enrolled or had earned any type of credential after 4 years of college, by high school diploma type .....	20
Figure 6. Percent of 2008 high school graduates who earned college credentials, by high school diploma type.....	21
Figure 7. Percent of high school graduates who enrolled and persisted by participation and proficiency level on Virginia's Algebra II SOL.....	22
Figure 8. Percent of DTC-enrolled 2008 high school graduates who persisted for four years, by Algebra II participation and proficiency level .....	22
Figure 9. Percent of 2008 high school graduates who earned college credentials by Algebra II participation and proficiency.....	23
Figure 10. Percent of DTC-enrolled cohort graduates who persisted for four years, by diploma type and Algebra II proficiency level.....	24
Figure 11. Percent of 2008 high school graduates who earned college credentials within four years by diploma type and Algebra II proficiency level.....	25
Figure 12. Percent of 2008 high school graduates who enrolled in 2008/09 and persisted each year by EOC writing proficiency level .....	26
Figure 13. Percent of DTC-enrolled 2008 high school graduates who persisted for at least four years, by EOC writing proficiency level.....	27
Figure 14. Percent of 2008 high school graduates who earned Bachelor's and Associate's degrees within four years by EOC writing proficiency levels .....	28
Figure 15. Percent of DTC-enrolled 2008 cohort graduates who persisted for at least four years, by diploma type and EOC writing proficiency level .....	29
Figure 16. Percent of 2008 high school graduates who earned college degrees by high school diploma type and EOC writing outcome. ....	30

## Table of Tables

Table 1. Description of postsecondary data used in this study .....	7
Table 2. High school variables used in this study .....	8
Table 3. Number of students included in each high school achievement group .....	9
Table 4. Major components of diploma requirements for Virginia's high school graduates of 2008 .....	18
Table 5. Number of students by Algebra II proficiency level and diploma type .....	26
Table 6. Number of students by EOC writing proficiency level and diploma type .....	30

# Executive summary

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In 2007 the Virginia Board of Education authorized the Virginia Department of Education (VDOE) to conduct studies aimed at understanding the factors that are associated with high school students' successful preparation for college and careers. VDOE then embarked on a multi-year effort to identify available data sources and conduct research aimed at understanding high school indicators available to all Virginia public schools that are predictive of students' success in college and careers. With this information, parents, students, educators, and policymakers can take actions that lead more Virginia students down the path towards success in college and postsecondary training. Actions could include exposing more students to a rigorous curriculum earlier in their education; ensuring that teachers and leaders have high expectations for all students in the courses they take; ensuring that teachers have the knowledge, skills, and resources they need to support all students' learning; and ensuring that all students have access to the supports they need for success in coursework that prepares them for success in college and postsecondary training programs.

In this research report, we provide information about the four-year postsecondary outcomes for high school students who graduated from Virginia's public high schools. This project builds on previous research that assessed high school graduates' college enrollment, participation, and success in credit-bearing courses (Garland, LaTurner, Herrera, Jonas, & Dougherty, 2011; Jonas, Dougherty, Herrera, LaTurner, Garland, & Ware, 2012). For the current project, we focused on understanding graduates' college persistence and degree completion. We studied the high school graduates from Virginia's 2008 cohort into and through college for four years, until the end of the spring semester in 2012. Specifically, we sought to answer the following questions:

- How many and what percentage of the 2008 high school cohort graduates enrolled in college in the 2008/2009 school year, and remained in college for the first four years after high school graduation?
- How many and what percentage of 2008 cohort graduates earned college credentials within four years of graduating high school?
- Are students' high school achievement outcomes associated with students' outcomes in the second to fourth year of college?

Results showed that:

- Nearly 70 percent of the 2008 high school cohort graduates enrolled in directly into college within one year of high school graduation.
- Nearly half of the high school graduates were still college-enrolled or had earned a college credential within four years.

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Nearly 70 percent of the 2008 high school cohort graduates enrolled directly into college within one year of high school graduation. After four years, nearly half of the high school graduates remained college-enrolled or had earned a college credential.

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- Just under half of the graduates were enrolled in four-year colleges (44 percent). Most of these students (89 percent) remained in college or completed college within four years.
- Just under one-quarter (24 percent) of the high school graduates were last enrolled in two-year colleges. By the end of the four years, only 39 percent of this group were still enrolled or had earned a college credential.
- By the end of the four-year study period, 29 percent of the high school graduates had earned college credentials, with 22 percent earning Bachelor's degrees.
- High school diploma type was an important factor in determining graduates' four-year success in college, as were outcomes on state EOC Algebra II and writing tests.
- Students who earned Advanced Studies diplomas were more likely to enroll, persist and complete college in four years.
  - Ninety-three (93) percent of Advanced Studies diploma-earners who enrolled in four-year institutions of higher education (IHE) were still enrolled or had earned a credential by year four. This was true of only 49 percent of Advanced Studies diploma-earners who were last enrolled in two-year IHE.
  - Standard diploma-earners who were last enrolled in a four-year IHE were more likely to remain enrolled or earn credentials (73 percent) than Standard diploma earners who were last enrolled in two-year colleges (31 percent).
- High school graduates who scored advanced proficient on the SOL Algebra II test were more likely to enroll, persist, and complete college—half of these students earned Bachelor's degrees within four years, compared to 22 percent of high school graduates who earned proficient scores on the Algebra II test.
- High school graduates who earned advanced proficient scores on the SOL end-of-course writing test were more likely to enroll, persist, and complete college relative to graduates with lower scores. Forty-four (44) percent of these students earned Bachelor degrees within four years, compared to 14 percent of students who earned proficient scores.

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Results showed that a program of study consistent with Virginia's Advanced Studies diploma coupled with high achievement in math and writing courses, as demonstrated by state test performance, predict better college outcomes.

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Experts estimate that by 2018, at least 65 percent of all jobs (Carnevale, Smith, & Strohl, 2010) will require some type of postsecondary education or training. As such, it is critical that Virginia's high schools ensure that students graduate with the knowledge and skills needed for success in postsecondary programs. This research provides important insights into the value of the Advanced Studies diploma—and the courses within the diploma—in preparing students for success in life. As well, the research supports the importance of ensuring students reach high

achievement in mathematics and English courses to support their success. Furthermore, this research suggests that choosing to attend a four-year college can enhance high school graduates' likelihood of staying in and completing college.

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As today's high school graduates get ready for their future, it is becoming ever more important to be prepared for postsecondary education and training programs.

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Since 2008, when students in this study graduated high school, Virginia updated its learning standards to align with college-level achievement expectations. This important change is bolstered by increased mathematics course-taking requirements in Virginia's Standard diploma that began for students who first started ninth grade in 2011/12. Simultaneously, Virginia's Community Colleges have invested significantly in a number of programs aimed at increasing their students' persistence and completion. This research supports the need for these types of changes and offers information that can be shared with students, parents and families, teachers, and administrators about the role of courses and achievement in supporting students' later success. Nonetheless, it will be important to assess how the many policy changes that have taken place since 2008 influence high school graduates' long-term outcomes in later years.

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Since the high school class of 2008 graduated, Virginia's K12 policy has changed with the goal of strengthening students' preparation for college and careers. Simultaneously, Virginia's Community Colleges have invested in strengthening programs aimed at increasing student access, progress, and degree completion.

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# Introduction

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As part of its [College and Career Readiness Initiative](#) (CCRI), the Virginia Department of Education (VDOE) collaborates with the State Council of Higher Education for Virginia (SCHEV) and the Virginia Community College System (VCCS) to conduct research that informs program and policy development. One overarching goal of the CCRI research program is to inform state efforts aimed at helping more high school graduates enroll in college, enroll directly into credit-bearing courses, and successfully earn postsecondary credentials.

This research project focused on assessing the long-term outcomes for students who graduated from Virginia's public high schools. The project builds on previous research that assessed high school graduates' college enrollment, participation, and success in credit-bearing courses (Garland, LaTurner, Herrera, Jonas, & Dougherty, 2011; Jonas, Dougherty, Herrera, LaTurner, Garland, & Ware, 2012). For this project, we focused on college persistence and degree completion. We studied the high school graduates from Virginia's 2008 cohort into and through college for four years and sought to answer the following questions:

- How many and what percentage of 2008 cohort graduates enrolled in college in the 2008/2009 school year, and remained in college for the first four years after high school graduation?
- How many and what percentage of 2008 cohort graduates earned college credentials within four years of graduating high school?
- Are students' high school achievement outcomes associated with students' outcomes in the second to fourth year of college?

This report is one part of a larger research program aimed at understanding the influence of high school achievement on graduates' college outcomes. Our next steps are to explore credit accumulation over the four year study period and to assess whether there are differences in college enrollment, persistence, and graduation rates for students with different demographic characteristics.

## 1 Data and methods used in this study

To conduct this research, we accessed de-identified student-level records from students' high school and college experiences using VLDS ([Virginia Longitudinal Data System](#)). For high school records, we accessed data about student demographic characteristics, program participation, state assessment participation and results, and diploma type. VLDS enabled us to link these records to the same students' enrollment in, and graduation from, colleges that are represented in SCHEV and the National Student Clearinghouse (NSC).

Records from SCHEV were available for all public and private non-profit institutions of higher education (IHE) in Virginia. These records provide information that IHE report to SCHEV in accordance with state requirements. SCHEV records were matched with high school records using the matching algorithm in VLDS. The VLDS algorithm de-identifies student information (e.g., name, date of birth) within state agencies and then connects records to enable longitudinal research (see <http://vlds.virginia.gov> for more information).

Through VLDS, VDOE provides data from the NSC. The NSC records include student enrollment, persistence, and degrees earned from colleges and universities across the country. The NSC self-reports that the colleges reporting to them enroll 98 percent of college students in the United States (US).<sup>1</sup> An independent research report suggests that the NSC database provides data from approximately 92 percent of those enrolled in US colleges (Dynarski, Hemelt, & Hyman, 2013). The NSC data include records from public and private IHE, including some private for profit institutions.

NSC conducts the matches with VDOE records for high school graduates using a proprietary algorithm. The algorithm is based primarily on students' names and dates of birth, and includes an automated matching process as well as a human review of potential matches that were inconclusive. Based on our conversations with NSC staff aimed at better understanding their processes (Jonas, personal communications, 2012), NSC staff who review the inconclusive results are trained to be conservative in their decisions, which decrease the likelihood of a mismatch in the records returned to the requesting organization (i.e., VDOE).

We obtained NSC data for IHE enrollment years 2008/09, 2009/10, 2010/11, and 2011/12 through VLDS, which de-identifies the records and enables researchers to connect them to other VDOE and SCHEV records.

## 1.1 Methods

The primary purpose of this study was to describe the four-year college outcomes of Virginia's 2008 cohort of high school graduates, and to learn whether high school achievement is associated with college persistence and graduation. In this report, we describe college persistence and completion outcomes for Virginia's cohort of 2008 high school graduates for four years. This study was part of a larger project that was designed to model potentially meaningful ways for VDOE to regularly analyze and report students' long-term college outcomes. Based on conversations with VDOE, SCHEV, and VCCS, we agreed to limit our analytic methods to simple descriptive statistics (i.e., numbers, percentages). We varied the student population of interest to help readers understand associations between certain high school achievement variables and college outcomes. This approach allowed us to describe and compare outcomes, while portraying different postsecondary pathways of Virginia public high school graduates.

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<sup>1</sup> Retrieved from [http://www.studentclearinghouse.org/about/clearinghouse\\_facts.php](http://www.studentclearinghouse.org/about/clearinghouse_facts.php), February 24, 2014.

## 1.2 Key variables

In preparing this report, we collaborated with VDOE, SCHEV, and VCCS to define key outcome variables to use in the analysis. We focused on three primary outcome variables: college enrollment, persistence, and completion, and we described high school graduates' outcomes in two- and four-year colleges. In this section, we describe how we operationalized these variables. The operational decisions affect how we interpret results and the generalizability of the results.

Table 1 and 2 display a brief description of the college and high school variables used in this study, as well as their original source. This is followed by more detailed information about the outcome variables used in this study.

**Table 1. Description of postsecondary data used in this study**

Study variable	Description	Data Sources	Notes
Postsecondary records			
Direct-to-college (DTC) enrollment	Identifies students who enrolled in an IHE in the fall or spring of 2008/09	NSC and SCHEV	
Annual persistence	Identifies students who remained enrolled in or earned a credential from an IHE.	NSC and SCHEV	Persistence is defined as DTC-enrolled students who stayed in college each subsequent year in the fall or spring, <i>or</i> earned a credential. Students were initially classified as DTC-enrolled (or not) in the 2008/09 school year. Students who were classified as <i>persisted</i> in the next year were also enrolled in the fall or spring of the 2009/10 school year or earned a college credential. Persistence could continue through the 2011/12 school year.
College credential indicator	Identifies students who earned any credential, a Bachelor's, Associate's, or certificates between 2008/09 and 2011/12	NSC and SCHEV	The "any" credential category counts each student one time, regardless of the number of credentials students earned. The other categories are not mutually exclusive. Students who earned more than one <i>type</i> of degree were included once in each category. Therefore, a student who earned an Associate's degree in 2009/10, and earned Bachelor's degree in 2011/12, is represented in both the Associate's and Bachelor's degree data.
IHE type	Identifies the last IHE type (e.g., 4-year or 2-year) in which a student was enrolled	NSC and SCHEV	We retained the highest-level institution type for students who were enrolled in more than one IHE type in a specific year.

Throughout this paper, we describe outcomes for groups of students who were members of the Virginia On-Time Graduation Rate (OGR) cohort and graduated in 2008 or earlier. We describe outcomes for all OGR graduates, and for students who had different levels of achievement on Virginia-specific indicators.

The high school variables used in this study are described in Table 2. Table 3 displays the number of students who met each high school achievement indicator.

**Table 2. High school variables used in this study**

Study variable	Description	Data Sources	Notes
High school records			
Algebra II, EOC writing proficiency	Ordinal measure of student proficiency on the respective <i>Standards of Learning</i> (SOL) tests	VDOE assessment records	When students had more than one score on the same assessment, we used the highest obtained scaled score. Students who were missing assessment records for the respective test were classified as having not taking the exam.
Diploma type	Type of diploma a student earned	VDOE Student Record Collection	For students who were awarded multiple high school diplomas, we retained the highest level diploma.
On-time-graduation flag	Identified students in Virginia's 2008 On-Time Graduation Rate cohort who earned a high school diploma in four years or less.	VDOE Student Record Collection	This group of students represents the sample population. Students in this adjusted cohort typically started ninth grade in the 2004/05 school year. The cohort is adjusted to add students who transfer in, remove students who transfer out, and to account for students who have an individualized education plan (IEP) permitting more than four years of high school (for more information visit <a href="#">VDOE's website</a> ).

**Table 3. Number of students included in each high school achievement group**

Group	Number (N)
All 2008 OGR graduates <sup>1</sup>	78,087
– Direct-to-college (DTC) graduates	54,024
<b>Diploma type</b>	
Advanced Diploma earners	41,834
Standard Diploma earners	32,840
Other diploma earners	3,413
<b><i>Algebra II SOL</i></b>	
– Advanced	11,972
– Proficient	37,566
– Fail	4,875
– No Score	23,674
<b><i>Writing EOC</i></b>	
– Advanced	22,722
– Proficient	49,875
– Fail	1,773
– No Score	3,717

<sup>1</sup> Includes only 2008 OGR graduates who earned a diploma during or prior to the 2007/08 school year.

### 1.2.1 College enrollment

We identified students as “enrolled” in college when SCHEV or NSC data documented students’ enrollment in the first year after high school graduation, defined as starting college between August 2008 and June 2009. While this approach provides consistency, previous research (Radford, Berkner, Wheelless, & Shepherd, 2010) suggests that students who enroll in college directly after graduating from high school are more likely to earn college credentials compared to those who wait.

We limited our study sample to students who are included in Virginia’s state-defined high school graduating cohort of 2008. The cohort is based on a sample of students who started ninth grade for the first time in 2004/05<sup>2</sup> and graduated high school no later than the summer of 2008.<sup>3</sup> In these analyses, we did not include students from the same cohort who graduated from high school in later years (e.g., graduated high school in 2009, after completing five years of high school). This gave all students in the study sample the opportunity to earn a four-year college degree if they remained enrolled full-time for each of the four years after high school graduation or to earn a two-year degree if they were enrolled half-time.

### 1.2.2 College persistence

The research team defined college persistence as direct-to-college (DTC) enrollment (see Table 1 for the definition) followed by college-enrollment during the fall or spring semester of each subsequent year. Consistent with recommendations from SCHEV, we excluded students who enrolled *only* in the summer semester from the numerator of the persistence calculation.<sup>4</sup> Persistence is important because it provides one measure of student progress through (and potential success in) college. In an effort to ensure that the operational definition of persistence did not penalize students who earned a college credential, the persistence measure also *includes* students if they earned a college credential in the previous school year.

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<sup>2</sup> The cohort also includes students who transferred into Virginia’s schools and removes students who transferred out or are deceased. More details are available on the Virginia Department of Education website, [http://www.doe.virginia.gov/statistics\\_reports/graduation\\_completion/cohort\\_reports/calculating.pdf](http://www.doe.virginia.gov/statistics_reports/graduation_completion/cohort_reports/calculating.pdf).

<sup>3</sup> A small percentage (less than 3 percent) graduated before the 2007/08 school year.

<sup>4</sup> For more details about how college enrollments were calculated, including definitions of fall and spring semesters, see Garland & Booth (2013), VDOE CCR data preparation manual.

VLDS enabled us to connect the data longitudinally as students move through high school, into college, and through college. The data also permit us to identify students who are enrolled in different institutions simultaneously and over time. As a result, college student persistence reflects students who remained in *any* IHE in the subsequent year.

Results from this approach will necessarily differ from enrollment reports based on point-in-time (i.e., cross-sectional) enrollment snapshots and those that do not include college students who transfer into another IHE.

### 1.2.3 College type: two- and four-year institutions

We assigned each student who enrolled in college to one of two types of colleges: two- or four-year. Based on conversations with SCHEV, VCCS, and VDOE, *we categorized students who attended multiple colleges based on the last college they attended*, excluding summer sessions. For example, students who began in two-year colleges and transferred to four-year colleges were included in the four-year college category. This group includes 4,789 students, representing 24 percent of students who first enrolled in a two-year IHE.<sup>5</sup> High school graduates who began in four-year colleges and transferred to two-year colleges were categorized as enrolled in two-year colleges throughout our analysis. This represents approximately 11 percent of all students who were enrolled in a four-year IHE in 2008/09.

### 1.2.4 College credentials

Students in the study sample had opportunities to earn college credentials throughout their college experience. Through the NSC and SCHEV records, we had information on whether students earned one-year certificates, two-year (Associate's) degrees, or four-year (Bachelor's) degrees. Some students also earned multiple credentials during the four-year study period. For purposes of reporting results, we described the number and percentage of students who earned any credential, and the number and percent who earned one-year Certificates, Associate's, and Bachelor's degrees. We counted each student once when we reported the number and percent of students who earned *any* credential, regardless of the number of credentials earned. However,

**More on the persistence calculation**  
Students who enrolled in college in 2008/09 and were enrolled *again* in 2009/10 *persisted* into their second year. These students would be included in the numerator of persistence calculations in 2009/10.

Students who enrolled in 2008/09 and were not enrolled in 2009/10 did not persist, and therefore, would not be included in the numerator in any subsequent year, regardless of their future enrollment status.

Students who earned a two-year credential in 2009/10 and were not enrolled in subsequent year are included the persistence numerator.

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<sup>5</sup> Nearly half (48 percent) of the students who transferred from two- to four-year colleges in Virginia earned Associate's degrees before transferring. Nearly 70 percent of these students, and those who earned more credits while in two-year IHE, earn four-year degrees. For more information about student outcomes after transfer, see SCHEV transfer feedback reports, [http://research.schev.edu/apps/info/CC\\_Feedback.All-Public-Two-year-Colleges.ashx](http://research.schev.edu/apps/info/CC_Feedback.All-Public-Two-year-Colleges.ashx).

when we reported results based on credential type, we counted each student once for *each type* of credential earned.<sup>6</sup>

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It is important to note that this study only followed students through four years of college. Because it has become less common for students to complete a college degree in four years, students' credentials-earned should be viewed as a snapshot of what has happened after four years, while recognizing that many of the students still enrolled will earn credentials in later years.

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For instance, according to the data reported in the National Center for Education Statistics (NCES) Integrated Postsecondary Education Data System for first-time Bachelor's degree-seeking students at 4-year IHE in 2005, approximately 39 percent earned a Bachelor's degree within four years, while 54 percent earned a Bachelor's degree within five years (NCES, 2012).

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<sup>6</sup> Some college students earned more than one credential within a category, for example, earning two different one-year program certificates. These students were only counted one time within a category.

# Results

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## **2 How many and what percent of 2008 cohort graduates enrolled in college in the 2008/09 school year, and remained in college for the first four years after high school graduation?**

We identified 78,087 cohort graduates in 2008, and of these, 54,024 were DTC-enrolled in 2008/09. Figure 1 shows the percent of 2008 high school cohort graduates who enrolled in college in 2008/09, and persisted for each of the four years included in the study. Overall, nearly 70 percent of the 2008 cohort graduates enrolled in college somewhere in the US within one year of high school graduation, and nearly 50 percent remained enrolled for at least four years.

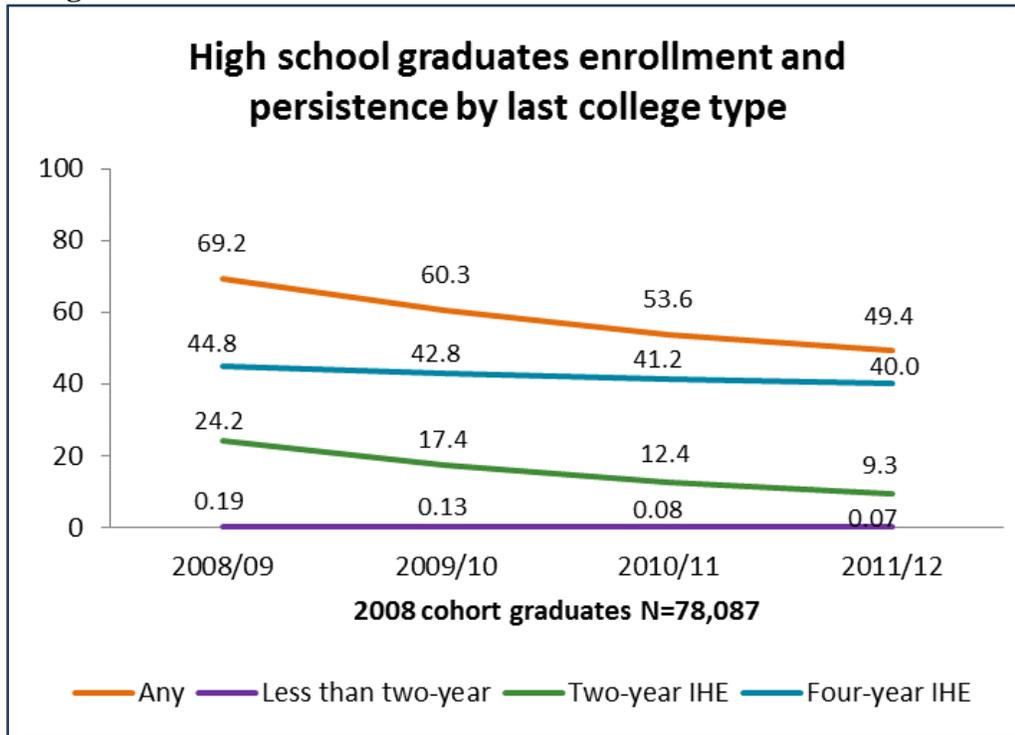
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Nearly 70 percent of the 2008 cohort graduates enrolled in college somewhere in the US within one year of high school graduation, and nearly 50 percent remained enrolled for at least four years.

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A larger percent of Virginia's high school graduates were last enrolled in four-year colleges relative to two-year and less than two-year IHE. Students who enrolled in four-year IHE were more likely to persist in college.

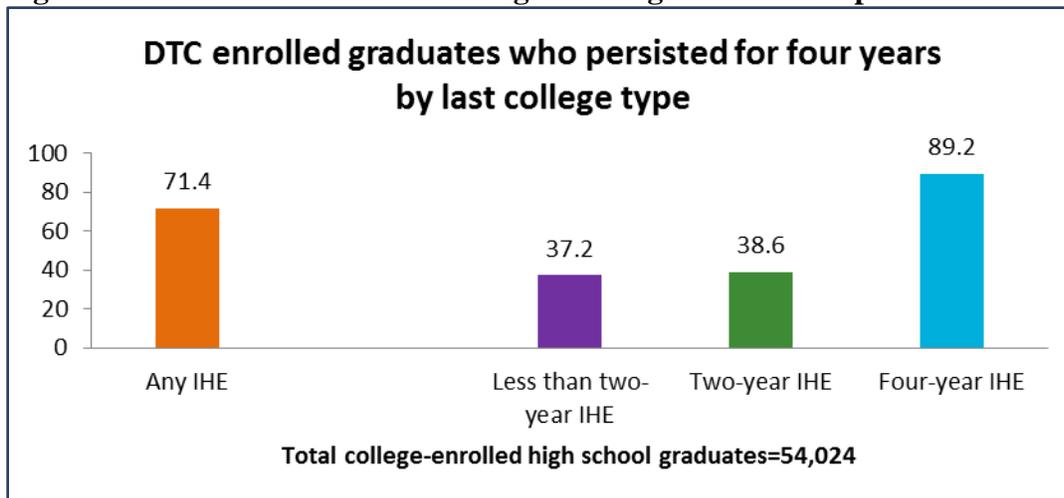
**Figure 1. Percent of 2008 high school cohort graduates who enrolled and persisted in college over time**



\* Any IHE represents the sum of students enrolled or persisted each year in each of the three types of IHE.

Figure 2 shows the percent of DTC-enrolled cohort graduates who persisted for four years. For students who enrolled directly in college after high school graduation, 71 percent remained enrolled or had earned a credential by 2011/12. Persistence was higher for DTC-enrolled students whose last college attended was a four-year IHE. Most DTC-enrolled students whose last enrollment was a four-year college (89 percent) were enrolled in college throughout the four year study period. This was true for only 39 percent of the students whose last college was a two-year IHE.

**Figure 2. Percent of DTC-enrolled high school graduates who persisted for four years**



### 3 How many and what percent of 2008 cohort graduates earned college credentials within four years of graduating high school?

Based on the data from SCHEV and NSC, students could earn:

- Program certificates, which typically represent completion of a one-year postsecondary program of study
- Associate's degree, which represent completion of a two-year program of study, and includes technical and transfer degrees from Virginia's Community Colleges
- Bachelor's degrees, which represent completion of a four-year program of study.

There were also 3,438 students for whom there was documentation of earning a college credential, but, the credential type was not included in the data.<sup>7</sup>

Figure 3 displays the percent of high school graduates who earned Certificates, Associate's, and Bachelor's degrees within four years. Overall 22,970 students (29 percent) of the 2008 high school graduating cohort earned at least one credential within four years. Just more than one-fifth (22 percent) of the graduating class earned Bachelor's degrees within four years—approximately half of those enrolled. Six percent of high school graduates earned Associate's degrees within four years.

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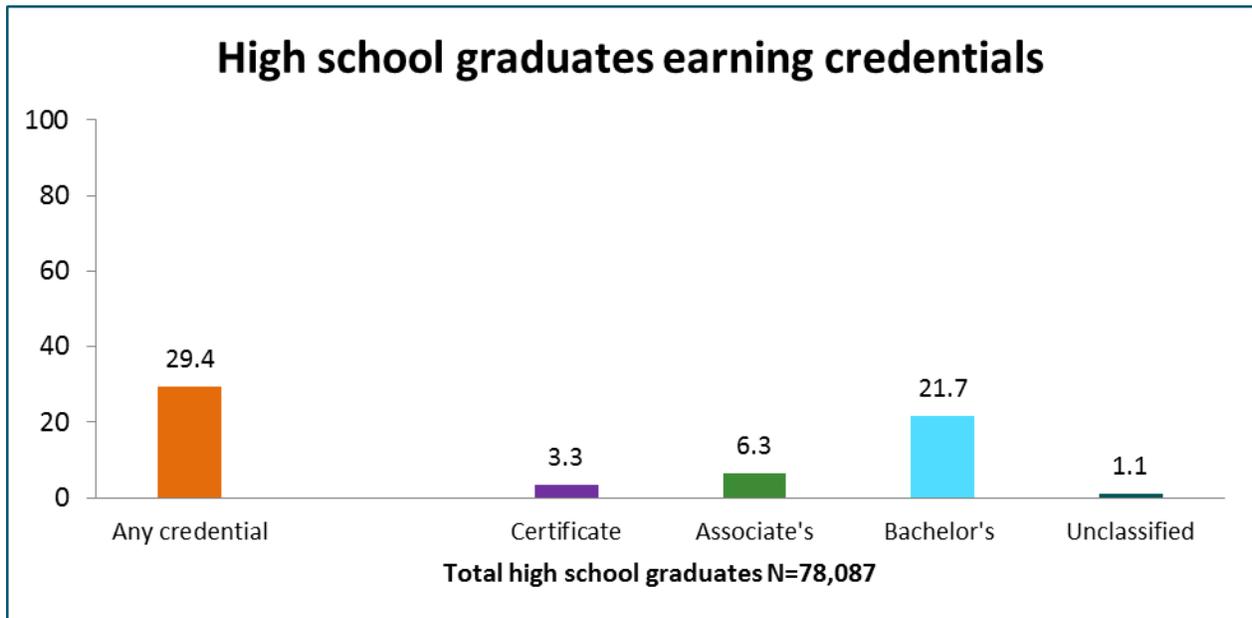
Just more than one-fifth (22 percent) of the 2008 high school graduates earned Bachelor's degrees within four years—approximately half of those who were college-enrolled. Six percent of high school graduates earned Associate's degrees within four years.

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<sup>7</sup> These are primarily NSC records. See Garland and Booth (2013) for more detail about how diploma type was derived from the NSC graduation records.

**Figure 3. Percent of high school graduates who earned one or more college credential within four years**



NOTE: Students are included only once in the “any” category. Students may be included once in each of the credential types, resulting in some students being included in two or more categories in this graph. As a result, adding the percent of students earning Certificate, Associate’s, Bachelor’s, and unclassified degrees double-counts students and does not equal the percent of students earning “any credential.”

#### 4 Are high school achievement outcomes associated with outcomes in the second to fourth year of college?

Previous research with this same student cohort showed that students who participated in a more rigorous program of study in high school and who reached higher achievement levels in mathematics and English<sup>8</sup> were more likely to: 1) enroll in college; 2) enroll directly into credit-bearing (i.e., non-developmental) courses; and 3) earn a passing grade in those courses (Garland, LaTurner, Herrera, Jonas, & Dougherty, 2011; Holian & Mokher, 2011; Jonas, et al., 2012; Lichtenberger, Dietrich, Kamulladeen, & O’Reilly, 2010). This previous research suggested that three indicators were most strongly associated with college enrollment and success: Virginia’s high school diploma type, scores on Virginia’s end-of-course (EOC) writing assessment, and scores on Virginia’s EOC Algebra II assessment. We used these three indicators—diploma type, performance level on the Virginia Algebra II SOL assessment, and performance level on the Virginia EOC Writing assessment—to determine whether these high school achievement indicators were also associated with college persistence and graduation in four years. We note that previous research (Lichtenberger, et al., 2010) showed that Virginia’s assessments did not predict persistence into the second year in four-year IHE only.

<sup>8</sup> Virginia’s high school diploma type was used as a proxy for measuring the rigor of a high school program of study. Achievement in mathematics and English courses was measured by performance on state-required end-of-course tests.

As shown previously in this paper, less than one percent of the graduating class enrolled in or earned credentials from less-than two-year IHE, and 3.3 percent of the high school graduates earned Certificates (less-than 2 year credentials). As a result of these relatively small numbers, the remainder of this report focuses on enrollment and outcomes in two- and four-year programs.

#### **4.1 Outcomes for students who earned Standard and Advanced Studies diplomas**

Students in the high school cohort of 2008 were eligible for four types of high school diplomas, two of which were limited to students with identified learning disabilities. We identified just more than 500 students who earned the Modified or Special diplomas and enrolled directly in college after high school (less than 1 percent of all college-enrolled high school graduates). Given this relatively small number of students enrolling in college who earned these high school credentials, we limited our research to describing differences between college outcomes for students who earned Virginia’s Standard and Advanced Studies<sup>9</sup> diplomas. This sample represents more than 96 percent of high school graduates and limits the sample to students who earned federally recognized diplomas.

Students who earned both diploma types were required to complete four years of high school English. Requirements for other core content areas varied by diploma type. Table 4 shows the minimum core course requirements for the 2008 cohort graduates earning each diploma type.<sup>10</sup> The Advanced Studies diploma is aligned with the minimum course of study that students need to succeed in a four-year college program (Adelman, 2006). Students earning Virginia’s Advanced Studies diplomas were required to complete a course of study that included four years of content in each core content area and three years of foreign language. Students were required to complete mathematics courses that included Algebra II or higher, and science courses including chemistry or physics. Virginia’s 2008 graduates who earned Standard diplomas were not required to participate in Algebra II, chemistry or physics, nor were they required to participate in foreign language courses.

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<sup>9</sup> International Baccalaureate (IB) diplomas are collapsed together with Advanced Studies diplomas.

<sup>10</sup> Complete course requirements for each diploma may be found by visiting, <http://www.doe.virginia.gov/instruction/graduation/index.shtml>. The information available includes changes in graduation requirements that went into effect for first-time ninth graders entering high school in 2011/12 or later.

**Table 4. Major components of diploma requirements for Virginia's high school graduates of 2008**

Diploma type	Core Course Requirements	Minimum high school credits required
Advanced Studies diploma	English	4
	Mathematics*	4
	Lab Science	4
	History and Social Sciences	4
	Foreign Languages	3
Standard diploma	English	4
	Mathematics**	3
	Lab Science	3
	History and Social Sciences	3
	Foreign Languages	0

\*All courses were required to be at or above the level of algebra and include at least three different course selections from among: Algebra I, Geometry, Algebra II, or other mathematics courses above the level of Algebra II.

\*\*All courses were required to be at or above the level of Algebra and include at least two course selections from the following list: Algebra I, Geometry, Algebra II, or other mathematics courses above the level of algebra and geometry.

#### 4.1.1 College persistence

In Virginia's 2008 cohort, 41,834 graduates earned Advanced Studies diplomas, and 32,840 cohort earned Standard diplomas. Figure 4 shows the percent of high school graduates who earned a Standard or Advanced Studies diploma and enrolled and persisted in college each year by IHE type (two-year or four-year).

A larger percent of Advanced Studies diploma-earners were last enrolled in four-year IHE (nearly 70 percent) than in two-year IHE (19 percent), whereas a larger percent of Standard diploma-earners were last enrolled in two-year IHE (32 percent) compared to a four-year IHE (18 percent). Regardless of IHE-type, the data suggest that high school graduates whose last enrollment was in a four-year IHE were more likely to persist (i.e., remain in college or earn a credential) than cohort graduates who enrolled in two-year IHE.

Figure 5 provides more information about how persistence is associated with diploma- and IHE-type. The bar graph shows the percent of DTC-enrolled high school graduates who persisted or earned a credential at some point before the end of the four-year study period. Ninety-three (93) percent of the college-enrolled Advanced Studies diploma-earners and nearly three-quarters (73 percent) of college-enrolled Standard diploma-earners whose last enrollment was a four-year IHE persisted for four years.

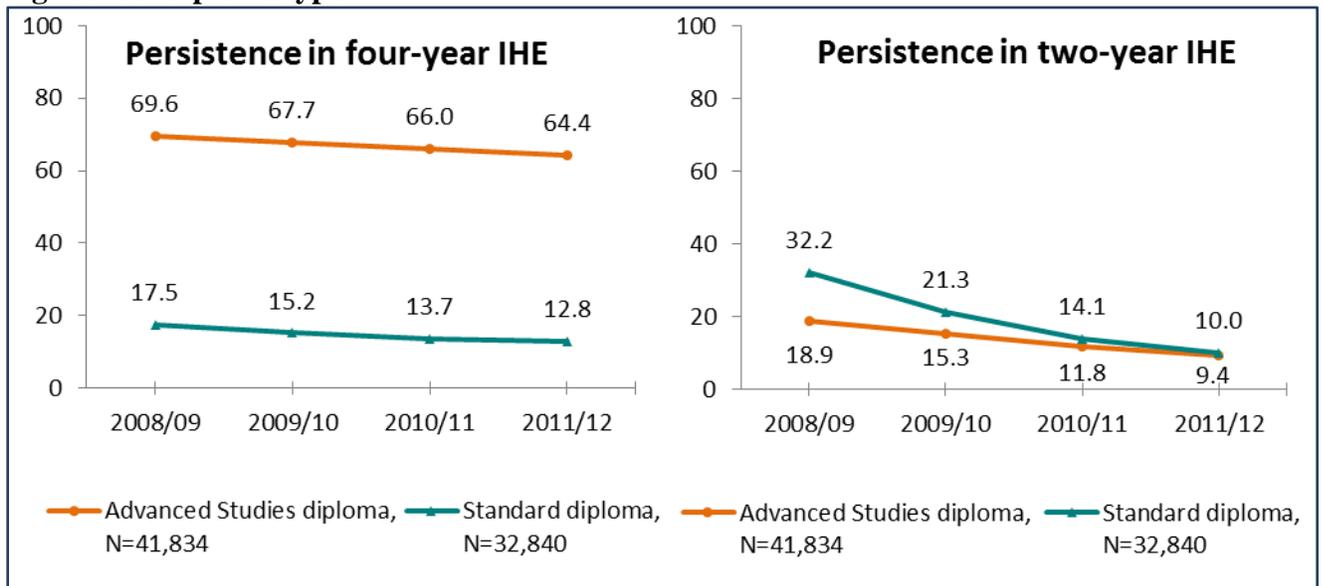
### Why does diploma type matter?

In Virginia, the requirements of the Advanced Studies diploma are aligned to the entrance requirements for typical college and other postsecondary training programs. Students who complete a program of study consistent with or exceeding the Advanced Study diploma requirements will be better prepared for college-level coursework and other types of training programs upon graduation. Students who earn the Advanced Studies diploma are more likely to enroll in college, stay in college, and earn a degree.

Standard diploma-earners enrolled who were last enrolled in four-year IHE were more likely to persist than Advanced Studies diploma-earners whose last enrollment was at a two-year IHE (49 percent). Standard diploma earners who were last enrolled in two-year IHE were the least likely to persist. It is important to note that high school graduates who earned Standard diplomas and enrolled in four-year IHE had higher achievement in mathematics and writing than those who enrolled in two-year IHE. Standard diploma-earners attending four-year IHE were less likely to fail the Algebra II SOL (17 percent) compared to Standard-diploma earners who last enrolled in two-year IHE (22 percent). As well, Standard diploma earners whose last enrollment was four-year IHE were more likely to earn advanced proficient scores on the state writing test (18 percent) compared to Standard-diploma earners who were last enrolled in a two-

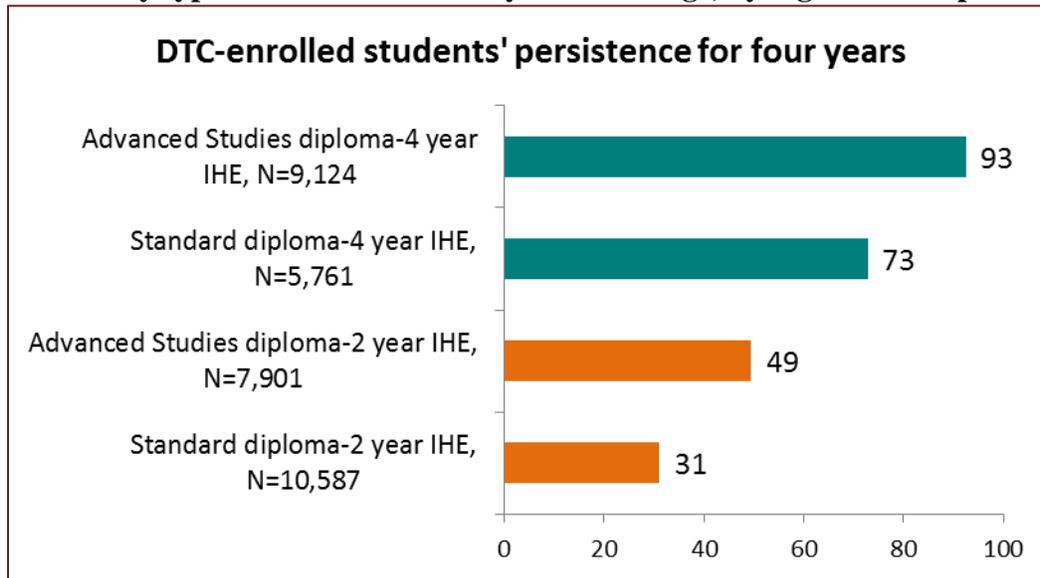
year IHE (11 percent). Similarly, Advanced Studies diploma-earners whose last enrollment was a two year IHE were more likely to earn lower scores on EOC writing and Algebra II tests compared to those who were in four-year IHE.

**Figure 4. Percent of 2008 high school graduates who enrolled and persisted in college by high school diploma type.**



NOTE: Definition of persistence includes students who earned a credential in the prior year.

**Figure 5. Percent of DCTC-enrolled high school graduates who were still enrolled or had earned any type of credential after 4 years of college, by high school diploma type**

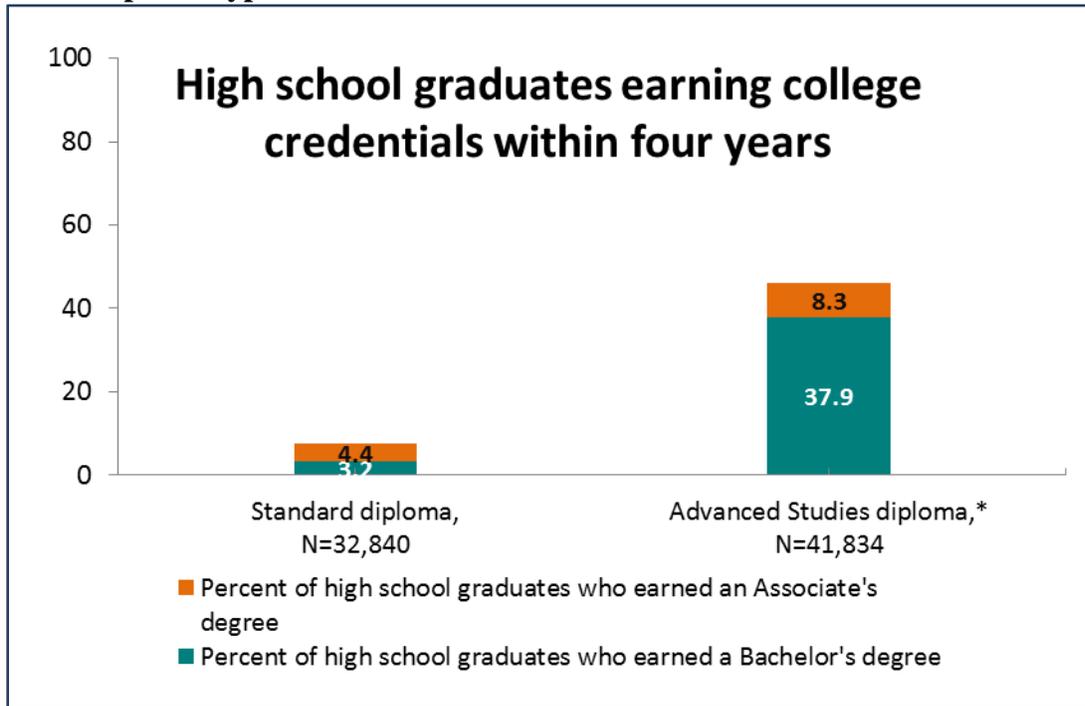


NOTE: Percentages based on DTC-enrolled high school graduates in 2008/09 who remained enrolled or earned a college credential by 2011/12.

#### 4.1.2 College credentials earned

Forty-three (43) percent of high school graduates who enrolled directly into college had earned a college credential, including Certificates, Associate’s, and Bachelor’s degrees. Figure 6 shows the percent of students who earned a credential within four years by high school diploma type. Students who earned Advanced Studies diplomas earned a larger percentage of college credentials than students who earned Standard diplomas. As well, students who earned Advanced Studies diplomas earned more Bachelor’s degrees than Associate’s degrees.

**Figure 6. Percent of 2008 high school graduates who earned college credentials, by high school diploma type**



\*Includes International Baccalaureate (IB) diplomas

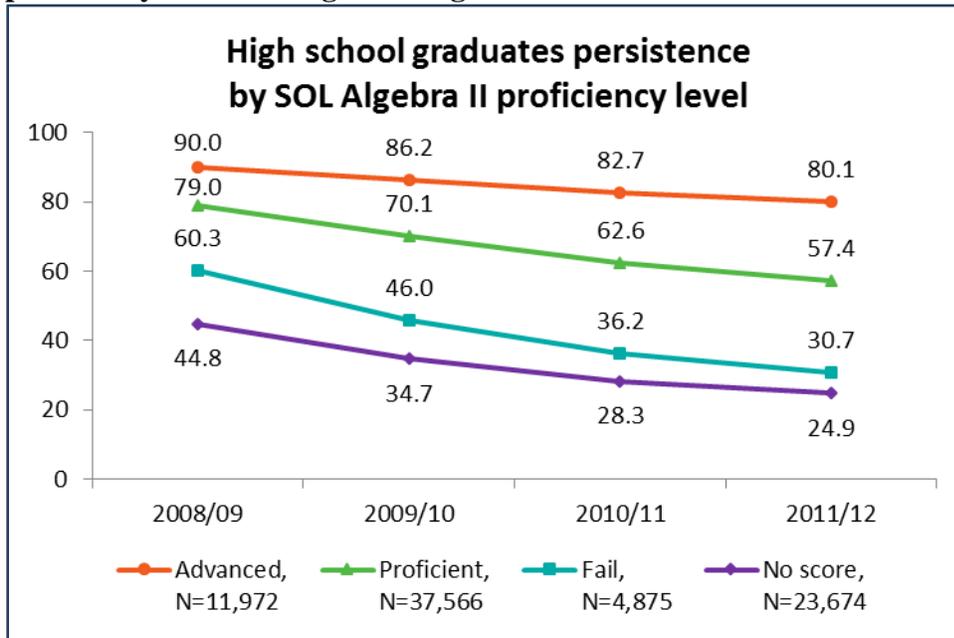
NOTE: Individual students are counted once for each type of college credential earned.

## 4.2 Outcomes for students based on Algebra II participation and proficiency level

Research shows that high school students who complete Algebra II are more likely to enroll and persist in college (Adelman, 2006) and in Virginia, enroll directly into and succeed in credit-bearing college mathematics courses (Garland, et al., 2011; Jonas, et al., 2012). This section of the report extends on these findings to assess how Algebra II participation and achievement levels impacted persistence and college completion in Virginia.

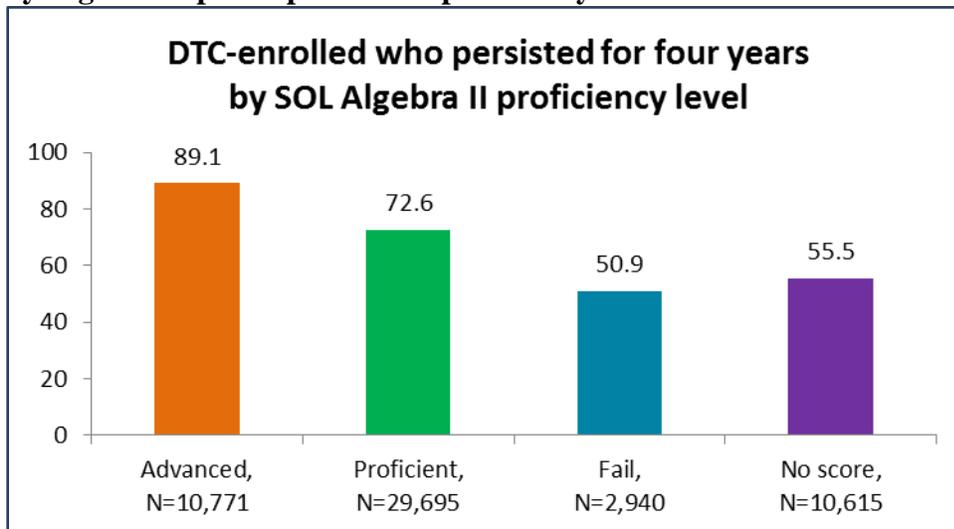
Figure 7 shows the percent of 2008 high school graduates who enrolled in 2008/09 and persisted in college for four years, based on their participation and proficiency level on the Virginia Algebra II SOL assessment. Like diploma type, the results show that students' participation and performance on the Algebra II SOL assessment is associated with college enrollment (see also Garland, et al., 2011; Jonas et al., 2012). The different slopes of the lines further suggest that there is an association between performance on the Algebra II SOL assessment and persistence over four years.

**Figure 7. Percent of high school graduates who enrolled and persisted by participation and proficiency level on Virginia's Algebra II SOL**



To explore this association further, we calculated the percent of DTC-enrolled high school graduates who persisted for four years (see figure 8). Of the DTC-enrolled cohort graduates, nearly 90 percent who earned Advanced Proficient scores on the Algebra II SOL test in high school were still enrolled or had graduated within four years compared to approximately half (51 percent) who failed the assessment.

**Figure 8. Percent of DTC-enrolled 2008 high school graduates who persisted for four years, by Algebra II participation and proficiency level**



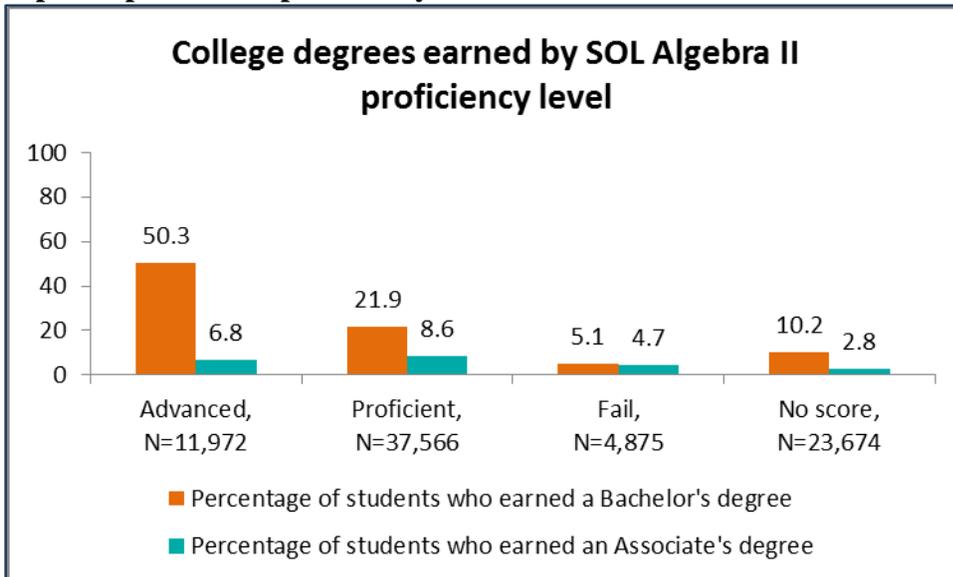
**Achievement in Algebra II is associated with greater chances of college success**

Findings that higher achievement on state mathematics tests suggests that not only is students' program of study important for college enrollment, persistence, and completion, but achievement within mathematics courses also matters. More than half of the students who earned advanced scores on the Algebra II test earned degrees in four years, whereas less than 1/3 of students scoring proficient earned degrees within four years.

Algebra II SOL outcomes are also associated with high school graduates' success earning credentials within four years. While just more than half of high school graduates who earned Advanced Proficient scores on the Algebra II SOL earned a Bachelor's degree within four years of high school graduation, only about one-fifth of those who earned proficient scores and five percent of those who failed the test earned a Bachelor's degree within four years (see

Figure 9). There were also small differences in the percent of students earning Associate degrees, although the association between test performance and earning the degree is less clear for these two-year degrees.

**Figure 9. Percent of 2008 high school graduates who earned college credentials by Algebra II participation and proficiency**



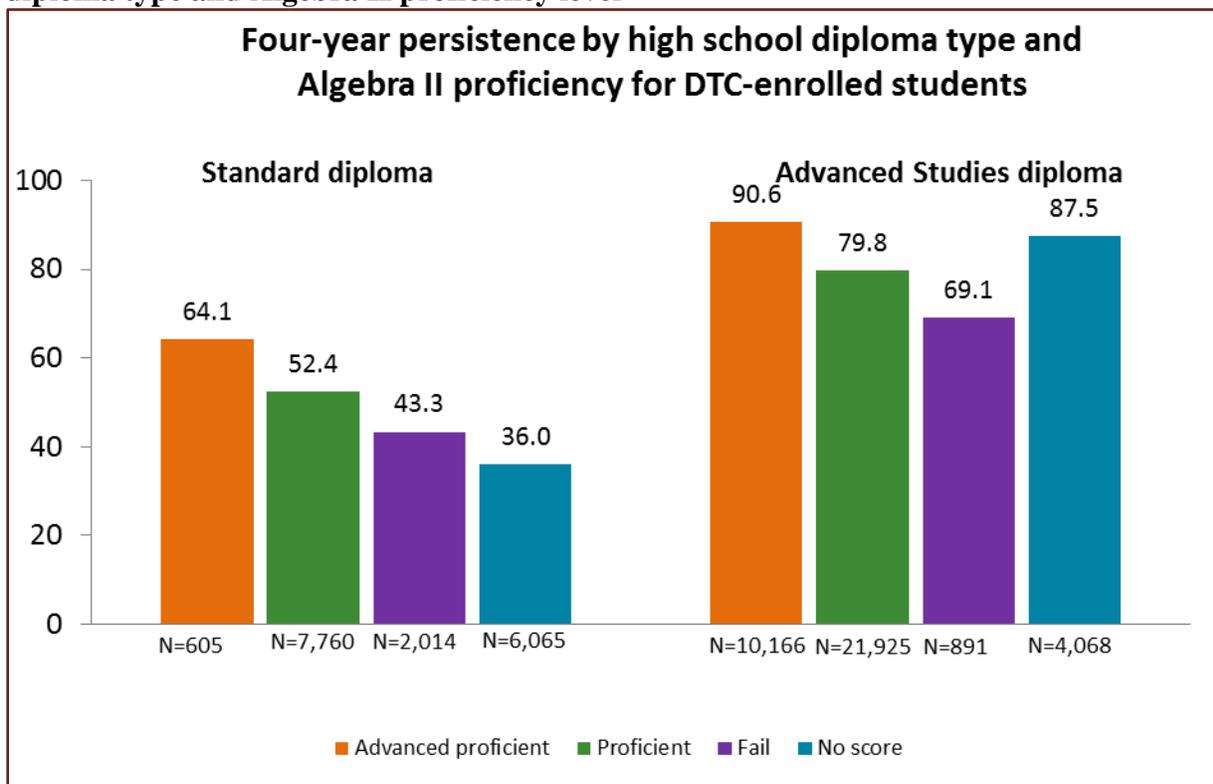
NOTE: Individual students are counted once for each type of college credential earned.

### 4.2.1 Outcomes for students by diploma type and SOL Algebra II proficiency level

In addition to assessing how achievement in Algebra II is associated with college persistence and completion, we assessed how the combination of Algebra II achievement and diploma type are associated with persistence and completion. This is important because the diploma can serve as a proxy for high school graduates' overall course-taking rigor, which is a strong predictor of college outcomes in Virginia and nationally (e.g., Garland, et al., 2011; Jonas et al., 2012; Adelman, 2006).

Results in this study showed that students who earned Advanced Studies diplomas were more likely to persist in college if they earned advanced proficient scores on the Algebra II test relative to those who earned proficient and failing scores on the Algebra EOC test. Figure 10 shows the percent of DTC high school graduates who persisted for at least four years. Overall, students who earned Advanced Studies diplomas were more likely to remain enrolled. However, even for Advanced Studies diploma-earners, Algebra II proficiency levels were associated with the likelihood that students remained enrolled or earned a college credential within four years. Advanced Studies diploma earners who failed the Algebra II test were only slightly more likely to persist (69.1 percent) than Standard diploma earners who earned Advanced Proficient scores on the test (64.1 percent). Just more than half of the Standard diploma-earners (52.4 percent) with proficient scores on the Algebra II test persisted for four years.

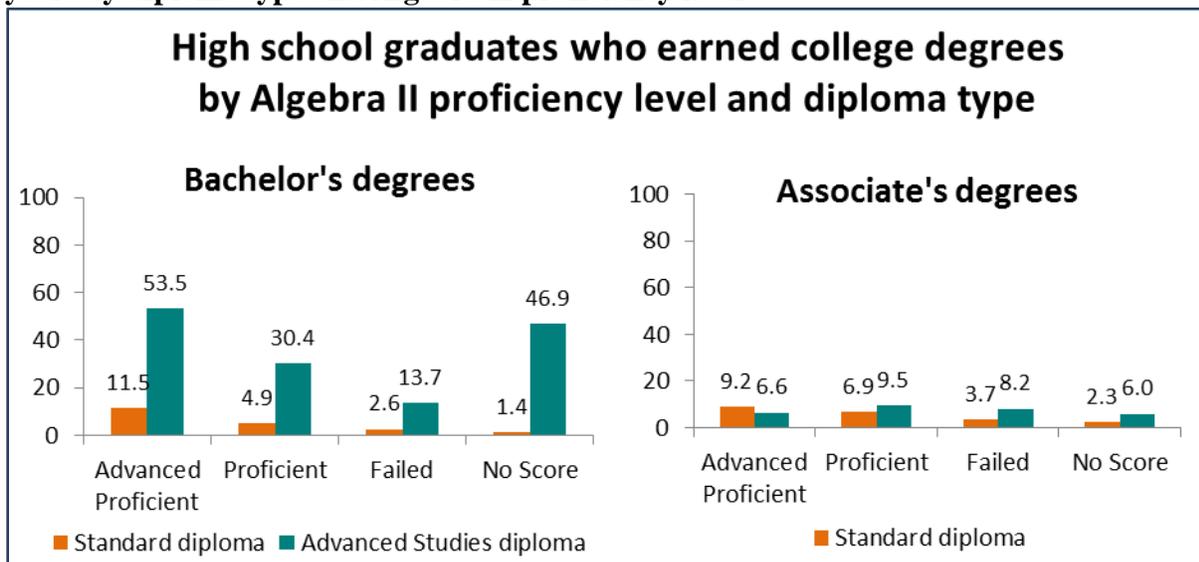
**Figure 10. Percent of DTC-enrolled cohort graduates who persisted for four years, by diploma type and Algebra II proficiency level**



The interaction between Algebra II SOL proficiency level and high school diploma types shows similar associations with college credentials earned. Figure 11 shows the percent of the 2008 cohort graduates who earned college credentials within four years of high school graduation. While more students who earned Advanced Studies diplomas earned a Bachelor's degree within four years, there were differences in the credentials earned that were associated with performance on the Algebra II SOL. More than half the Advanced Studies diploma earners who also earned advanced proficient scores on the Algebra II SOL earned a Bachelor's degree within four years, whereas only 30 percent of Advanced Studies diploma earners who scored proficient, and 14 percent of those who failed the Algebra II test, earned a Bachelor's degree within four years (see Figure 11).

In general, students who earned Standard diplomas in high school were less likely to earn college degrees. However, even for Standard diploma earners, those who earned advanced proficient scores on the Algebra II test were more likely to earn Bachelors' or Associates' degrees than students who earned proficient or failing scores (see Figure 11). Interestingly, Standard diploma-earners who scored advanced proficient on the Algebra II test earned a similar percent of college credentials in four years (11.5 percent) as Advanced Studies diploma-earners who failed the test (13.7 percent). Table 5 shows the number of students in each group in figure 11. Of note, fewer than 1,000 students who earned Standard diplomas scored Advanced Proficient on the Algebra II assessment, and just over 1,000 students who earned Advanced Studies diplomas failed the assessment.

**Figure 11. Percent of 2008 high school graduates who earned college credentials within four years by diploma type and Algebra II proficiency level**



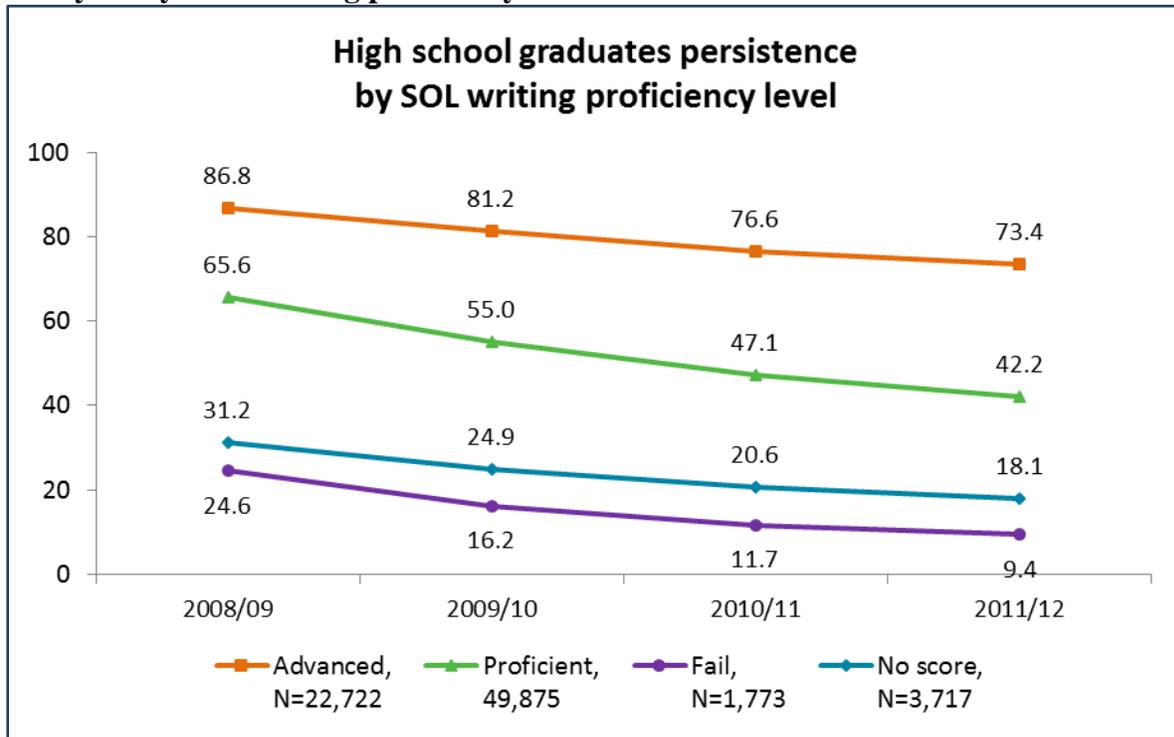
**Table 5. Number of students by Algebra II proficiency level and diploma type**

Algebra II proficiency level	Standard diploma	Advanced Studies diploma
Advanced Proficient	902	11,070
Proficient	12,531	25,017
Failed	3,709	1,118
No Score	15,698	4,629

### 4.3 College outcomes based on end-of-course writing proficiency level

Results from the analysis of college persistence and credentials earned based on the SOL EOC writing test were similar to those we found for Algebra II. High school graduates with advanced proficient scores on the EOC writing test were more likely to enroll and persist than students with lower proficiency levels. Figure 12 shows the percent of 2008 cohort graduates who persisted for at least four years. Graduates who earned proficient scores on the writing test were more likely to leave college relative to those who earned advanced proficient scores on the test. High school graduates who failed the writing test had the highest rates of leaving college.

**Figure 12. Percent of 2008 high school graduates who enrolled in 2008/09 and persisted each year by EOC writing proficiency level**

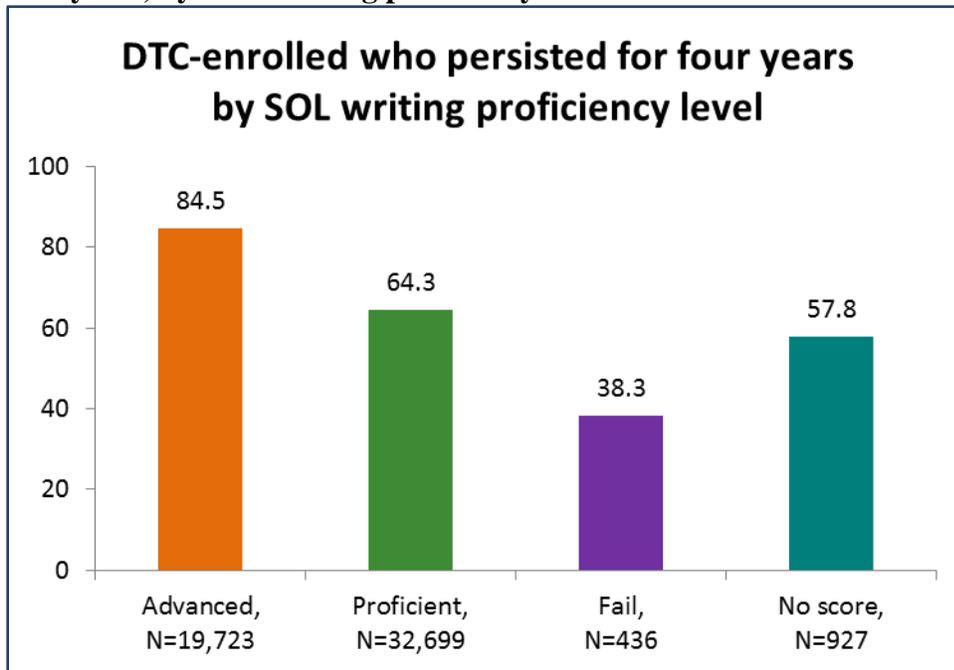


NOTE: Percent is based on all 2008 cohort graduates

Figure 13 shows this association focusing on DTC-enrolled cohort graduates. The higher the graduates' proficiency level, the more likely they were to remain in college for at least four years or earn a credential. College-enrolled students who earned advanced proficient scores on their

state writing test were more than two-times as likely to persist for at least four years compared to students who failed the state writing test.

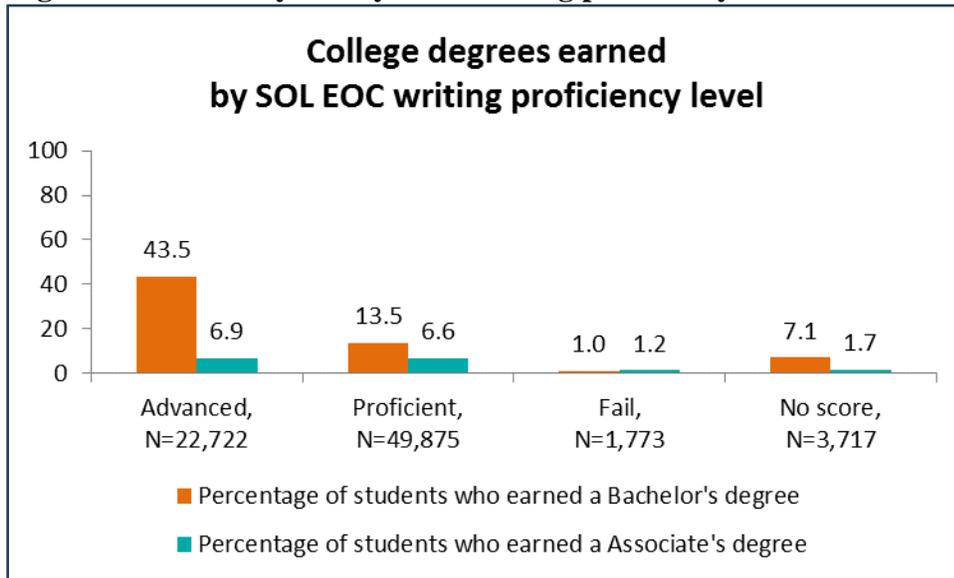
**Figure 13. Percent of DTC-enrolled 2008 high school graduates who persisted for at least four years, by EOC writing proficiency level**



NOTE: Percent is based on IHE-enrolled high school graduates only.

High school graduates' EOC writing proficiency level was also associated with their likelihood of earning a college credential within four years (Figure 14). A larger percent of high school graduates who scored advanced proficient on the EOC writing test earned a Bachelor's degree within four years than did students who earned proficient, failed, or did not take the test. Relatively few students who earned proficient scores on EOC writing tests earned a college degree within four years.

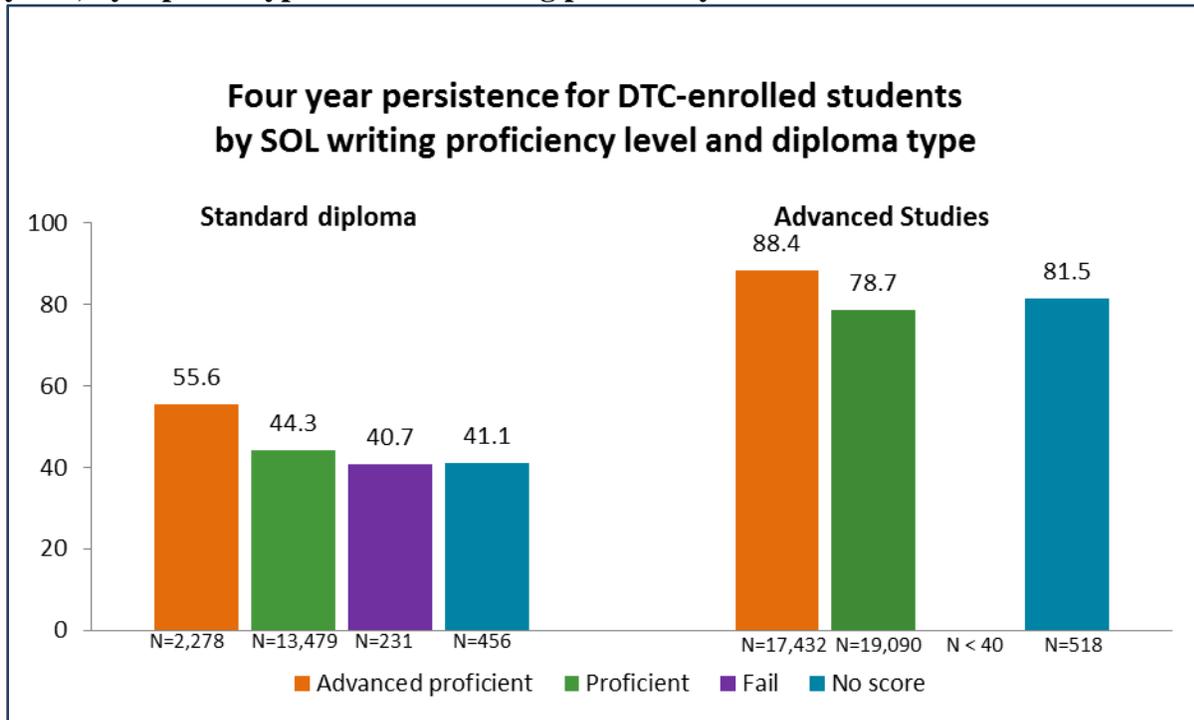
**Figure 14. Percent of 2008 high school graduates who earned Bachelor's and Associate's degrees within four years by EOC writing proficiency levels**



#### 4.3.1 Outcomes for students by diploma type and SOL writing proficiency level

Students who earned Advanced Studies diplomas were most likely to stay in college if they earned advanced proficient scores on the EOC writing test. College persistence was lower for high school graduates who earned proficient or had no writing scores (Figure 15). While high school graduates who earned Standard diplomas were less likely to enroll overall, they were more likely to persist if they earned advanced proficient scores on the EOC writing test.

**Figure 15. Percent of DTC-enrolled 2008 cohort graduates who persisted for at least four years, by diploma type and EOC writing proficiency level**



NOTE: Less than 40 students earned Advanced Studies diplomas and failed the writing test. Data not shown.

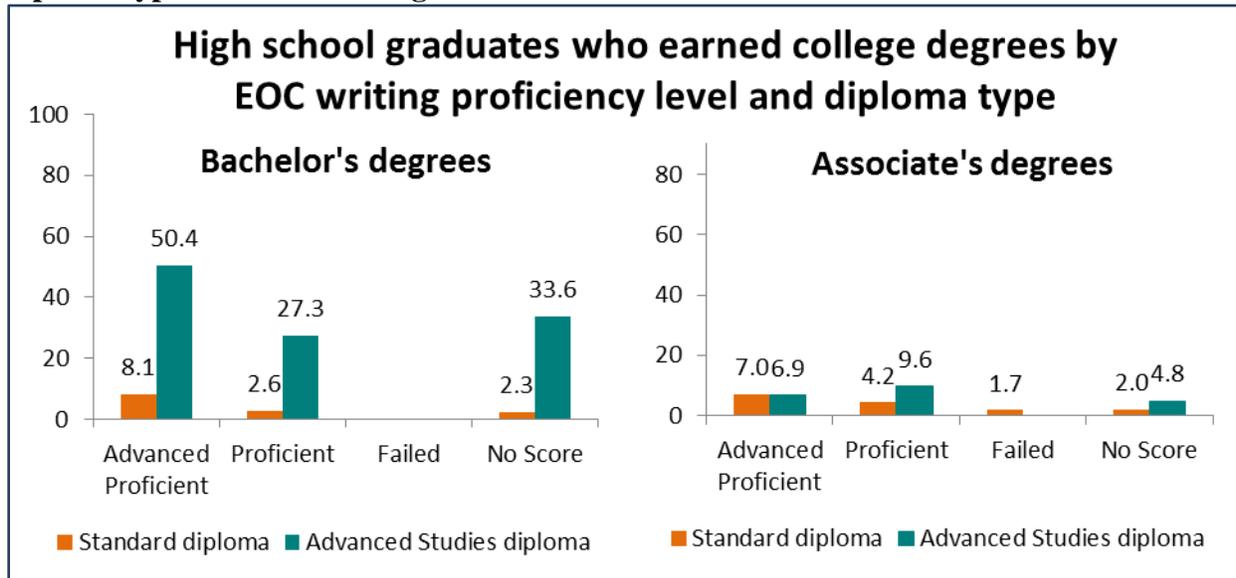
Writing outcomes also interact with diploma type. Figure 16 shows the percent of high school graduates who earned Bachelor’s and Associate’s degrees by diploma type and EOC writing proficiency level. Table 6 shows the number of students in each group. Performance on the writing assessment *and* diploma type are associated with college completion. While more than half of the graduates who earned an Advanced Studies diploma and scored advanced proficient

on the writing test earned a college credential within four years, only about 30 percent of the Advanced Studies diploma earners who scored proficient on the EOC writing test earned a college credential in the same time period. In general, high school graduates who earned Standard diplomas earned few college credentials, but those who also scored Advanced on the writing test earned more Bachelor and Associate degrees than those who earned scores in lower proficiency levels.

**Writing achievement and program of study make a difference in students’ later college success**

While students’ high school program of study was a strong predictor of college degrees earned, students who had higher writing proficiency levels were more likely to earn college degrees than their peers, even with similar diploma types. Twenty-three (23) percent more Advanced Studies diploma earners who also scored advanced on the EOC writing test earned Bachelor’s degrees within four years, relative to Advanced Studies diploma earners scoring proficient.

**Figure 16. Percent of 2008 high school graduates who earned college degrees by high school diploma type and EOC writing outcome.**



**Table 6. Number of students by EOC writing proficiency level and diploma type**

EOC writing proficiency level	Standard diploma	Advanced Studies diploma
Advanced Proficient	3,667	19,048
Proficient	27,243	22,105
Failed	754	<40
No Score	11,76	645

## 5 Summary and recommendations

This research followed the graduates from Virginia's 2008 On-Time Graduation Rate cohort into and through four-years of college. We found that nearly 70 percent of high school graduates enrolled in college, nearly half were still enrolled or earned credentials within four years. This research also showed that overall, just fewer than 30 percent earned college credentials within four years. Consistent with other research, the results show that high school graduates who completed a more challenging high school curriculum, as measured by students earning Advanced Studies diplomas, were more likely to enroll and persist in college, and earn degrees in four-years. As well, high school EOC writing and Algebra II tests were also associated with college enrollment, persistence, and completion. Students who earned advanced proficient scores on these state EOC tests were most likely to enroll, persist, and complete college. It is important to note that proficiency level on the mathematics and writing tests interacted with diploma type, such that students who earned Standard diplomas and advanced proficient scores on the Algebra II test were nearly as likely to persist as students who earned Advanced Studies diplomas but failed the Algebra II test. These results suggest that high achievement in one area

(e.g., mathematics) can moderate the impact of less rigorous coursework. Before drawing firm conclusions about the role of high achievement in one area, it is important to conduct additional research. In this study, we did not have complete course information for high school students. It is possible that some students who earned Standard diplomas were close to meeting the minimum requirements for an Advanced Studies diploma, and that it was these students who had the strongest college performance.

These results are limited to those public high school graduates who completed high school in four years or less. The data presented in this paper include all high school graduates. It is important to learn whether these same findings apply to different groups of students, such as those whose families are economically disadvantaged. Recent research suggests that despite great potential for many high achieving students who are living in poverty to enroll and succeed in college, these students are less likely to enroll, persist, and complete (e.g., Bromberg & Theokas, 2014). Our team is analyzing Virginia’s data to better understand the college pathways for these students.

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It is also important to determine whether these results apply to high school graduates from later years who entered high school with a different set of learning standards and may have entered community college after new placement policies and developmental educational programs were put in place.

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Since the 2008 graduates completed high school, Virginia’s K12 system has increased learning expectations by establishing more challenging *Standards of Learning* and the associated tests that measure student mastery of the standards. As well, the Virginia’s Community Colleges, which enroll most of Virginia high school graduates who attend two-year colleges, have made substantive changes to its instructional programs, course enrollment requirements, and college placement tests. These changes were designed to increase student success in college and support more students in their efforts to earn credentials or transfer to four-year schools. Determining how students are faring after these changes, and how high school achievement is associated, will help the state determine next steps in local and state policy to further support high school graduates’ success in postsecondary education.

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