

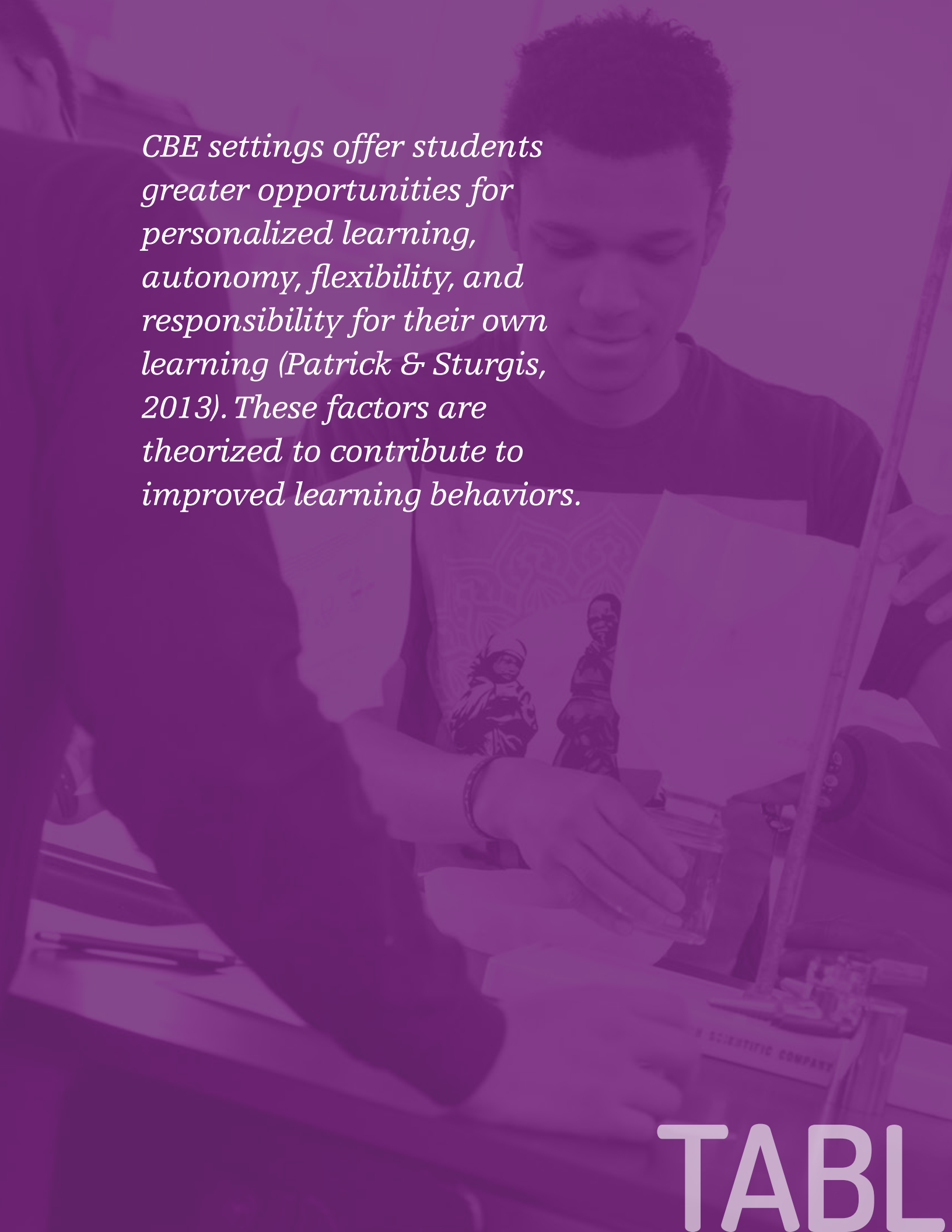
LOOKING UNDER THE HOOD OF COMPETENCY-BASED EDUCATION:

*The Relationship Between Competency-Based
Education Practices and Students' Learning
Skills, Behaviors, and Dispositions*

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A student in a lab coat is working in a chemistry laboratory. The student is pouring liquid from a beaker into a graduated cylinder. The background is a solid purple color. The text is overlaid on the left side of the image.

CBE settings offer students greater opportunities for personalized learning, autonomy, flexibility, and responsibility for their own learning (Patrick & Sturgis, 2013). These factors are theorized to contribute to improved learning behaviors.

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INTRODUCTION

Competency-based education (CBE), an approach to instruction that places emphasis on what students learn and master rather than how much time they spend in school, is gaining popularity nationwide. CBE encompasses a range of practices and policies that vary across settings, but it typically includes the following features:

- Specific learning targets for what students should know and be able to do to get credit.
- Assessment, support, and monitoring of individual students' progress as they work toward meeting these targets.
- Requirements that students demonstrate mastery of competencies before they can earn credit and advance.
- Flexible pacing and progression (both extended or accelerated).

CBE settings offer students greater opportunities for personalized learning, autonomy, flexibility, and responsibility for their own learning, which are theorized to contribute to improved learning behaviors (Patrick & Sturgis, 2013).

The goal of this study was to rigorously examine the relationship between CBE practices and changes in such learning capacities (i.e., the skills, behaviors, and dispositions that enhance student capacity to learn in school). Researchers administered surveys to Grade 9 students, core content teachers, and administrators in high schools identified by state education administrators and local school administrators as implementing CBE and a set of comparison high schools identified as not implementing CBE in three states.

WE USED SURVEY DATA TO DO THE FOLLOWING

- ◆ Examine the extent to which educators reported implementing CBE practices in mathematics and English language arts (ELA) classes in CBE and comparison high schools.
- ◆ Assess the extent to which students experienced CBE practices in their first year of high school.
- ◆ Explore the relationship between students' experiences of CBE practices and changes in their learning capacities during their first year of high school.

The study found that the implementation of CBE practices varied greatly across and within schools, regardless of whether the school was categorized as implementing CBE. Significantly, more teachers in the study's CBE schools reported using CBE practices than teachers in the comparison schools. However, the responses of teachers in CBE schools varied considerably, suggesting that implementation was not consistent in settings deemed "competency-based." Furthermore, many teachers in schools that had not explicitly adopted a CBE approach nonetheless reported using elements of CBE practices. Similarly, students in both CBE and comparison schools reported that they experienced practices normally associated with CBE.



The fact that CBE practices varied considerably within CBE schools and were also evident in comparison schools indicates that the distinction is not as clear as might be expected and that CBE implementation falls along a continuum—an important point for studies of CBE. In our study, for example, the lack of strict distinction among school types made a direct comparison between “CBE” and “non-CBE” less useful than an examination of individual CBE practices. We therefore examined whether students’ reported experiences with specific CBE practices were associated with changes in their learning capacities regardless of the school they attended.

THE ANALYSES SHOWED SEVERAL POSITIVE ASSOCIATIONS BETWEEN STUDENTS’ EXPERIENCES OF SPECIFIC CBE PRACTICES AND THEIR LEARNING CAPACITIES.

- **LEARNING TARGETS:** Students who reported having a clear sense of the learning targets in their ELA or mathematics courses showed more positive changes in some learning capacities over time than students who did not report having clear learning targets in their courses.
- **MEASUREMENT OF LEARNING:** A requirement to show mastery of learning targets to pass mathematics and ELA courses was also associated with favorable changes in intrinsic motivation.
- **INSTRUCTIONAL APPROACHES AND SUPPORTS:** Receiving instruction delivered via a variety of formats (e.g., participation in collaborative group projects) was positively related to

changes in learning capacities.

- **WHEN AND WHERE LEARNING TAKES PLACE:** Participating in school-related work outside of the school building during the school day (e.g., internships) was also positively related to changes in learning capacities over time.
- **ASSESSMENT OF LEARNING:** Having access to nontraditional assessments (i.e., assessments other than written tests) was positively associated with intrinsic motivation.
- **PACING AND PROGRESSION:** The option of extra time to finish a topic or unit and the opportunity to retake an exam or re-do a final project in mathematics were associated with favorable changes in students’ self-efficacy in mathematics. Allowing extra time to finish mathematics coursework was also associated with more positive changes in intrinsic motivation and perceived utility of mathematics.

The remainder of this report is organized as follows: First, we describe the study sample and methods. The subsequent section discusses teachers’ and administrators’ reports of CBE implementation. Finally, the report examines students’ reported experiences of a number of specific CBE practices and the extent to which they were associated with changes in students’ learning skills, behaviors, and dispositions from fall to spring of their ninth-grade year. The report concludes with directions for future research. Researcher-developed surveys to measure CBE implementation are included in Appendix A.



METHODS

School and Respondent Sample

We studied the implementation of CBE and associated changes in learning capacities in a group of high schools participating in the Innovation Lab Network facilitated by the Council of Chief State School Officers (CCSSO). The sample spanned three states and included 10 public schools that state education administrators as well as local district and school administrators identified as implementing CBE, and eight comparison high schools.

For our CBE sample, we sought schools with the following characteristics¹:

- Reported current implementation of CBE policies and practices schoolwide.
- Had implemented CBE for at least two years (i.e., since the 2011–12 academic year).
- Served students in Grade 9 who had not attended a CBE middle school.
- Enrolled at least 200 ninth-grade students.

For each CBE school selected, we identified a comparison school in the same district or county that served a similar population of students but whose principal indicated that the school was not implementing

CBE. CBE schools were matched to comparison schools based on the percentage of students qualifying for free or reduced-price lunch and the percentage of students belonging to the largest racial or ethnic groups.² Eight comparison schools participated in the study. In one district, a large high school served as the comparison for two small CBE schools. In another district, the comparison school dropped out of the study. For more information on sample selection and student population characteristics, please refer to Appendix B.

Data Collection

Teacher and administrator surveys were administered in all of the sample schools between April and June 2015. Pre and post student surveys were administered to Grade 9 students in a subset of four CBE and four comparison schools, selected because they enrolled the largest number of Grade 9 students who were not exposed to CBE practices prior to high school. Baseline data assessing students' learning capacities were collected between September and October 2014. Follow-up student data related to both their learning capacities and educational experiences were collected between April and June 2015. For more information about the types of data collected and constructs measured in the surveys, see Appendix C.

Within each school, the teacher and administrator samples included all core content teachers and at least

1 In some instances, we had to relax these requirements, such as allowing for more recently implemented CBE programs or schools with smaller Grade 9 enrollment, to identify a sufficient number of CBE schools to participate in each state. In addition, for schools that only completed the teacher and administrator surveys, we included schools that may have a CBE feeder middle school as well as schools that had a much smaller Grade 9 enrollment. Finally, in one state, there was only one high school in most counties, and so the degree of urbanization of the school (e.g., rural, urban, and suburban) was given greater consideration than the geographic closeness of the comparison school to the CBE school.

2 For each comparison school, the percentage of students qualifying for free or reduced-price lunch and the percentage of students belonging to the majority and largest minority racial or ethnic groups were within 10 percentage points of the CBE school population, with one exception. Within one school pair, the percentage of students qualifying for free or reduced-price lunch exceeded the percentage at the comparison school by 13 percentage points. However, this comparison school was deemed to be the best-matched comparison school because it is another large, comprehensive high school within the same school district.

Table 1. Student, Teacher, and Administrator Survey Sample Sizes

TARGET RESPONDENT GROUPS	CBE SCHOOLS			COMPARISON SCHOOLS		
	NUMBER SAMPLED	NUMBER RESPONDING	RESPONSE RATES	NUMBER SAMPLED	NUMBER RESPONDING	RESPONSE RATES
Students ^a	737	508	69%	682	546	80%
Teachers	161	111	73%	219	146	72%
Administrators	19	16	84%	21	14	71%

^aThese numbers are based on the number of students who responded to both the fall and spring survey. The total pool of student respondents includes all students enrolled in the ninth grade in participating schools.

one administrator (typically the principal and assistant principal[s]). In all, 380 core content classroom teachers and 40 school administrators across the 18 sample schools were invited to complete a survey of educational policies and practices. In the four CBE and four comparison schools in which we also administered the student survey, the sample included 1,419 ninth-grade students. Approximately 10 percent of sampled students did not consent to participate in the study, and due to absences and transfers, there were different response rates in the fall and spring. Only students who responded to both the fall and spring surveys were included in our analytic sample so that we could measure changes in their learning capacities over time. See Table 1 for a summary of the sample size drawn for each targeted group of respondents, number of individuals who responded, and response rate.

To account for the possibility that students attending CBE schools differed systematically from students attending comparison schools, we collected student demographic and achievement background data from district and state data systems. For all of the students who responded to the fall and spring surveys (n = 1,054), we obtained information about gender, race/ethnicity, special education status, English language learner (ELL) status, and Grade 8 mathematics and ELA achievement test scores. Students with missing background

information were excluded from the final analysis sample (approximately 8 percent of student respondents in comparison schools and 4 percent of respondents in CBE schools). See Appendix D for more information regarding the composition of our student sample.

Survey Data and Analyses

CBE Practices

To examine CBE practices, we administered additional surveys to teachers, administrators, and students in CBE and comparison schools. Survey items were designed to measure CBE practices in six domains: learning targets, instructional approaches, and supports, when and where learning takes place, assessment strategies, measurement of learning, and pathways and progression. For many of the CBE constructs measured in

the surveys, we combined information from three or more survey items into scales. See Appendix D for a more detailed description of the creation of survey scales. To compare differences in practices as reported by teachers in CBE schools and teachers in comparison schools, as well as differences in student experiences in CBE and comparison schools, we performed statistical tests that allowed us to determine whether observed differences were statistically significant.³

To account for the possibility that students attending CBE schools differed systematically from students attending comparison schools, we collected student demographic and achievement background data from district and state data systems.

³ Because of the large number of comparisons made within this report, we applied the Bonferroni correction within each domain of CBE practices and policies. This correction is used to reduce the probability of identifying differences that are statistically significant by chance. The p values used to determine significance (described in Appendix E) therefore differ between analyses of teacher survey and student survey data and across the domains of CBE practices and policies.



Student Learning Capacities

Students responded to survey items measuring 16 learning capacities in three domains (see circles below for descriptions of the domains). For our analysis, we measured students' learning capacities using scales developed from items in a survey administered in both fall 2014 and spring 2015. Surveys measuring students' experiences of CBE features were administered late in spring 2015, so their experiences

would reflect the entire 2014–15 academic year. To determine whether changes in learning capacities (i.e., scale values from the spring survey administration minus the scale values from the fall administration) were related to specific CBE practices and policies, we performed regression analyses that controlled for student demographic characteristics and Grade 8 achievement test scores. For more information on scale development and data analysis, please refer to Appendix D.

DOMAIN 1: STUDENT ACADEMIC MINDSETS AND DISPOSITIONS

Students' academic mindsets and dispositions include attitudes and beliefs about oneself as a learner, as well as feelings of connection with and engagement in school. They include intrinsic motivation, self-efficacy in mathematics and ELA, and sense of belonging in school.

DOMAIN 3: ACADEMIC BEHAVIOR

Academic behaviors are the observable, outward signs that a student is engaged and putting forth effort to learn and participate in school. Examples include preparation for class and active interest in learning.

DOMAIN 2: SELF-REGULATED LEARNING SKILLS

Self-regulated learning strategies are the self-directed, meta-cognitive, and self-control strategies students use to engage in learning, including making an explicit effort to connect new learning to what they already know and directing attention towards key learning tasks.



STUDY FINDINGS

The findings from the study are presented in two sections. First, we describe the reported implementation of CBE practices in CBE and comparison schools. We then examine students' experiences of CBE practices and describe how these experiences are related to changes in their learning capacities.

Section 1:

How Do School Policies and Classroom Practices Differ Between Competency-Based Education (CBE) and Comparison Schools?

Overall, teachers in CBE schools were more likely than teachers in comparison schools to report implementing some CBE-aligned practices, such as establishing learning targets, providing individualized support, and offering flexibility in assessment and instructional pacing. However, teachers in schools categorized as CBE were no more likely than comparison school teachers to report engaging in other CBE-aligned practices, such as having students take primary responsibility for keeping track of their own learning and progress. In addition, implementation of CBE-aligned practices was not uniform within CBE schools; variation in teacher-reported practices within schools was about the same as (and for some features much greater than) variation among schools.

The first goal of this study was to measure the implementation of CBE practices at both the school and classroom level from the perspectives of administrators and teachers.⁴ (Student perspectives are presented in the next section of the report.) The teacher survey results, which include statistical comparisons between CBE and comparison schools, were the focus of our analysis because they provide insight about practices at the classroom level. Administrator survey results provided additional information about the policy contexts in which teachers operate.⁵

This section is organized by the six domains of CBE implementation addressed in each survey: learning targets, measurement of learning, instructional approaches and supports, when and where learning takes place, assessment strategies, and pathways and progression. Box 2 provides descriptions of these domains. Findings are presented from survey items that represent the defining elements of each domain. (The full surveys, as well as comparison results for all survey items and scales, are provided in Appendix A.)

⁴ In the surveys, teachers were asked to consider one of their classes, either Grade 9 mathematics or ELA. If they did not teach Grade 9 mathematics or ELA, they were asked to consider a core subject that they taught for Grade 9 students. If they did not teach Grade 9 students, then they were asked to consider a core subject taught to Grade 10–12 students.

⁵ We did not perform statistical tests of administrator survey data due to the small number of administrators who took the survey.



Domains of CBE Implementation

LEARNING TARGETS

In a CBE setting, learning targets (or competencies) are explicit, shared with students, and based on rigorous college and career readiness standards (CCSSO, 2013; New Hampshire Department of Education [NHDOE], 2007; Patrick & Sturgis, 2013). Students are expected to demonstrate mastery of these targets in order to advance academically. In more personalized CBE settings, students may negotiate the means by which they obtain and demonstrate mastery.

MEASUREMENT OF LEARNING

In CBE settings, what counts toward course grades, course credit, and evaluation of proficiency is demonstrated mastery, not participation, effort, or how long learning takes (e.g., CCSSO, 2013; NHDOE, 2007; Patrick & Sturgis, 2013).

INSTRUCTIONAL APPROACHES AND SUPPORTS

Because learning in CBE settings is more individualized than in traditional settings, teachers may make greater use of technology and more flexible and student-centered instructional strategies (CCSSO, 2013; NHDOE, 2007). In some CBE models, students have considerable autonomy, responsibility, and choice regarding their learning. Individualized guidance about meeting learning targets is also considered a key feature of CBE environments (Patrick & Sturgis, 2013).

WHEN AND WHERE LEARNING TAKES PLACE

The focus in CBE settings is on students' learning and the mastery of competencies, with less emphasis on class and school attendance (i.e., seat time) (CCSSO, 2013; Le, Wolfe, & Steinberg, 2014; Patrick & Sturgis, 2013). As a result, students may have more flexibility regarding when and where they complete their work and greater opportunities to earn credit through activities, projects, online coursework, and internships that are completed outside of the traditional school setting and schedule.

ASSESSMENT STRATEGIES

Assessment of learning is considered a core feature of CBE. In a CBE setting, learning is continuously tracked and shared with students, and students receive feedback and support based on individual needs identified through assessment (Le et al., 2014; NHDOE, 2007; Patrick & Sturgis, 2013). Students in CBE settings are generally given greater latitude in retaking assessments and greater choice regarding the types of assessments used to demonstrate mastery.

PACING AND PROGRESSION

In a traditional school setting, students complete required courses on a prescribed schedule. In contrast, students in CBE settings may progress at their own pace, with progression contingent on demonstrating mastery of learning targets rather than the amount of time spent in classrooms. Grade-level advancement and graduation are based on demonstrated mastery of required competencies, with students given flexibility, support, and opportunities for an accelerated pace or extended time if necessary (CCSSO, 2013).

Learning Targets

In a CBE environment, what determines mastery of learning targets (i.e., what counts toward course grades, course credit, and evaluation of mastery) is clearly defined and communicated to students (e.g., CCSSO, 2013; NHDOE, 2007; Patrick & Sturgis, 2013). The findings of our study suggest that requiring mastery of learning targets is a common practice in both CBE and comparison schools. A majority of administrators at both CBE (14 of 16) and comparison schools (10 of 14) reported that students in their school were expected to meet specific learning targets. Teachers in CBE schools were more likely than teachers in comparison schools to report requiring that students demonstrate proficiency of learning targets. Still, more than half of comparison teachers reported the same requirement (see Table 2), suggesting that this practice is fairly common in traditional as well as CBE schools.

Table 2. Teachers' Reported Requirements for Mastering Learning Targets

ITEM	PERCENTAGE WHO REPLIED YES	
	Comparison	CBE
Q. Do students need to demonstrate proficiency (or mastery) of a specific set of learning targets (i.e., specific skills, knowledge, or abilities) in order to pass and get credit? (Yes/No)	54	72 ^a

^a Significant difference: $p < .05$.

Measurement of Learning

A related component of CBE is how mastery of learning targets is measured and used to determine progression through grade levels and graduation (i.e., “what counts” toward grades and credit). In an ideal CBE setting, what counts toward credit is students’ mastery of competencies, not their attendance, level of participation, or effort.

In fact, we found that teachers and administrators from CBE schools reported the use of a mix of traditional and CBE-aligned practices for measuring learning and determining school progress. The pattern of responses suggests that CBE schools use traditional measurement of learning practices in addition to CBE-aligned practices. For example, six of the 16 administrators at CBE schools (compared with three of the 14 administrators at comparison schools) reported a seat-time requirement, and six of the 16 administrators at CBE schools (compared with one administrator at the comparison schools) reported an attendance requirement for graduation. In addition, all of the CBE school administrators reported that demonstration of competencies was required for graduation, compared with 10 of the 14 administrators in comparison schools.

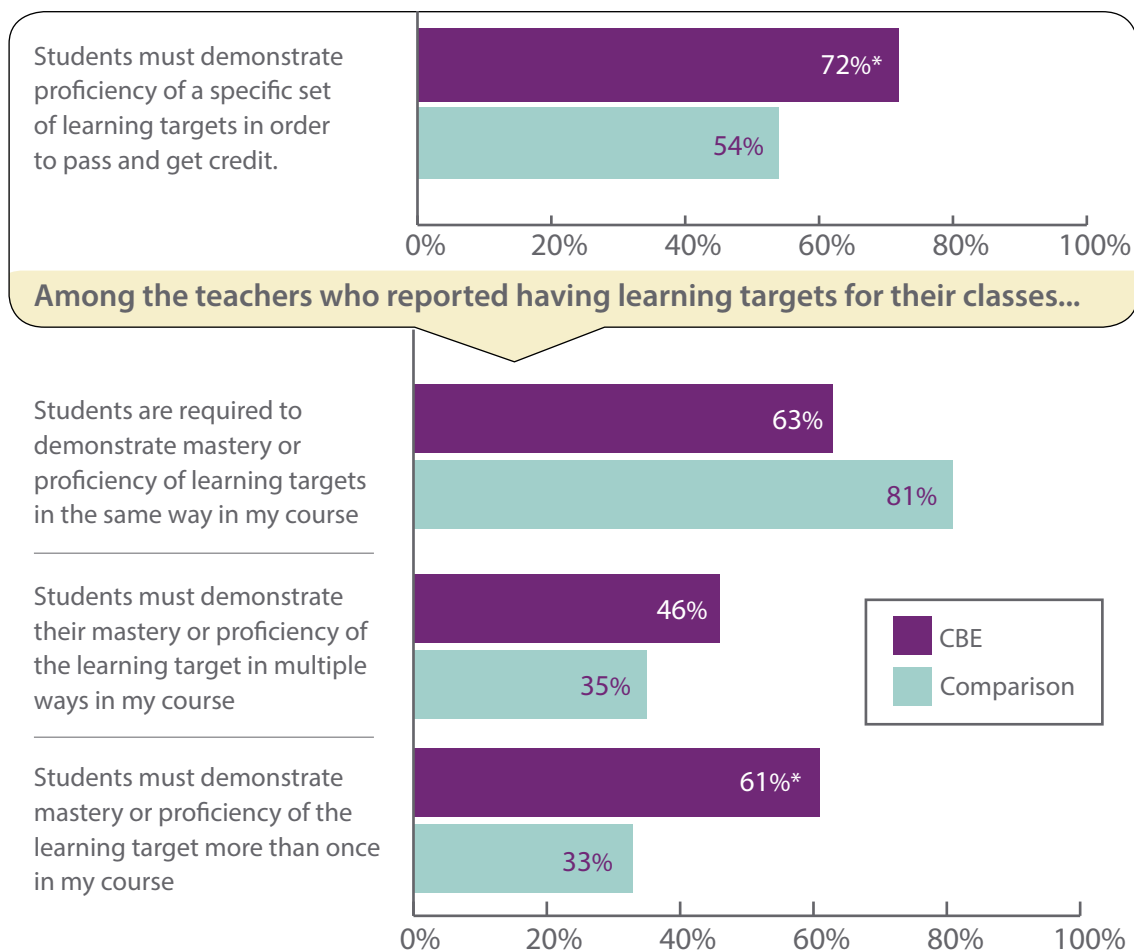
To examine how learning was measured at the classroom level, teachers were asked which factors, such as attendance and participation, counted in determining a student’s grade or whether a student would receive credit for a course. There were no

significant differences between teachers in CBE and comparison schools in their reported use of different measures of learning to determine whether students would pass and get credit for a course, including more traditional measures of learning, such as attendance, class participation, homework, and completion of work by a due date, as well as the CBE-aligned practice of measuring students’ level of mastery in meeting course learning targets.

Another potentially distinguishing feature of CBE is that students may be required to demonstrate mastery of their learning targets multiple times and in multiple ways in order to show deep or thorough understanding. However, they are given flexibility in how they do so. Figure 1 shows that, among the 72 percent of teachers in CBE schools and 54 percent of teachers in comparison schools who reported having learning targets for their classes:

- A substantial number of teachers from both groups reported that they require all students to demonstrate mastery in the same way (no difference between school types). In other words, teachers did not tailor the type of assessment to student needs or interests.
- Teachers in CBE schools were more likely to report requiring students to demonstrate mastery of a given learning target *multiple times*.
- There was no difference in requiring students to demonstrate mastery in *multiple ways*.

Figure 1. How Teachers Require Students to Demonstrate Proficiency of Learning Targets



Instructional Approaches and Supports

Another distinguishing characteristic of CBE is that learning is more individualized than in traditional settings. CBE settings may employ more supportive technology, a wider range of learning opportunities, and more flexible instructional strategies to meet the varying needs of individual students (CCSSO, 2013; NHDOE, 2007). CBE settings may also provide more individualized guidance for students about meeting learning targets (Patrick & Sturgis, 2013). We asked teachers and administrators about technology use,⁶ individualized student guidance and support, customized learning activities, instructional practices, and opportunities for student decision making. We found that teachers in CBE schools, when compared with teachers in comparison schools, were more likely to do the following:

- Use technology to customize instruction and track student proficiency—although all teachers, regardless of school type, reported frequent use of technology in general
- Meet with students formally and develop individualized learning plans, regardless of their success in school
- Provide opportunities for students to make their own decisions about learning—although the number of CBE teachers implementing this practice was still fairly low

When asked about other typical CBE instructional approaches, teachers in the two types of schools reported similar

⁶ Teachers were asked about six specific uses of technology in their classroom: three items addressed uses of technology to customize instruction, assessment, and proficiency tracking (to provide customized assessment, to provide customized instructional supports, to track student progress or proficiency), and three items address more traditional uses of technology (to track assignment completion, to track student grades or credits, and to post course resources and materials for students to access). Three scales were created from these items: the number of “traditional” uses of technology (Cronbach’s alpha = .52), the number of uses of technology related to customizing instruction, assessment and proficiency tracking (Cronbach’s alpha = .53), and a scale counting the total number of uses of technology (Cronbach’s alpha = .61).

levels of use. For example, teachers in CBE and comparison schools reported using a similar number of student-centered instructional practices. Approximately one third of teachers in both types of schools reported that students take primary responsibility for keeping track of their own learning and progress.

More detailed findings for each of these practices are described next.

Technology Use

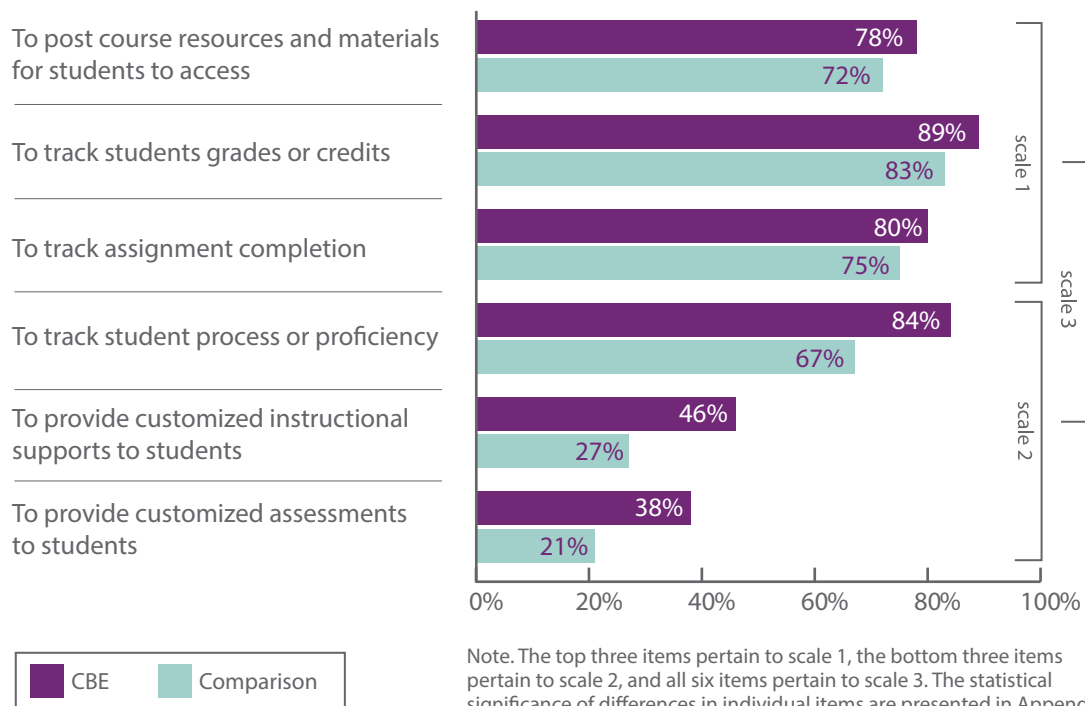
When asked about their uses of technology, teachers in CBE schools reported using technology for a wider array of purposes than teachers in comparison schools. This finding was driven by teachers in CBE schools reporting that they use technology to customize assessment, customize instruction, and track students' proficiency or progress more often than teachers in comparison schools. Administrative uses of technology (i.e., tracking assignment completion, tracking grades, and posting materials) were the same in CBE and comparison schools (see Table 3).

Table 3. Teachers' Reported Uses of Different Types Technology

ITEMS	AVERAGE NUMBER OF USES OF TECHNOLOGY	
Scale 1: Technology used to post resources/materials, track grades/credits, and track assignment completion (three items)	Comparison 2.29	CBE 2.47
Scale 2: Technology used to track progress/proficiency, provide instructional supports, and provide customized assessments (three items)	Comparison 1.16	CBE 1.67 ^a
Scale 3: All uses of technology (six items)	Comparison 3.45	CBE 4.14 ^a

^a Significant difference: $p < .00625$.

Figure 2. Teachers' Reported Uses of Technology for Different Purposes, by School Type





Individualized Student Guidance and Support

The next set of survey items asked teachers whether they had formal meetings with students and whether their students had individualized learning plans. Teachers in CBE schools were more likely than teachers in comparison schools to report meeting with students regardless of how well the students were doing in school. This difference was likely due to school culture or policy in CBE schools; 15 of 16 administrators in CBE schools reported that teachers met with students regardless of achievement levels, compared with seven of 14 comparison administrators. CBE teachers also were more likely to report that all students had learning plans: 32 percent of teachers in CBE schools reported that all students had an individualized learning plan, compared with 10 percent of teachers in comparison schools (see Table 4).⁷

Opportunities for Student Decision Making

Student autonomy, responsibility, and decision making is another important feature of the CBE instructional environment. Survey items on this topic asked respondents how decisions are made about the topics students learn, the activities students undertake for homework, and how students demonstrate what they learned. Although CBE schools reported opportunities for student decision making at a higher rate than comparison schools, the rates were low overall.

All comparison school administrators reported that ninth-grade students get to choose which courses they take, as did 15 of the 16 CBE administrators. However, only six of the CBE administrators reported that ninth-grade students could choose the kinds of learning experiences they wanted to participate in, compared with one comparison school administrator.

Table 4. Teachers’ Reported Use of Individualized Guidance and Support

ITEMS	PERCENTAGE WHO REPLIED YES	
	Comparison	CBE
Q. Do you have formal meetings with students (individually or in small groups) to discuss how they are doing in school overall (i.e., not just how they are doing in your specific course), regardless of how well they are doing in school? (Yes/No)	32	68 ^a
Q. Do all or most students in your school have written, individualized learning plans? (Yes/No)	10	32 ^a

^a Significant difference: $p < .00625$.

⁷ Teachers were asked in a separate question whether learning plans were provided just for students who were struggling and needed extra support. Teachers in CBE and comparison settings were similarly likely to meet with students who were struggling academically.

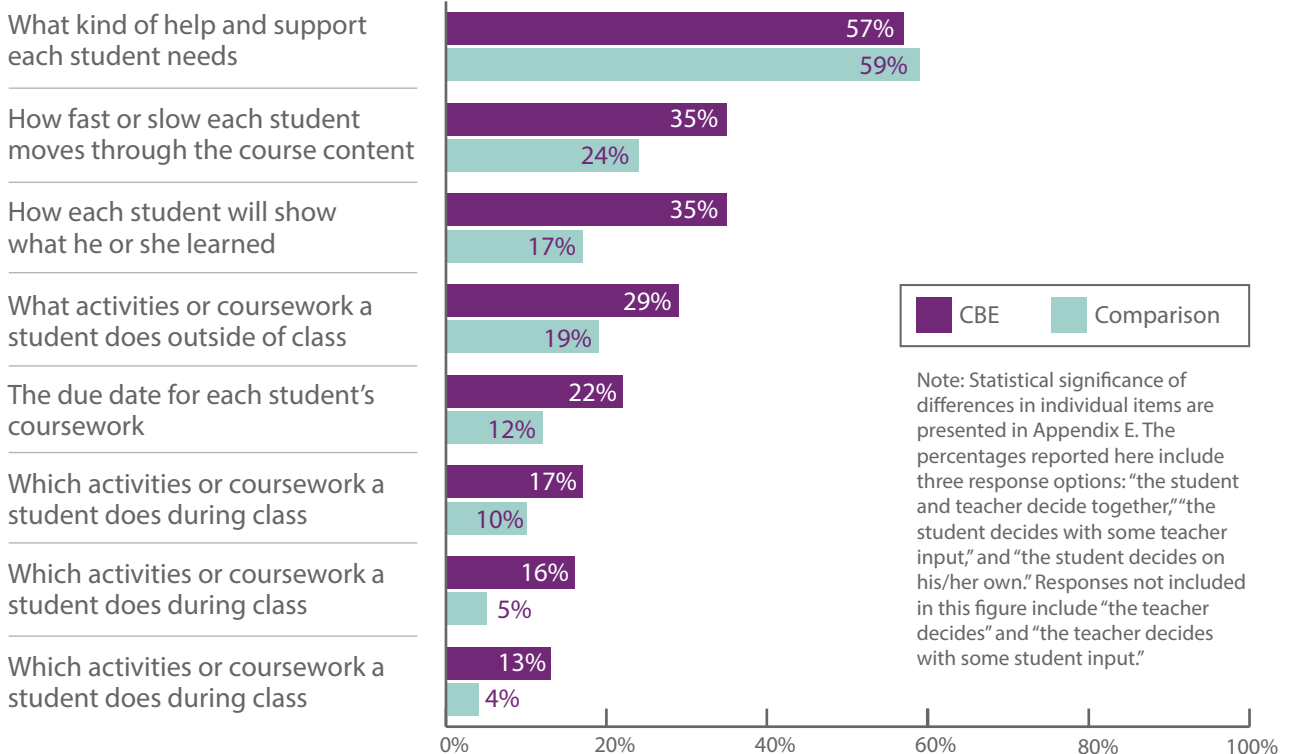


Figure 3 shows teacher responses to question about who makes instructional decisions at the classroom level. Although some student participation in decision making occurs, the primary takeaway from this figure is that teachers reported making the majority of instructional decisions in both types of schools. However, in most cases, CBE teachers report that students play a greater role in decision making about their learning.

Teachers in CBE and comparison schools responded similarly on a survey item about the extent to which students take primary responsibility for keeping track of their own learning and progress (34 percent in comparison schools and 36 percent in CBE schools, not a significant difference).

Figure 3. Percentage of CBE and Comparison Teachers Reporting Substantial Student Input in Various Aspects of Instructional Decision Making

The student and I decide together or the student decides...



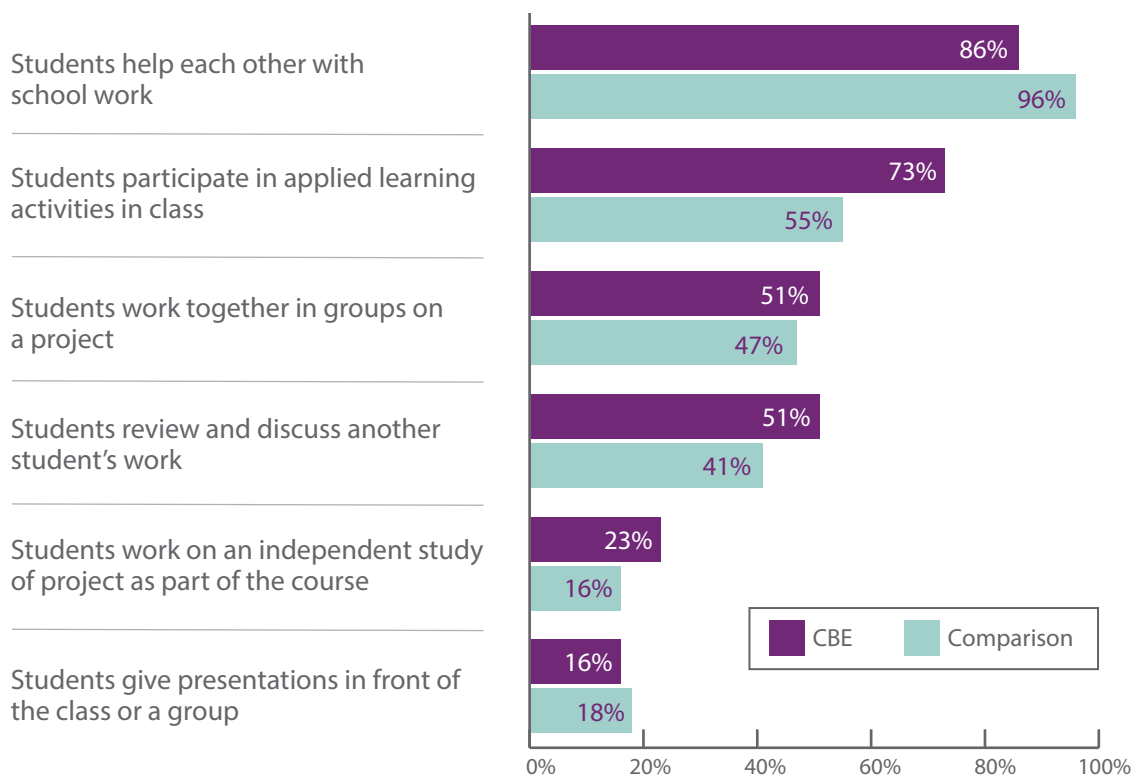
Instructional Practices

Teacher surveys also asked teachers to report the frequency with which they used varied and flexible instructional practices in the classroom, including having students give presentations in front of the class, having students collaborate on assignments and projects, having students participate in activities outside the school building during the school day, and having students complete independent studies. Figure 4 shows the percentage of teachers in each set of schools who

reported using specific instructional practices at least once per week.

For each teacher, we counted the number of the practices in Figure 4 (ranging from zero to seven) that teachers reported using at least once a week. Teachers in CBE schools reported using an average of 2.8 of these practices each week; comparison teachers used an average of 3.2 practices each week. This difference was not statistically significant.

Figure 4. Teachers Reporting Use of Various Instructional Practices at Least Once per Week, by CBE and Comparison Schools



Note. Statistical significance of differences in individual items are presented in Appendix E.

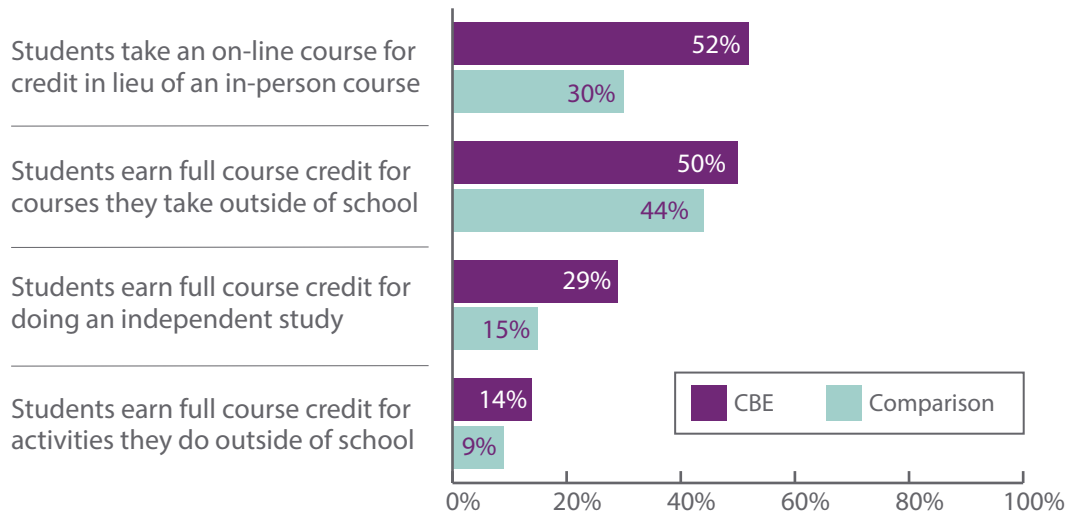


When and Where Learning Takes Place

The focus of CBE settings is generally on students' mastery of competencies, regardless of where and when this learning takes place. Schools with a CBE focus often place less emphasis on traditional class time and, instead, offer more opportunities for students to learn outside of the classroom through online and applied learning options. In this study, we found that, while CBE schools were more likely to allow non-classroom opportunities for earning credit, these practices were not widespread for Grade 9 students in either CBE or comparison schools.

Teacher survey items examined opportunities for students to earn credit through activities, projects, online coursework, and internships completed outside of the traditional school setting and hours. Figure 5 shows the percentage of CBE and comparison teachers reporting that these opportunities are part of regular school practices. For each teacher, we counted how many of these four opportunities regularly count towards credit. On average, teachers in comparison schools reported that one of the four opportunities count towards credit, and teachers in CBE schools reported about one and a half (0.97 vs. 1.44, $p < 0.05$).

Figure 5. Percentage of Teachers Reporting Regular Opportunities to Earn Credit for Learning Outside of the Classroom, by CBE and Comparison Teachers



Note. Statistical significance of differences in individual scale items are presented in Appendix E.

These classroom-level findings may be a result of school-level policies. A large majority of administrators in both CBE and comparison schools (13 of 16 CBE administrators and 12 of 14 comparison school administrators) reported that their Grade 9 students had to be in the building for a set time during the school day. One administrator each in both CBE and comparison schools reported that the school offers a regular time during the school day when Grade 9 students can participate in activities outside of class.

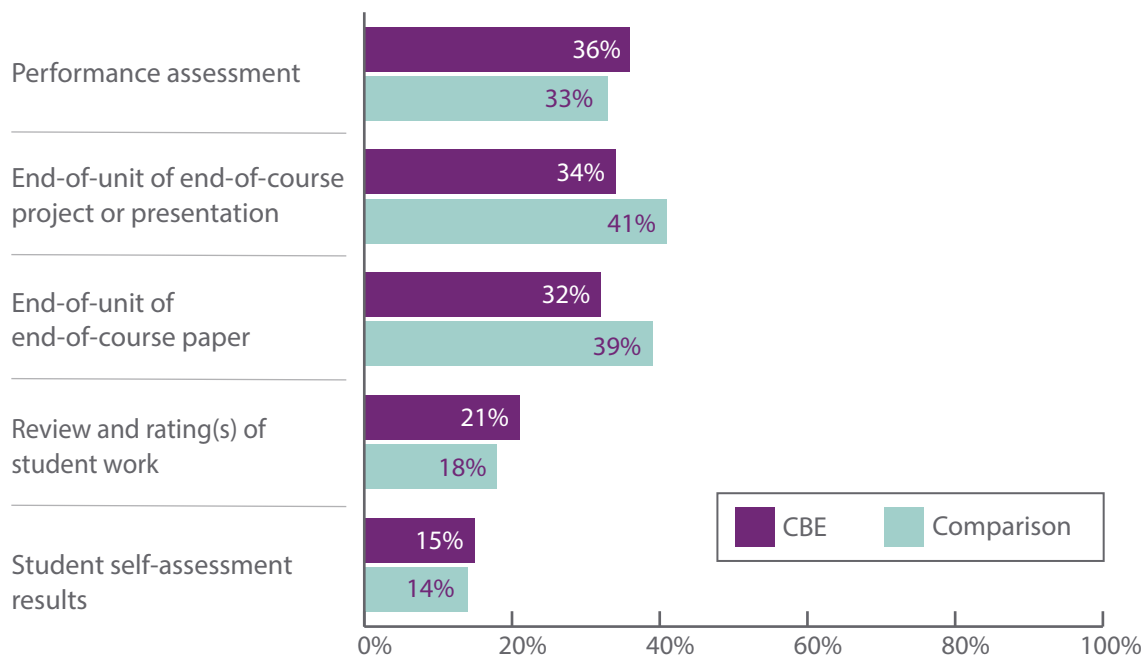
Assessment Strategies

In an ideal CBE setting, learning is continuously tracked and results shared with students (Le et al., 2014; NHDOE, 2007; Patrick & Sturgis, 2013). Such schools have explicit strategies for measuring mastery of learning targets and offer greater flexibility and choice in demonstrating mastery (Le et al., 2014; NHDOE, 2007). Typically, students in CBE settings can attempt a summative assessment as many times as necessary without negative consequences as long as they ultimately demonstrate mastery. We found that in the CBE schools in this study, teachers were no more

likely to provide different types of summative assessments than in comparison schools. However, CBE teachers did report offering students greater flexibility in retaking summative assessments or demonstrating competency in alternative ways if they performed poorly on the original assessment.

Teachers were asked about the use of alternative summative assessment strategies such as performance assessments, end-of-course papers or presentations, rating of student work samples, and student self-assessments. Figure 6 shows the percentage of teachers who reported using each type of summative assessment regularly in their classroom.

Figure 6. Frequency of Summative Assessment Types as Reported by CBE and Comparison Teachers



Note. Statistical significance of differences in individual scale items are presented in Appendix E.

The average number of these assessment options offered, 1.4 in CBE schools and 1.5 in comparison schools, did not differ significantly. However, teachers in comparison schools were significantly more likely to use end-of-course final exams relative to CBE teachers (93 percent compared with 63 percent). In addition, 69 percent of CBE teachers reported allowing students to retake or re-do a summative assessment, compared with 43 percent of comparison teachers (Table 5).

Table 5. Teachers' Reported Assessment Strategies

ITEMS	PERCENTAGE WHO REPLIED YES	
	Comparison	CBE
Q. Are students allowed to retake or re-do a summative assessment (without points off) (Yes/No)?	43	69^a
Q. How often do you use end-of-course final exams? (Is a regular classroom practice, Yes/No)	93^a	63

^a Significant difference: $p < .0125$.

We examined the consequences of students' poor summative assessment performance, asking teachers if they offered students any of the following three options:

- Arranging for the student to receive additional instructional support
- Allowing students to demonstrate their understanding in a different way
- Allowing students to re-do the assignment (or retake the assessment) at a later date without taking points off

On average, teachers in CBE schools reported offering students 2.8 of these options most or all of the time, while comparison school teachers offered 2.5 of these options. Although the use of alternative assessments was significantly higher in CBE schools ($p < .0125$), the rate was high overall in both.



Pacing and Progression

As discussed previously, course credit, grade-level advancement, and graduation are based on demonstrated mastery of required competencies in a prototypical CBE setting. An important component of this approach is flexible pacing—the time students need to achieve mastery may vary. On this topic, our sample teachers were asked whether students were allowed to move on to the next topic regardless of mastery, whether students could take extra time to finish a topic even if other students have moved on, and whether a student who understood a topic could move ahead of other students—or whether students were required to stay on pace with their peers. Overall, CBE teachers reported higher levels of flexible pacing relative to comparison teachers.

Table 6 shows the percentage of teachers in CBE and comparison schools who reported providing different degrees of flexibility in pacing. Teachers in CBE schools were more likely than teachers in comparison schools to report giving students extra time to finish a topic and to allow students to move on ahead of classmates if they had mastered a topic (although this practice was less common overall). Comparison school teachers were more likely to report that students needed to move onto the next topic regardless of mastery.

Table 6. Classroom Practices Related to Pathways and Progression

ITEMS	PERCENTAGE REPORTING AS A REGULAR CLASSROOM PRACTICE	
	Comparison	CBE
Students can take extra time to finish a topic, unit, or competency area if they need to, even if other students have already moved on.	28	50^a
Students who show that they understand a topic, unit, or competency area can move ahead of other students.	10	29^a
Students move on to the next topic, unit or competency area along with their classmates, regardless of whether they achieved mastery.	63^a	38

^aSignificant difference: $p < .01667$.

8 For comparison purposes, we developed a scale from these three items. The scale had high internal consistency with a Cronbach's alpha of .62.



At the school level, 10 of the 16 CBE administrators and seven of the 14 comparison administrators reported that students can progress at their own pace as an occasional or regular school practice in their schools; five of the 14 comparison administrators said that self-paced progression was never employed in their schools.

Variation in CBE Implementation

Findings across the six CBE domains indicate that CBE practices were not implemented universally in CBE schools, nor were they exclusive to CBE schools. We therefore examined how much of the variation in reported practices occurred among teachers within the same school versus how much variation in reported practices occurred among schools. This analysis, called a variance-decomposition analysis, is described in greater detail in Appendix D. Overall, we found high levels of variation of teacher reports within schools, particularly for features

that may be classroom specific (e.g., how teachers measure student learning). The amount of variation observed within schools was almost equal to the amount of variation observed among schools, even for features that we would expect to see implemented schoolwide (e.g., students having written learning plans and the use of technology to customize instruction). This suggests uneven implementation of CBE practices within most schools.

Implementation Summary

This study found many areas in which teachers in CBE schools were more likely than teachers in comparison schools to report implementing CBE-aligned practices in their classrooms, such as establishing learning targets, providing individualized support, and offering flexibility in assessment and instructional pacing. However, many comparison school teachers reported using the CBE-aligned practices as well. Importantly, findings show variation in implementation within both CBE and comparison schools, even when the overall difference between the two school types was significant. In other words, CBE practices were not implemented universally in the CBE schools, and teachers in comparison schools have adopted some CBE practices.

These findings highlight complications with categorizing schools as “CBE” or “non-CBE.” A true CBE setting is characterized by a wide variety of school policies and classroom practices that focus on the mastery of competencies, but there is a lot of latitude in how these policies and practices are implemented, and, as our study revealed, many of these practices may also occur in traditional educational settings. The findings suggest that examinations of how CBE influences student outcomes must also include examinations of which CBE practices are in place. We suggest that the surveys developed for this study can be helpful measures of a variety of CBE practices.

In the next section, we further investigate CBE practices by examining students’ reported experiences of CBE practices and the extent to which they influence, as hypothesized, changes in students’ learning capacities over time.

Section 2:

What Are Students’ Experiences of Competency-Based Education (CBE) and How Are These Experiences Related to Changes in Learning Capacities Over Time?

Ninth-grade students in both CBE and comparison schools reported experiencing classroom practices commonly associated with CBE. An examination of the relationship between students’ experiences of CBE and changes in their learning capacities suggests that several CBE practices were associated with positive changes for students during their first year in high school.

In this section, we examine students’ reported experiences of CBE practices, discussing the extent to which students attending CBE schools were more likely to experience each practice relative to students attending comparison schools. We then explore the extent to which students’ experience of these CBE practices is associated with positive changes in three learning domains: 1) academic mindsets and dispositions, 2) self-regulated learning skills, and 3) academic behaviors. Individual attributes within these domains and how they were measured in student surveys are described in Box 2.

Due to the extent to which students in the comparison schools also reported experiencing CBE-aligned practices, we examine the relationship between experiences of CBE practices and change in learner capacity regardless of

school type.⁹ Analyses were performed based on assumptions about which CBE features should be related to which student learning capacities. Table 7 shows which analyses were performed and which relationships were found to be significant. (If a cell contains the word “n/a,” then no relationship was hypothesized, and therefore no analysis was performed.) Note that all significant relationships were positive in the direction of CBE practices; in other words, students who experienced the CBE practice were more likely to experience a positive change in their learning dispositions, skills, or behaviors.

The remainder of this section presents information about these relationships. In the subsequent section of the report, we discuss the findings overall.

⁹ Our study design did not allow us to match students to specific teachers or examine the links between CBE implementation and students’ experiences. This is an important direction for future study.

Box 2. Description of Learning Capacities and Measures

Domain 1: Student Academic Mindsets and Dispositions

Sense of belonging and connection to school (BAC):

Student's emotional engagement, feeling of inclusion, and relational ties to school, peers, and teachers. Survey items measure whether students feel they belong and are accepted in their school.

Academic self-efficacy in mathematics and ELA (ASE): A belief in one's abilities to accomplish or be successful at a given task. Beliefs in one's abilities can differ across academic domains, tasks, and other areas of functioning. Survey items measure whether students have confidence in their abilities to learn and do well in their mathematics and ELA classes.

Intrinsic motivation (I-MOT): Students' possession of an internal drive to engage in their education. Survey items measure whether students consider their mathematics or ELA course material to be interesting and challenging, and whether students desire to do well in school.

Utility motivation in mathematics and ELA (U-MOT): Students' belief that what they learn in school is useful. Measures of task utility address how useful students consider the material in their mathematics and ELA courses, including how useful it will be for their future.

Locus of control (LOC): Students' beliefs that they have control over what happens in their lives, rather than circumstances or luck controlling their lives (i.e., external locus of control). Survey items measure

whether students think that they have control over whether they do well in school.

Implicit theories of learning (TOL):

The belief that the purpose of learning is for building understanding, and that the resulting skills, understanding, and competencies are malleable—that is, they will improve with one's effort and are not predetermined by innate ability. Survey items measure the extent to which students believe that doing well relies on natural talent versus effort.

Future planning (PLAN): Tied to future expectations, students engage in future planning when they discuss college, the goals they should achieve in high school in order to prepare for college, and other life goals. Survey items measure the extent to which students have discussed future plans with an adult, including ways to prepare for college and meet life goals.

Future education expectations (EdEx): One's hopes and plans for the future. Survey items measure the level of education that students expect to attain in the future.

Domain 2: Self-Regulated Learning Skills

Self-management (SM): The extent to which students manage their work to achieve self-set goals and complete learning tasks. Survey items measure the extent to which students make to-do lists, schedules, and set goals to do well in school.

Monitoring of understanding—deep processing (MON): Includes strategies to make cognitive connections to new material. These skills include one's awareness of

one's level of understanding and skills as well as intentional adjustments of learning strategies based on one's perceived effectiveness in building that understanding. Survey items measure the extent to which students double-check their work, monitor their understanding by putting what they learn into their own words, and relate what they are learning to things they already know.

Cognitive control (COG): A set of self-monitoring strategies used by students to identify learning tasks, maintain attention and engagement, and engage in other purposeful actions and processes to acquire skills or information. Measures include the extent to which students employ strategies such as identifying what they need to learn and looking for more information to acquire skills and knowledge.

Domain 3: Academic Behavior Preparation and organization

(PORG): The extent to which students are organized and prepared for their classwork. Survey items ask students about how well they manage their time and keep track of their assignments, overall, as well as how often they come prepared for their mathematics and ELA courses.

Engagement in mathematics and ELA (ENGAGE): The extent to which students actively participate in their learning activities and demonstrate an interest in learning. Survey items ask the extent to which students look forward to their mathematics and ELA courses, find their courses to be interesting, and prepare for and actively participate in class.

Table 7. Matrix Showing Relationships Between Students’ Experiences of CBE Practices and Positive Changes in Learning Capacities

CBE Domain	Student Experience of CBE-Aligned Practice	Response Type	Student Academic Mindsets and Dispositions										Self-Reg. Learning			Academic Behavior		
			BAC	ASE math	ASE ELA	I-MOT	U-MOT math	U-MOT ELA	LOC	TOL	PLAN	EdEx	SM	MON	COG	PORG	ENGAGE math	ENGAGE ELA
Learning Targets	Clarity of goals (math)	Scale	N/A	N/A	N/A	+	+	N/A	+	N/A	N/A	N/A	+	N/A	N/A	+	+	N/A
	Clarity of goals (ELA)	Scale	N/A	N/A	N/A	+	N/A	+	+	N/A	N/A	N/A	+	N/A	N/A	+	N/A	+
Measurement of Learning	Meet every target (math)	Yes/No	N/A	+	N/A	+		N/A			N/A	N/A				N/A	N/A	N/A
	Meet every target (ELA)	Yes/No	N/A	N/A		+	N/A				N/A	N/A			+	N/A	N/A	N/A
Flexible pacing and Progression	Extra time allowed (math)	Yes/No	N/A	+	N/A	+	+	N/A		N/A						N/A	N/A	N/A
	Extra time allowed (ELA)	Yes/No	N/A	N/A			N/A			N/A						N/A	N/A	N/A
Assessment of Learning	Retakes allowed (math)	Yes/No	N/A	+	N/A			N/A	N/A			N/A	N/A		+	N/A	N/A	N/A
	Retakes allowed (ELA)	Yes/No	N/A	N/A				N/A	N/A			N/A	N/A			N/A	N/A	N/A
	Non- traditional assessment type (math)	Count	N/A		N/A	+	N/A	N/A				N/A	N/A			N/A	N/A	N/A
	Non- traditional assessment type (ELA)	Count	N/A	N/A			N/A	N/A				N/A	N/A			N/A	N/A	N/A
When/Where Learning Happens	Activity outside school for credit	Yes/No	N/A	N/A	N/A	+	+			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Online course	Yes/No	N/A	N/A	N/A					N/A	N/A	N/A	N/A			N/A	N/A	N/A
Individualized Instruction and Support	Student decision-making (math)	Yes/No	N/A		N/A			N/A	N/A			N/A	N/A					N/A
	Student decision-making (ELA)	Yes/No	N/A	N/A				N/A	N/A			N/A	N/A				N/A	
	Meets one-on-one with teacher	Yes/No						N/A	N/A									
	Has written learning plan	Yes/No	N/A					N/A	N/A					N/A	N/A	N/A	N/A	N/A
	Variety of instructional practices	Count	N/A	+		+	N/A	N/A				N/A	N/A	+	+	N/A	N/A	N/A

Note. + indicates a significant positive relationship. None of the students’ experiences of CBE practices were negatively related to changes in learning capacities. Refer to Box 3 for definitions of abbreviations used in the table.

Learning Targets

Students in both CBE and comparison schools were asked three questions about the clarity of learning targets in their mathematics and their ELA courses. Specifically, they were asked the extent to which they agree that they understand what they need to learn to complete assignments, prepare for assessments, and get course credit. We then created two scales by averaging students’ responses with respect to their mathematics and ELA courses. Table 8 shows that students in CBE schools reported higher levels of clarity in learning targets in ELA, but students in comparison schools reported higher levels of clarity in learning targets in their mathematics courses. However, reported clarity was high overall (between 3 = agree and 4 = strongly agree) for all students.

Table 8. Students' Experiences of Clarity of Learning Targets

ITEM		AVERAGE	
Scale: Average clarity of learning goals (1 = strongly disagree, 2 = disagree, 3 = agree, and 4 = strongly agree)	Mathematics	Comparison 3.15 ^a	CBE 3.03
	ELA	Comparison 3.07	CBE 3.21 ^a

^a Significant difference: $p < .025$.

Independent of school setting, students' experience of clarity of course learning targets was related to favorable changes in the following learning capacities: intrinsic motivation, utility in mathematics and ELA, locus of control, self-management, preparation overall, and preparation in mathematics and ELA.

Measurement of Learning

Student survey responses reveal that students attending CBE schools were more likely to report that their teachers in ELA require them to show that they had met every learning target to pass the course (Table 9). However, most students in both sets of schools agreed or strongly agreed with the statement that they must meet every learning target to pass.

Table 9. Students' Experiences of Mastery of Learning Targets

ITEM		PERCENTAGE WHO AGREE OR STRONGLY AGREE	
I need to show that I have met every learning target, standard, or competency to pass my course.	Mathematics	Comparison 80	CBE 83
	ELA	Comparison 81	CBE 86 ^a

^a Significant difference: $p < .00625$

Independent of school setting, students' report that they need to meet every learning target to pass their mathematics course was positively related to changes in self-efficacy in mathematics and intrinsic motivation. Similarly, students' report that they need to meet every learning target to pass their ELA course was positively related to changes in intrinsic motivation and self-control.

Instructional Approaches and Supports

One-on-One Meetings With Adults and Individualized Learning Plans

Students in CBE schools were more likely to report having an individualized learning plan than students in comparison schools (35 percent versus 20 percent) and were more likely to report having regular opportunities to meet with an adult to talk about their learning than students in comparison schools (59 percent versus 46 percent) (see Table 10). However, independent of school setting, students' reports of meeting with teachers and having an individualized learning plan were not related to changes in their learning capacities during the first year of high school.



Table 10. Students' Experiences of Individualized Guidance and Support

ITEMS	PERCENTAGE WHO REPLIED YES	
	Comparison	CBE
Q33. Have you ever met one-on-one with an adult from your school to talk about your learning? (Yes/No)	46	59 ^a
Q37. Have you put any of this information about your learning into a written plan? (Some schools call these plans an Individualized Learning Plan [ILP] or Personalized Learning Plan [PLP]). (Yes/No)	20	35 ^a

^a Significant difference: $p < .00833$.

Opportunities for Student Decision Making

Students were asked about the extent to which they were given opportunities to make decisions about their own learning in the following five areas: (1) which topics they learn in class, (2) which activities or coursework they do during class, (3) the due dates for their coursework, (4) how they will show what they learned, and (5) when they will take the final exam or assessment.

Students were asked the same series of questions for both their Grade 9 mathematics and ELA courses. For each item, and across both mathematics and ELA courses, the majority of students reported that their teacher decides how, what, and when they learn. Students in CBE and comparison schools reported similar levels of decision making in their mathematics and ELA courses (about one third of each group reported involvement in at least one type of instructional decision).

To examine differences in student decision making between CBE and comparison schools, we identified students who reported that they were involved in the decision-making process (i.e., the student decided, or the teacher and student decided together) for at least one of the five areas. Independent of school setting, none of the measures of students' decision-making power in mathematics or ELA were related to changes

in their learning capacities from fall to spring during ninth grade.

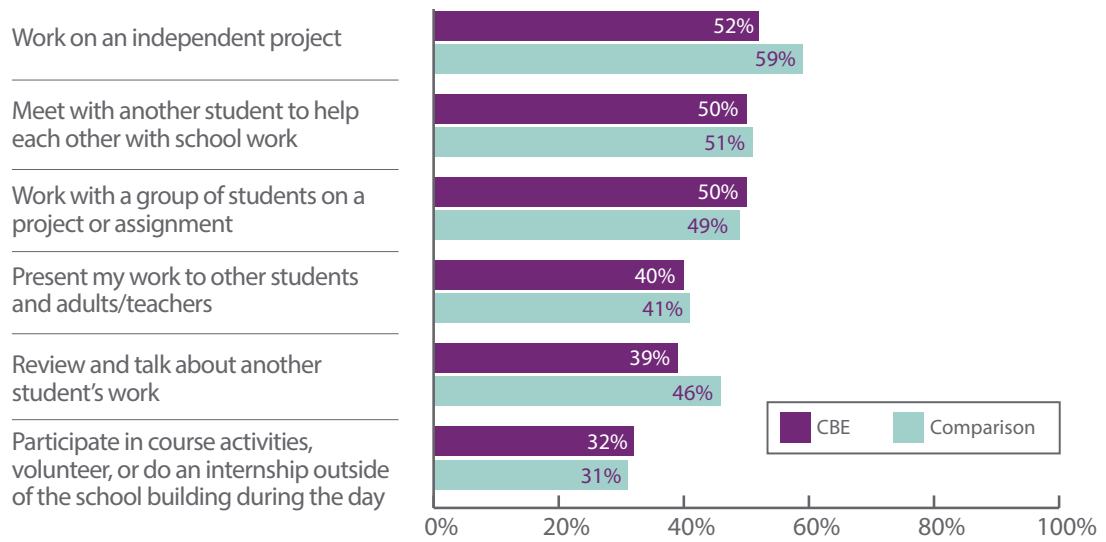
Instruction Delivered via a Variety of Practices

Students were asked to report about the types of instructional practices they experienced in their courses, including the following:

- Working on an independent project
- Meeting with another student to help each other with school work
- Working with a group of students on a project or assignments
- Presenting work to other students and adults/teachers
- Reviewing and talking about another student's work
- Participating in course activities, volunteering, or doing an internship outside of the school building during the school day

Students from both types of schools reported participating in most of these activities at least once weekly at rates of approximately 40 percent to 50 percent, with the exception of participating in outside activities, which approximately 30 percent of students reported doing weekly (Figure 7).

Figure 7. Percentage of Students Who Reported Experiencing Specific Instructional Practices at Least Once per Week



Note. Statistical significance of differences in individual scale items are presented in Appendix E.

To look at students' experiences across a variety of instructional practices, we summed the number of practices that students experienced at least once a week. Students in CBE schools and comparison schools reported participating in a similar number of student-centered activities at least once a week—about three activities.

Our analysis indicated that exposure to these practices (regardless of the type of school) was positively related to changes in students' efficacy in mathematics, intrinsic motivation, self-monitoring, and self-control during the first year of high school.

When and Where Learning Takes Place

Students were asked whether they participate in classroom activities, volunteer, or do an internship outside of the school building during the school day. Students in CBE and comparison schools were similarly likely to report participating in these activities at least once per week—approximately one third of students in each group. In addition, approximately 12 percent of students in CBE schools and comparison schools reported taking courses entirely online (Table 11).

Table 11. Students' Reports of Where Learning Takes Place

ITEMS	PERCENTAGE WHO REPLIED YES	
	Comparison	CBE
During the school day, I participate in course activities, volunteer, or participate in an internship outside of the school building during the school day (at least once weekly).	31	32
Have you taken any of your courses completely on-line this year (in other words, instead of taking an in-person class)?	12	12

While online course taking was not related to changes in students' learning capacities, participating in activities outside of school was positively related to changes in intrinsic motivation and perceived utility of mathematics.

Assessment Strategies

Retaking Exams

Students in CBE and comparison schools were similarly likely to report that they are allowed to retake final ELA and mathematics exams or re-do final projects to see if they can do better (Table 12). Overall, two-thirds or more of students from both sets of schools agreed with these statements.

Table 12. Students' Experiences of Assessment Retake Policies

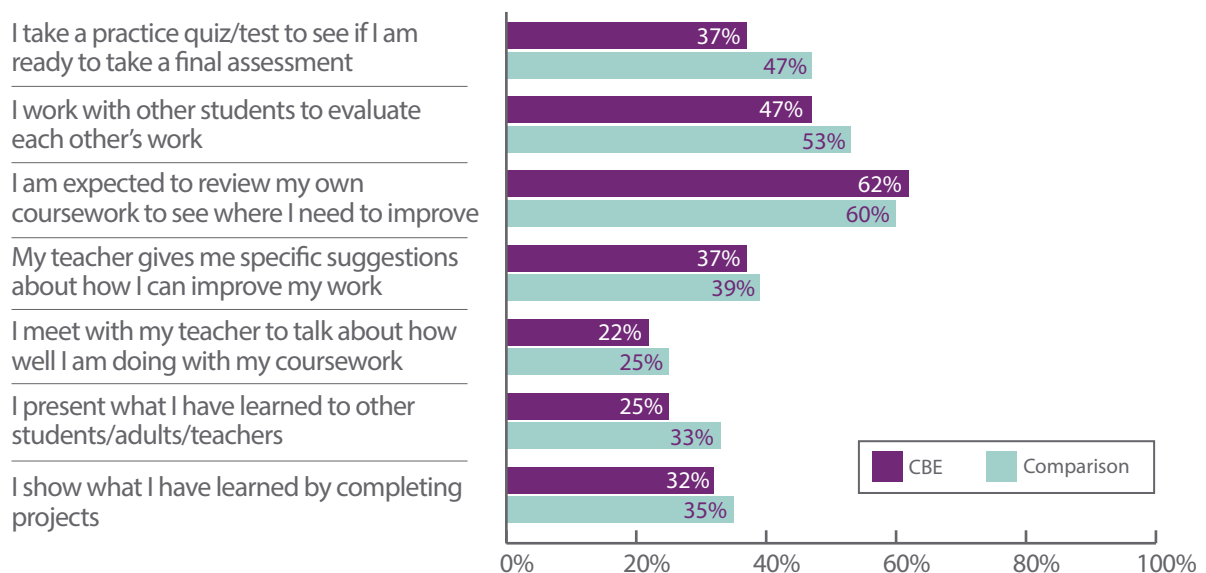
ITEM	PERCENTAGE WHO AGREE OR STRONGLY AGREE		
	I am allowed to retake the final exams and assessments, or re-do final projects to see if I can do better.	Mathematics	Comparison 75
ELA		Comparison 65	CBE 66

Independent of school setting, student reports of being allowed to retake assessments in mathematics were positively related to changes in efficacy in mathematics and self-control. However, student reports of being allowed to retake assessments in ELA were not related to changes in learning capacities.

Nontraditional Assessments

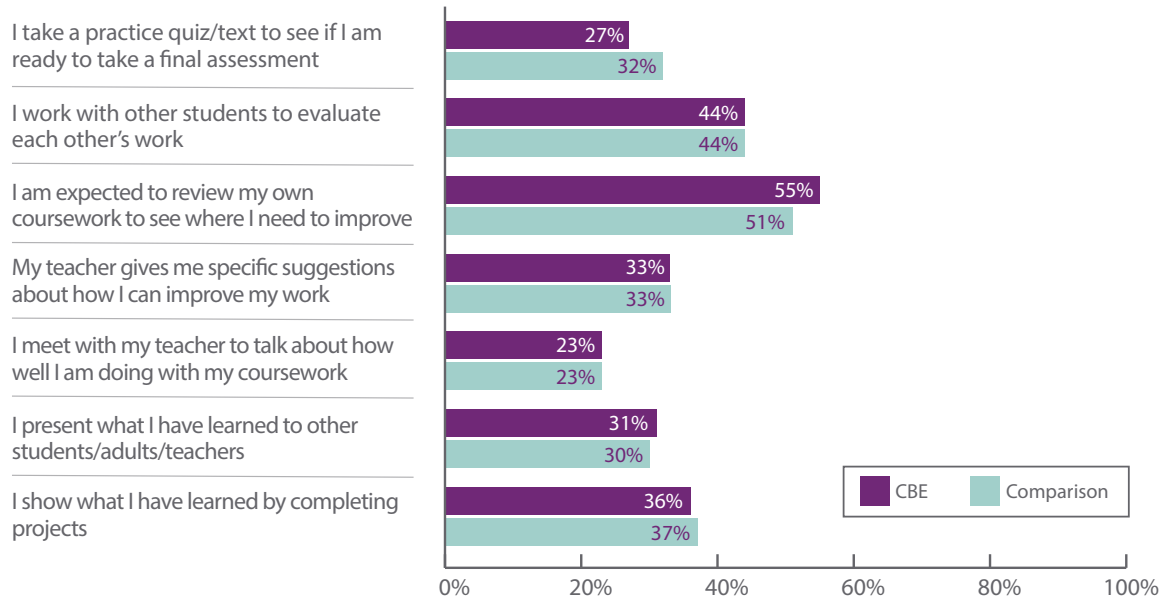
Students were asked about the frequency with which different types of non-traditional assessments (e.g., projects, presentations) were used to assess their learning in their mathematics and ELA courses. Figure 8 and Figure 9 show the percentages of students who reported experiencing each type of nontraditional assessment at least once a week in mathematics and ELA, respectively.

Figure 8. Percentage of Students Who Reported Experiencing Nontraditional Assessment in Mathematics at Least Once per Week, by CBE and Comparison School



Note. Statistical significance of differences in individual scale items are presented in Appendix E.

Figure 9. Percentage of Students Who Reported Experiencing Nontraditional Assessment in ELA at Least Once per Week, by CBE and Comparison School



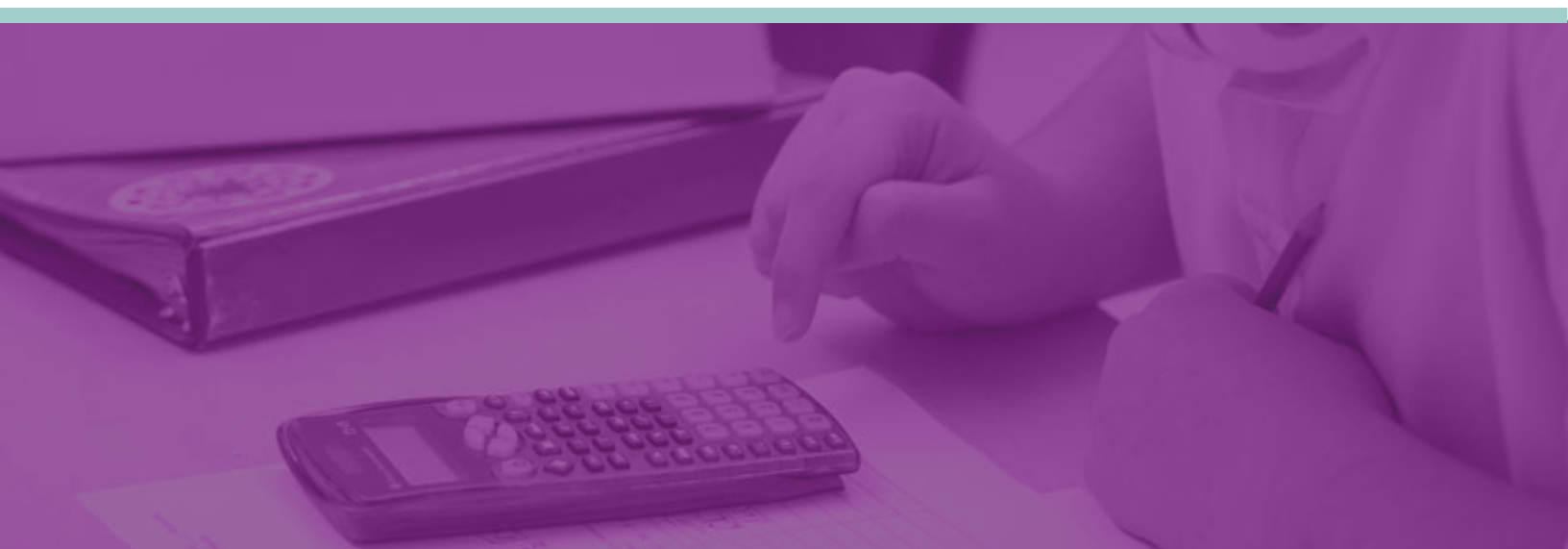
Note. Statistical significance of differences in individual items are presented in Appendix E.

We also counted the number of nontraditional types of assessments that students reported experiencing at least once weekly. Students in CBE and comparison schools reported a similar number of nontraditional assessment types (between two and three) every week in both their mathematics and their ELA courses (Table 13).

Independent of school setting, students who reported experiencing a larger number of nontraditional assessment types at least once per week also experienced favorable changes in intrinsic motivation during their first year of high school.

Table 13. Students' Experiences of Nontraditional Assessment Strategies

ITEM	AVERAGE NUMBER OF ASSESSMENT TYPES		
	Mathematics	Comparison	CBE
Count of nontraditional assessment strategies used at least once a week to track student progress (count of up to seven possible assessment types).		2.92	2.63
	ELA	2.51	2.50



Pacing and Progression

Overall, approximately half of students in CBE schools and comparison schools reported that they can take extra time to finish a topic or unit if they need to (Table 14). There was no significant difference between the two groups of students (CBE and comparison) in either subject.

Independent of the school setting, students who reported being allowed to take extra time to finish mathematics course material experienced favorable changes in mathematics efficacy, perceived utility of mathematics, and intrinsic motivation. However, students' reports of having extra time to complete their ELA coursework was not related to changes in their learning capacities.

Table 14. Students' Experiences of Course Pacing

ITEM	PERCENTAGE WHO AGREE OR STRONGLY AGREE		
	I can take extra time to finish a topic or unit if I need to, even if other students have already moved ahead.	Mathematics	Comparison 53
ELA		Comparison 55	CBE 62

Discussion of Overall Student Findings

As described previously, students' experiences of CBE practices did not differ markedly by CBE and comparison schools. Regardless of school type, students' experiences of CBE-aligned practices were positively associated with changes in learning capacities in several areas. Also, several overarching patterns of results were observed in these student data. These are presented next.

Intrinsic motivation appears to be one of the learning capacities most strongly associated with CBE practices. Several CBE features are positively related to changes in students' intrinsic motivation during Grade 9. Having clear learning targets and requiring students to meet all learning targets to earn course credit in mathematics and ELA were both positively related to changes over time in intrinsic motivation. In addition, providing a variety of student-centered instructional practices, allowing students to participate in activities outside of school for course credit, allowing extra time to complete coursework (in mathematics), and providing a wider variety of assessment types (in mathematics) are positively related to changes in students' intrinsic motivation.

Students' perceived clarity of learning targets were positively associated with the greatest number of favorable changes in learning capacities. Students' perceived clarity of learning targets in their mathematics and ELA courses were related to favorable changes in intrinsic motivation, perceived utility of mathematics and ELA, locus of control, self-management, and preparation for courses (both overall and specifically within

mathematics and ELA classes). These findings suggest that students' clarity of learning targets may be an important instructional feature.

Some CBE practices appear to be related to positive change in learning capacities from fall to spring in one academic subject area only. In mathematics classes, requiring students to meet all learning targets in order to receive course credit, providing students extra time to complete coursework when necessary, allowing students to retake assessments without taking points off, and offering a variety of instructional practices were all positively related to changes over time in efficacy in mathematics. Having clear learning targets, allowing extra time to complete coursework, and allowing students to participate in activities outside of school for course credit were also positively related to changes in perceived utility of mathematics during students' ninth-grade year. In contrast, none of the CBE features we examined were related to efficacy in ELA, and only the clarity of ELA learning targets was positively related to changes in students' perceived utility of ELA.

Providing varied and flexible instructional practices appears to be one of the only CBE practices positively related to changes from fall to spring in students' self-regulated learning skills. Although commonly associated with CBE, offering a variety of instructional practices is not exclusive to CBE. Yet, this area was the only one that appeared to be positively associated with both self-monitoring of understanding and cognitive control.

Some of the measured learning capacities do not appear to be strongly associated with any individual CBE practices. Students' sense of belonging, perceived utility of ELA, efficacy in ELA, locus of control, theory of intelligence, planning for the future, expectations for future education, self-management, and preparation for courses (both overall and specifically within mathematics and ELA courses) were not related to individual CBE practices. Aside from the aforementioned positive relationships with clarity of learning targets in mathematics and ELA courses, other individual CBE practices did not seem to be related to changes in measured learning capacities, with a few exceptions.

CONCLUSION

This study revealed that school-level CBE implementation is neither comprehensive nor uniform in schools that may be identified or self-identify as practicing competency-based approaches; a school's designation as CBE may reflect a wide range of policies and practices. In some cases, we found that CBE schools were simply raising the bar for students—expecting high student attendance and timely completion of work in addition to mastery of competencies. This finding suggests that the CBE model is still evolving and may not be consistently interpreted or practiced in many schools using the CBE label.

To best understand how CBE may be positively influencing the learning of students, we need to more closely examine the implementation of specific CBE practices. Taking that approach, this study found promising evidence that students' experiences of specific CBE practices are indeed associated with positive changes in learning dispositions, skills, and behaviors.

There is still much to learn. We conclude this report with several directions for future research.

- **APPLICATIONS FOR UNDERSERVED AND UNDERREPRESENTED STUDENT GROUPS.** There is little or no previous research regarding the influence of CBE practices on outcomes for students from low-income households, traditionally underrepresented racial/ethnic groups, and ELLs. This study sought to address the need for research in this critical area, but our ability to do so was limited by the student composition of the sampled schools and the availability of student background characteristics. ELL status was excluded from statistical models due

to the small number of students in our sample who were ELLs. In addition, we were unable to obtain students' free or reduced-price lunch status from schools in one of our three study states, so our main statistical models did not include this indicator of socioeconomic status. Understanding the impact for these subpopulations remains an important area for future research.

- **LINKS BETWEEN CBE IMPLEMENTATION, STUDENT EXPERIENCES, AND OUTCOMES.** With the data collected, we were unable to establish links between the practices teachers reported using and what students actually experienced. Future research designs should link students to teachers within schools, thereby examining the relationships among CBE implementation at the classroom level, students' own experiences, and student outcomes.
- **RELATIONSHIPS AMONG CBE PRACTICES.** It is possible that some CBE practices must be implemented together to positively influence student learning. It is also likely that certain CBE practices, and certain student outcomes, are actually mediating factors in larger constellations of practices and outcomes that have important effects on student learning. Future studies with larger populations should further explore interactions among these variables.
- **SURVEYS OF CBE PRACTICES.** The surveys developed for this study allowed us to examine CBE implementation and students' CBE experiences. Nonetheless, additional qualitative research is needed to capture additional details about CBE practices and strengthen these instruments.



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You can find the appendices to this report online here: <http://bit.ly/29269rb>



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