The Connecticut Technical High School System (CTHSS) *is a state high school system drawing students from all 169 public school districts across the state of Connecticut. We have 17 high schools located in urban, suburban, and rural areas and a total enrollment of approximate of 10,800 students. Our graduates are prepared to go immediately into the workforce in the trade they have studied and many go on to two and four year college.*

Implementation of Mastery-Based Learning for Mathematics at CTHSS

We began our journey with grade 9 students at three schools during the 2014-2015 school year and found it to have a very positive impact on learning. During the 2015-16 school year these schools expanded the Model to include grade 9 and 10 students. Additionally during the 2015-2016 school year, an additional nine schools added the Model. Plans for 2016-2017 school year will have all 17 schools in the district implementing the Model.

We believe in a "phase-in" approach. Our Model is a dramatic change to what students, parents, and teachers experienced in the past. Our approach tries to cultivate a change in the "mind-set" during grade 9 and continue that expectation throughout the four years. Therefore, during our "phase-in" approach, older students are not experiencing the MBL Model unless they started the MBL Model during grade 9. During the 2017-2018 school year the three pilot schools will have the entire math program implementing the Model. During the 2019-2020 school year our entire district at every grade level will be implementing the Model.

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Our Vision for Mastery-Based Learning Model for Mathematics

Mastery-Based Achievement through a Blended Learning Environment as students work through the curricula at a level that meets their Zone of Proximal Development either in a Cohort Model or Individually.

- Mastery-Based Achievement: Credit is earn through achievement and not seat-time.
    - Standard to meet
        - For all sequential math courses a minimum of 80% for a course grade is required to earn credit
        - For all non-sequential math courses a minimum of 70% for a course grade is required to earn credit
    - Grading for a course is calculated by averaging the grade for each unit of a course. Unit grades are calculated by averaging the following:
        - Percent of the unit completed in the ALEKS software
        - District Summative Assessments of a traditional sense that focus on procedural knowledge and simple problem solving.
        - District Performance Assessments that focus on conceptual knowledge and more complex problem solving.

- Blended Learning: We hope to cultivate learners who can learn independently, with and from peers as well as from the teacher.
    - We integrate the use of the ALEKS software into the learning and assessing for each course. This program allows for independent learning and only exposes students to content when they have the proper pre-requisites.
    - Teachers form small flexible groups to target student needs, facilitate learning from peers and appropriately challenge students.
    - Curricula materials also include videos tied to learning objectives in which students can view individually or in small groups.
    - Teachers are encouraged to use performance tasks to facilitate conceptual understandings and collaboration skills as part of the learning process.

- Zone of Proximal Development:
    - At the start of every course, students are pre-assessed in the custom curriculum developed in the ALEKS program.
        - If students do not test through the pre-requisite skills, then their learning begins there.
        - If students test through one or more units, then:
            - The student is given the assessments for prior units to help calculate the grade for the course.
            - The student will begin learning in the place of curriculum that meets their need. This could mean the student begins learning in Unit 3.
        - Enrollment in Honors courses becomes an informed choice based on the pre-assessment results. If students are successful in the Honors course they continue. If they are not successful they will move to the core curriculum.
    - ALEKS data provides teachers the information to group students within the classroom. This provides the teacher with much flexibility when some students progress at a very fast pace while other move slower.

- o Timeline to earn credit: Our Model does not require students to complete a course during a school year. We allow students more time to "master" the content of the curriculum at a very high standard. For some this means attending summer learning program and/or continuing the learning into the next school year.
    - Because many of our students come into grade 9 with weak pre-requisite skill they are unable to meet the high standards of the Model. Some of these students take a year and a half to finish Algebra I.
    - This model also allows for acceleration. Students who complete a course prior to the end of the school year will be enrolled into a second course.
- Cohort Model or Individually:
    - o Ideally we try to have students in small groups navigating through the curriculum together to facilitate peer learning and collaboration. This also helps teachers manage learning during day to day routines.
    - o Occasionally we find students who are gifted and highly motivated. We do not want to hold any student back but rather encourage them to reach their highest potential. To do this we may need to allow some students to work through the curriculum independently. However, this does not mean that they never put into collaborative groups to work together with other students.

Results and Success Stories:

- A number of students have completed two or three courses for credit in one school year.
- Many students have taken more than one year to complete Algebra I and have the time to develop strong skills and understandings. Their skills are noted in other courses such as science and our trade areas.
- Assessment Data suggests the Model is superior to what was done in the past:
    - o PSAT data from Oct. 2016 showed that our Grade 10, students under the MBL Model, significantly outperformed our Grade 11 students who did not learn under the MBL Model.
    - o During the 2014-2015 school year, grade 9 students and grade 11 students were given the identical internal assessment. The Grade 9 students who were piloting the MBL Model outperformed the Grade 11 students who did not learn under the MBL Model.
- Schools who are effective using this Model have developed a student-centered classroom.