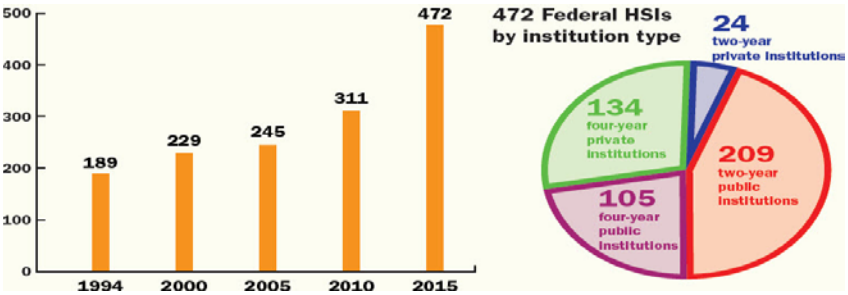
INTRODUCTION

Woodland Community College (WCC) is an accredited public two-year institution within the Yuba Community College District (YCCD) in rural northern California. In 2008, WCC achieved full accreditation status as the 110th community college in California. WCC is a designated Hispanic- Serving Institution (HSI), with a Hispanic student enrollment of 49%. it is one of 152 HSI's in California, and one of only five community colleges designated as an HSI in Northern California. WCC has a main campus located in Woodland, CA and two campus sites in Colusa and Lake Counties.

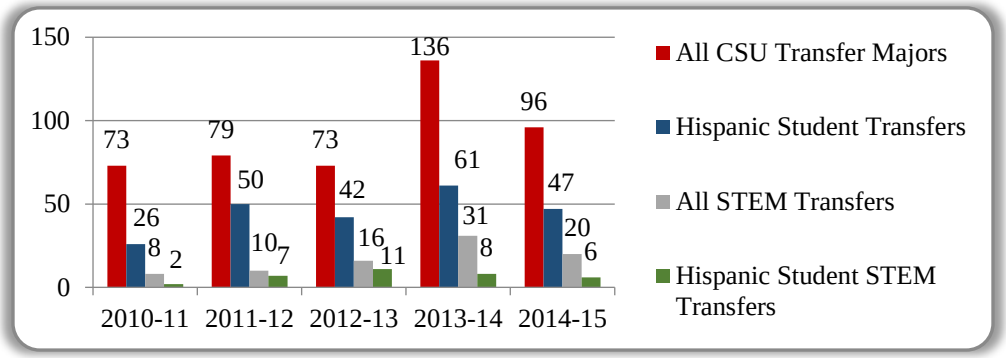
The populations of the three counties have remained relatively stable between 2010 and 2015. While Yolo County experienced a modest 3% growth, Lake and Colusa counties experienced a .8% and .1% decline, respectively. WCC continues to navigate challenges to serve the populations in this service area, with Lake and Colusa counties ranking among the five poorest counties in California. As a HIS, WCC must also design services and curriculum to meet the educational needs of students, many of whom are low income, first generation college attendees. Hispanic populations in 2015 in Lake and Yolo Counties 18.5% and 31% , respectively; while Colusa County has a 60% Hispanic population.

While there has been a significant growth in colleges identified as HIS's in the United States since 1994, the output of STEM certificates and degrees for Hispanic students



continue to lag behind. Only 8% of degrees and certificates awarded in STEM fields in 2009 and 2010 were awarded to Hispanics.[1] WCC also exemplifies this trend. Between 2010 and 2015, out of a total of 457 students transferring to California State Universities (CSU), 34 or 8% were Hispanics pursuing STEM degrees, an average of 6.8 Hispanic students per year. Similarly, an average of 9.6 non-Hispanic students transferred to CSUs in STEM fields each year (18% of total transfers). Compounding this observation is the reality that Hispanics are not sufficiently exposed

[1] U.S. Department of Education, National Centter for Education Statistics, IPEDS. 2009-2010, Completions survey.



to STEM subjects at the K-12 Levels, and less than 2% of the United States STEM workforce is Hispanic while 20 percent of the youth population is Hispanic.[2]

WCC faces many challenges in its efforts to increase the STEM pipeline in order to increase the number of Hispanic and other students who earn degrees and certificates in STEM fields. The College has identified the following challenges and proposed solutions for overcoming them:

- Entering students are unprepared in math – 79% of these students are not ready for college level math.
- Fewer students declare an interest in pursuing STEM degrees.
- Only 8% of students who take a math course three levels below transfer successfully transition to a transfer level math course.
- Success rates in STEM disciplines are low
- A majority of students lack a clear educational plan.

Table 1, below, provides a summary of these challenges and documents strategies that the College is currently pursuing to address them. These strategies focus on problems and obstacles to student success and STEM completion rates, and they incorporate proven instructional strategies and student support services such as supplemental instruction.

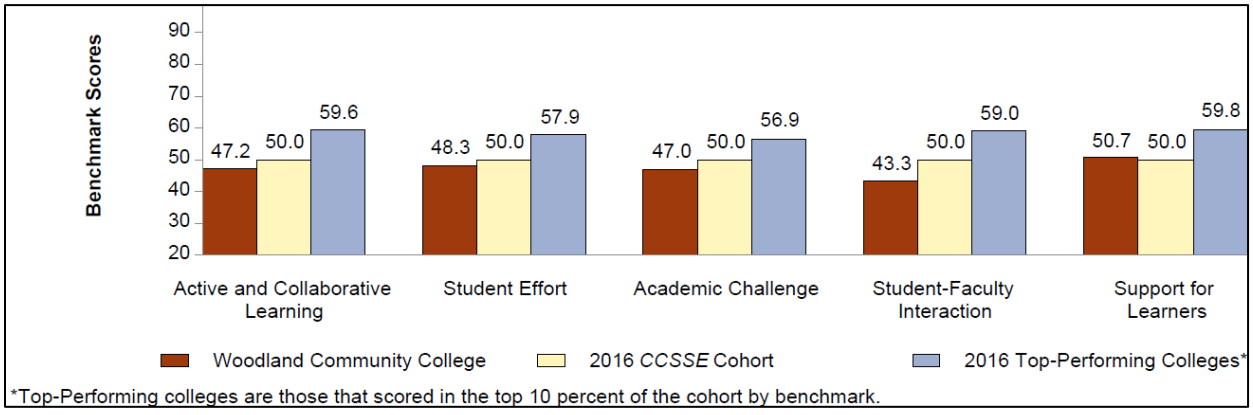
[2] Overview of Hispanics in Science, Math, Engineering and Technology (STEM): k-16 Representation, Preparation and Participation.

Table 1: Overview of Needs & Activities to Increase STEM Degree Completion and Transfer for Latino & Low-Income Students	
Challenge/Need	**Proposed Activity/Strategy**
A majority of WCC's entering students are not ready for college level math (79%) presenting a significant barrier to successfully earn a STEM degree and transfer.	Implement Summer Bridge math and science camps to address gaps in students learning and provide a strong foundation for success as students begin their academic career at WCC. Expand and enhance WCC's Math, Engineering, Science Achievement (MESA)/STEM program to develop a STEM learning community that will provide students with a strong foundation for success.
Only 17% of first-time students, 8% of Latino, and 11% of low-income students declare an interest in pursuing a STEM degree.	• Implement ***Summer Bridge math and science camps*** for first-time students. • Develop and implement STEM student engagement opportunities for current students through the college's Math, Engineering, and Science Achievement program, including STEMinars (university faculty speakers and employers) and other campus exhibits and interactive STEM events. • Provide ***STEM undergraduate research*** opportunities (through UR embedded within STEM classes and through university partners) and provide students with opportunity to present outcomes at annual research symposiums. • Develop and disseminate through ***STEM student engagement and outreach*** efforts information regarding WCC's STEM degree majors and classes to high school and prospective WCC students.
Only 8.5% of students who first take a math class 3 levels below transfer-level math successfully complete a transfer-level math class.	• Redesign and implement an alternative pathway for the remedial math course sequence based upon successful acceleration and contextualization models. • Fully implement Supplemental Instruction to integrate structured tutoring for all math and science courses.
WCC's STEM degree offerings are limited (4). Number of WCC STEM degree awarded in last 5 yrs. (114) and students who transfer to a university to pursue a STEM degree are low. CSU transfers in last 5 yrs.: all students: 457; Latino students: 34.	• Expand Associates degrees for Transfer in Science for Biology, Chemistry, Computer Science, and Engineering. In coordination with the CSU, develop Associate Degrees for Transfer to provide a clear pathway, guaranteed admission and priority, for STEM students to the CSU. Build upon on the foundation of UCD Transfer Admission Guarantee Agreements. • Improve the STEM transfer student transition between WCC and the university partners (UCD and CSUS) through opportunities for student engagement with university STEM faculty and students to help WCC students prepare for the transition to a four-year institution, as well as advising students on graduate degree pathways. • Improve WCC's STEM classrooms, labs, and equipment.
Success rates in STEM classes, especially math (51%-57%), Chemistry (64%-69%), and Biology (60-65%), are low for students pursuing STEM degrees.	• Fully implement Supplemental Instruction for STEM classes**.** • Provide ***dedicated STEM counseling peer coaching, and case management*** to provide continuous support and early intervention throughout the student's educational path to a STEM degree and transfer. • Expand and enhance the college's MESA program by creating a STEM learning community for students through the ***STEM Learning Center.***
A majority of WCC students lack a clear, comprehensive education plan to ensure they stay on track to earn a degree and/or transfer.	• Develop ***structured, clear advising pathways for prospective and declared STEM majors*** and "meta majors" for undecided students with dedicated STEM advisors, counselors, and peer coaches. • Guarantee entering students English, math, and student success course (block scheduled) in first year to provide a foundation for success. • As an incentive for students to stay on track and participate in SI and/or tutoring, provide free books for STEM classes through the lending library.

The College's Educational Master Plan has also undertaken a data informed analysis to address student success. Utilizing data from two student surveys administered by the Center for Community College Student Engagement (CCSSE), the College has set a three year goal of improving student success through a concentration on student engagement. In both surveys, the Survey of Entering and New Student Engagement (SENSE) and the Community College Survey of Student Engagement (CCSSE), the college discovered that its students lagged behind other similar colleges across the country in terms of student engagement, including active and collaborative learning.

STUDENT ENGAGEMENT. **Woodland Community College recognizes that student engagement levels must improve.** Two Center for Community College Student Engagement (CCSSE) reports provide college-specific data as well as benchmark comparisons between our College, top-performing colleges, and the CCSSE cohort. The first of these two reports (continuing student surveys) highlight aspects of highest and lowest student engagement at WCC, as well as results from five CCSSE special-focus items.

- *Level of Academic Challenge* (e.g., number of assigned textbooks, number and length of papers written, working harder than you thought you would, campus emphasis on time spent studying)
- *Student Faculty Interaction* (e.g., discussing grades or assignments with faculty, discussions about career plans, discussed class readings with faculty outside of class, received prompt feedback on assignments)
- *Supportive Campus Environment* (e.g., campus provides resources to help student achieve academically and socially)
- *Enriching Educational Experiences* (e.g., participates in co-curricular experiences, the availability of independent studies, using electronic technology to complete assignments)
- *Active and Collaborative Learning* (e.g., made a class presentation, asked questions in class, worked with other students outside of class to complete assignments

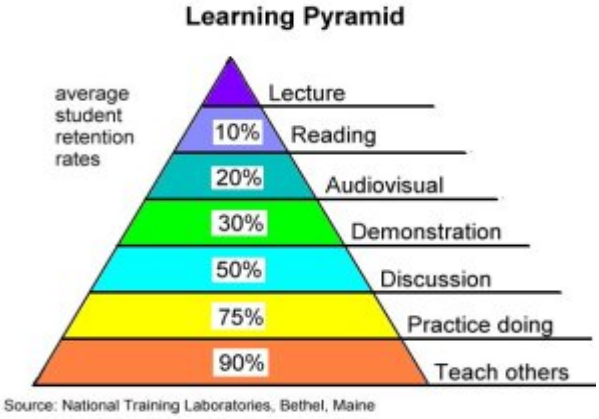


WCC student responses indicate less than optimal perceived student active and collaborative learning (tutored or taught other students) as well as student-faculty interaction (used email to communicate with instructor).

Maker Movement as a Strategy for Student Engagement

WCC, informed by student survey data, perceives Makerspace as a vehicle to propel student engagement through active and collaborative learning. Makerspace can also utilize the underlying problem based learning that can help math and science students contextualize their understanding of concepts. WCC students in STEM courses will be able to work in collaboration with physics and math colleagues to build drones, and see the applications of basic math concepts. The Makerspace will evince the collaborative nature of learning, engage the student, allow interactions with the instructor and allow students to learn from, and teach each other. Using the Makerspace concept, WCC basic skills math students collaborating on a drone project, for example, will observe different levels of mathematics in play. It will sharpen their critical thinking skills that are necessary for success in math courses. Moreover, it will provide them with the experiences and skills that can be translated to 21st century jobs.

WCC envisions a group of English students working with math and science students to write their observations in essay assignments. Entrepreneurship students can apply business concepts in identifying the marketing potentials of drones and the attendant profits and earnings that can be accrued from such ventures. Digital media students will work with graphic art and marketing students on projects. It will allow WCC students to actualize the benefits of the Learning Pyramid[3]



That demonstrates that the highest levels of learning occurs when there is demonstration, practice by doing and teaching others.

Makerspace represents a strategy that WCC can pursue as a result of its institutional self evaluation: student preparation in math courses are low; success rates in STEM courses, which are taught through traditional methods, is low; student engagement through active and collaborative learning is low. The Makerspace concept posits to overcome these challenges to our student learning through problem based and collaborative learning.

[3] Source: National Training Laboratories, Bethel, Maine.