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DRAFT Goal Statement

Every student in the corridor/State will be motivated, academically prepared and realize potential in STEM academic areas and will have the opportunity to participate in the STEM professional workforce upon completion of elementary, middle, high school, certificate, AA, transfer, BS and/or graduate degree.

NOTES:

- Spell out associate, and possibly BS.; “Associate Degree”
- Clarify that there is not an expectation for students to go all the way through the pipeline.
- Need to prepare students for many choices after high school
- Focus on getting students into workforce
- May wish to reflect lattice idea rather than linear pipeline
- National Educational technology standards are pre-k through 12.

INSPIRE

- Inspire students with confidence through success
  - Successes in STEM help other areas like English and art by giving students confidence
- As early as preschool
  - GEMS, FOSS (Full Option Science System) may serve as potential resources.
- Through culturally valid role models and mentors
  - Hollywood can serve as source of inspiration
  - Female and African American astronauts
  - Famous entrepreneurs
- Through parent involvement
- Career path choices
- New culture of science and technology
  - Address culture that sets limitations for career development
  - Student expectations derived from experiences of parents
  - Alternative media; Blogs, YouTube, radio, etc.
- Urban reality
- Community economic vitality
- New stereotypes and expectations
- Innovations
- Partnerships for seamless transitions
- Informal Education
  - Science centers; there exists an association of science centers
  - Girl Scouts, Boy Scouts

Notes:

- Good to highlight career path choices; How does inspire relate specifically to Transitions
  - Role models/champions specific to Transitions or each level or phase
    - Champion meaning; astronauts, scientists, CSI, Governor
    - Speak positively about STEM and STEM Careers
- Project Lead the Way; Robotics competitions; can function as a champion as well
  - Identify appropriate levels for each item, PLTW maps to High School
- Tech Museum of Innovation
- Astronauts inspire elementary age kids, but as the kids move forward, the idea of becoming an astronaut is seen as less accessible and a new champion is needed.
- Role of parents needs special consideration in helping students in transtions
  - Women in Technology program: inform girls that there may be careers they have not thought of. Helps to educate parents. Some of the literature is geared toward the parents.
  - K-12, UCSC, CC, intersegmental work focused on middle school aged girls
    - Tutors involved as well
    - Mini-lab for teachers; how to teach nano tech to 12 year olds

    - Teacher Development; sometimes teachers are enthusiastic about content that is not fitting for the age group they are addressing
        - Two programs at Stanford: Research experience for Undergraduates. Focused on retention of undergrads in the field. Undergrads work with professors on research and teachers work alongside them. Curriculum is brought back to classroom. Replicability should be considered.
- Alternative media
    - UCSD computer science professor; alternative media; developing a wireless network HPWREN; totally remote access. Able to tour facilities and make accessible to offsite individuals. Can teach classes from remote locations without hardwire connections.
    - SkypeCast; with lunar eclipse to coordinate between CA and Africa observatories. The technology can be low cost or free to do this. Works like a teleconference.
    - Teachers who are teaching outside of their major could get access to outside experts for help in certain subject areas.
- Teacher development
    - 84% of our teachers did not major in STEM, often not comfortable teaching science. The training that teachers have received is a known attribute.
    - Service Learning program at Stanford; Students go into classrooms to help in STEM teaching.
- Informal Education
    - Community Educator Training Program; Pilot currently. 3-4 month intensive training. Help community centers and youth groups to have more hands on science. Should fit under informal education.
    - Association of Science and Technology Centers; October meeting in LA Conference Center. Could be good to attend in order to see what is being discussed.
        - Strategic integration being addressed by these groups? Starting to head in that direction due to intense competition. Collaboration is encouraged especially for papers and presentations; the culture of science museums. Not formalized quite yet, but desired by colleagues. Maybe STEMCAP would be able to assist in this (October ’08?).
- Partnerships:
    - Between Stanford and Foothills college; training and technology. 9 month training for K-12 teachers.

ENGAGE

- Each student
- California STEM industries
- Connect nodes on the lattice
- Provide opportunity at all transition points
  - Help students to understand impact of decisions made during grades 1-8 on future opportunities
  - Can use STEM Inventory as resource to map opportunities
- Motivate students with real opportunities
  - Raise student awareness of how important it is to engage early in academics in order to create future opportunities
  - Raise student awareness of lifestyle choices and the impact on future career opportunities such as security clearances
  - Career preparation can be started as early as middle school, but most students are not concerned with college until much later
- Create opportunities to motivate students
  - Engage professional societies
    - NACME, AIAA, ASME, SHPE, IEEE
    - Students can become involved with professional leadership very early on (middle school) by giving papers at student conferences, etc.
- Mentoring plays a critical role in engaging students
  - Use technology to connect with and between students (email, text messages, etc.)
  - University students can leveraged for outreach
  - Engage parents and enable them to serve as role models
  - Parental involvement is often lost when abstract math is encountered
- Partnerships created by students should be enduring
- Though model proven programs during and outside of school day
  - After school programming can be used to address lack of time in classroom for STEM.
- Informal organizations, NPO's, CBO's Professional organizations
  - Girl Scouts, Boy Scouts, Science centers
- All technologies

Notes:

- Student academic support programs, during grades 1-8 for instance.
  - MESA, GearUp, CSU Early Assessment Program, UC Early Academic Outreach Program, Puente, AVID, Cisco Academies, LA Unified to establish 80 academies, High Tech High in Nappa, Riverside and San Diego
  - Should focus on programs that can be replicated.
  - Two places to include; in narrative section of STEMCAP, and in the STEM Inventory of model programs and best practices.

EDUCATE

- Create new measures of student/educator success
- Resources needed for real equipment used in STEM jobs
- Experienced educators with practical experience as well as teaching strategies in STEM
- Redefine professional development for teachers
  - Include pre-school
  - GEMS, FOSS (Full Option Science System)

- Redefine grade levels and early activities
- Provide alternative pathways, time, and modes
  - Can make use of NADE data/reports?
- Real skills, subject matter for jobs of future
  - Teachers are not able to fit STEM into schedule due to existing policies
  - Project based learning plays critical role
  - 21st century workforce vocational courses, career technical education
- Redefine vocational education and academic relevance
  - Technology and engineering are not addressed by current opportunities
    - Need to create a Technology and Engineering pathway
    - This may be an area to address with a policy change
- Review standards for relevance
  - California Schools are behind other states
  - There is no existing test/standard for Technology and Engineering at the elementary level.
  - The current standards are note necessarily designed to create opportunities for the students who excel at them
  - Existing standards for CA science are like a laundry list and difficult to accomplish
  - High School math curriculum is not focused on applications and turns kids off
    - Industry outreach may apply here

Notes:

- At university level; intent is to create PhDs and post docs, but this effort can eliminate those who don't fit the same paradigm. Pushes students out of STEM path. How to catch these folks to make them aware of alternatives to the Ph.D. track.
- Students are not interested in CAREERS until much later (will update slides). Not all need to focus on University. CCs offer many opportunities.
- NSF very concerned about losing undergrads in science and have been tracking. How does this fit into professional development for professors? There are recommendations; Dennis will share. Possible to address through faculty associations. Academic Councilors play a key role in this.
- Professors; Washington Charter, endorsed by International Astronautical U. Focused on motivation for professors to do any kind of public outreach. Can encourage astronomers to do some writing in order to reach public. Initially not

well received, but is now getting more support from top levels. Need web sites and links.

- Most research says; If you don't have children engaged in STEM by 11 or 12, can be lost forever.
- Should include professorial associations in order to improve linkage between public science literacy and congressional funding of research. The more educated the public, the more they support scientific research.
- NSPWG to be included as a model. Other associations to follow suite?
- Enduring partnerships; between mentors;….clarify.
- THROUGH
- Currently working on professional development for teachers in LA. Is a self sustaining program. Must include teacher preparation with professional development.
- Must get notes from Governor's address
- There are technology standards for CA at elementary level

EMPLOY

- All transitions have direct link to work force opportunity
- Allow opportunity to step out to work and then return to further education
- Multiple entry and exit points
- Collaborate with industry

Notes:

- Link between all four areas: High Tech High as model for STEM high school. STEM is not just Stem Cells. May be beneficial to raise awareness of STEM. With the success of High Tech High, could gain similar visibility for STEM by recreating the formula.
- Other models to consider:
    - New Tech High School; has a requirement that students do internships in relevant field to their work. Also required to take 12 CC units in order to graduate.
    - Academic Partnership; requires funding from industry.
    - Can connect with employment even at high school level.
- Engineering Tech program separate from engineering. One program track for pre-engineers to transfer, other track terminates at technician level. Why not bridge the gap in order to facilitate crossover. Should talk to Steve Bruckman regarding this. CC issue or systemic?
- El Camino has technical courses for students who are interested in being engineers, but are not qualified. More vocational focus.
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BEST PRACTICES CRITERIA

- Measured
- Evaluated
- Both formal and informal
- Portable
- Replicable
- Applicable to diverse audiences
- Inspiring
- Access or delivery mechanism
- Success based
- Sustained
- Relevant to STEM
- Innovative
- Scalable
- Partnerships include all stakeholders
- Cross segments
- Defined focus area
- Leadership driven
- Cost effective…affordable
- Improvement cycle defined

Notes:

- Results based

MEASURE OF OUTCOMES

- Short Term (STEMCAP development success)
  - Define and produce deliverable
  - Target number of positive impressions (media, conferences, etc.)
  - Identification and/or creation of long-term metrics
  - Number of new partnerships/collaborations
  - Institutional changes initiated (legislation, program)

- Long-Term STEM progress in California
  - Increase in number/quality of STEM workers
  - CSU, reduced req'd number of units thru articulation
  - Increased number of STEM program options, pathways at community colleges, universities
  - Legislative "wins"
  - California headcounts: grads, students, teachers
  - Other?

NOTES:

- Long-Term:
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