Appendix I: Arizona STEM Network – Full Immersion Model

A Timeline for STEM Program Development

The **Full Immersion Model** describes a total school experience where STEM-related experiences are imbedded within a cross-curricular, thematic focus in ALL content areas. Full Immersion schools look more like 21st Century workplace environment rather than 20th Century K-12 school environments. Problem-based Learning drives the curriculum and instruction. Students constantly collaborate to solve authentic problems, propose solutions, and contribute ideas to the larger community.

Model Description

- Whole school approach to teaching STEM education through a global mission and vision
- Participation by all school staff, classroom and special area teachers
- STEM lessons are planned and aligned by all grade levels and special area classes to be integrated, spiraling in increased complexity and rigor, and constructivist in nature
- Provides an opportunity for student participation in problem/project-based instruction with an end result of teaching through product development
- Several collaborations with business and industry partners in the geographical area occurs, along with mentors and STEM advocates
- Collaborations and partnerships with Higher Education
- School or district has defined STEM as a priority

Roadmap I How to Guide I Timeline

One year prior to implementation:

- Each STEM educational design team must identify, design and create a program that will meet the needs of their community.
- Guiding questions:
    - Identify the focus of your goals as a school/district/community
    - What is the impetus for economic growth and development, and/or quality of life in the community in which you live?
    - If you were to outline the strengths and weaknesses of your community, what would those be?
    - What are your greatest opportunities for job growth, i.e. agriculture, mining, high tech, housing/construction?
    - Generate ideas for an educational STEM program(s) that will provide support and collaboration with the businesses and resources you have in your community. Examples of programs include; engineering, agriscience, biotechnology, sustainability, electronics, bio-medical, solar power, etc.

- Identify your "graduate profile". What do you want your students "to know and be able to do" when they exit your program? What will be the number of students involved and target grade levels for instruction?

Nine months prior to program implementation:

- Once a STEM content focus has been identified, establish a team of stakeholders to participate in leadership team, design team and advisory board. Recruiting representatives from businesses, Higher Education, district employees, parents and students will be helpful in the early stages to identify vision, mission and philosophy for the STEM program. Cast a wide net to gather input from all.
- Identify what resources, if any, the community already possesses (i.e. content, materials, technology, school/business partnerships, structural/ building resources).
- Identify a time line for development. This can include a preliminary brainstorming session with focus groups. (All stakeholders having input)
- Identify strategies for creating a school culture that encourages learning/innovation

Eight months prior to program implementation:

- Establish sub-working groups from the stakeholder group to:
- Identify the STEM program targeted audience (high school, honors program, GTE, English Language Learners, special needs) and level of implementation (Exploratory, Partial Immersion, etc).
- Identify content resources that are currently available and those that will need to be developed. Design the curriculum, scope and sequence, and assessments or evaluation of the program before you design the learning environment. Knowing "what" you are teaching precludes knowing what facilities you will need to facilitate the instruction. Identify, design and create units/objectives that support higher order thinking skills, inter-disciplinary cross-curricular content, research practices, and rigorous, authentic workplace competency skills. Review existing curricula (i.e. NASA, GLOBE, Project Lead the Way)
- Identify what materials will be used to facilitate instruction (computers, books, lab equipment)
- Identify the modality of STEM instruction-auditory (lecture), visual (including various forms of technology/digital learning), kinesthetic /hands-on, etc.
- Identify the instruction focus, i.e. the integration of science and mathematics only, or the implementation of all four STEM (science, technology, engineering, mathematic) areas. Additional program models include the Arts and Humanities for a STEAM-based approach.
- Identify adequate instructional time
- Identify the pedagogy, i.e. inquiry based, project/problem based, collaborative learning, independent study.

- Identify and integrate 21st Century work place competency skills that are necessary to promote a knowledge-based economy within your community.
- Identify processes to provide equal access for all students
- Identify the number and types of credit (classes) each student may earn by participating in the program. For example, a high school program may offer a STEM collaborative class, or GTE, AP, and dual enrollment classes within a STEM content area. A middle school might offer STEM electives or provide integrated classes in mathematics and science. An elementary program may include the integration of content within the day-to-day schedule, or be an "add-on" to the weekly curriculum.
- Identify necessary personnel resources. Do you need to hire new teachers or maximize potential teachers already at a school? Determine the number of academic teachers, specialist teachers, and support staff. Research types of certification and highly qualified status each teacher would need to teach the courses. Establish an extensive professional development plan for all faculty and support staff. Establish professional learning communities (PLC's) with staff and administration with a focus on student achievement.
- Plan an extensive professional development program for all teachers and support personnel that includes content and pedagogy in project-based instruction and STEM implementation
- Identify technology tools and resources.
- Identify necessary structural resources/school site identification. Can you teach the program in an existing school, or would a new building/ addition need to be designed? What structural resources would be necessary to promote flexibility, adaptability, and growth within the program? If using an existing structure, what modifications, if any, would need to occur to the building/classrooms/office spaces?

Six to nine months prior to implementation:

- (If necessary) Start project design and bid process, plan review and building permits, detail expected construction timeline and project expected opening date.
- If designing a new structure identify where construction will occur and find an architect. Total Team Approach is best if building from the ground up.

Six months prior to implementation:

- Start a preliminary budget based on the implementation model you have created. Establishing three layers of budgets (sky's the limit, functioning, and acceptable) will help pinpoint what is necessary, and what is not. Identify potential funding sources, i.e. grants, district funds, community partnerships, donations, etc.
- Establish beginning ties to resources in the community (i.e. business leaders,

focus groups, advisory boards, STEM advocates, mentors, shadowing experiences, internships).
- Establish School/Family partnership plan
- Establish parameters for program evaluation. Pre-post program/course evaluations, can include; focus group discussions among instructors, external consultants/evaluators, academic gains (grades, state/national assessments/efficacy surveys), and input from the community. Identify strategies for student recruitment and retention.
- Prepare and present scope of project/program to School Board for approval
- Prepare Marketing Plan (include both recruitment and retention strategies)
- Begin recruiting students from available sources.
- Hire necessary STEM instructional staff. Recruit for "best practicing" teachers. Create opportunities for teambuilding with staff members.

Three to six months prior to program implementation:

- Begin professional development program for staff members.
- Order all materials and supplies
- As recruiting is occurring, start registering students into the program/school
- Create a website or other digital media to convey program progress and introduce staff/program to parents and general community

One month prior to implementation:

- Finalize curriculum, projects, problem-based activities
- Create and plan for a new student orientation/ "welcoming" program to be hosted two weeks prior to school/program starting
- Review Design Team plans making sure that all preparatory items have been accounted for and review any additional suggestions from the team.

Two weeks prior to implementation:

- Confirm students schedules/classes
- Confirm materials and supplies delivered and prepared
- Confirm opening day/week schedules and protocols

Day of program implementation:

- Welcome students, check with support staff and teachers to make sure everyone has what they need.
- Meet and greet parents/community members, business mentors, advisors, media
- Enjoy the journey!