PERPETUAL PODS: HIGHER EDUCATION OF STEM STUDENTS – PART II
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Abstract
Demand for STEM workers has and will continue to increase in the foreseeable future. Moreover, the misalignment between what employers need, and skills taught and delivered, continues to be expressed as a critical problem for U.S. competitiveness. i More intense team exposure during formative college years to better prepare those entering the workforce lends to this introduction of Perpetual Pods (or P-Pods™). P-Pods™ are perpetual scholarly units of students – undergraduate, graduate and pre-college; faculty, industry, government, community and alumni partners. They form, bond around, and focus on a specific interdisciplinary interest, initiative or cause. Expected yield is exploration and contribution to the greater body of knowledge; creation of a human network for discovery, research and other growth opportunities; and the establishment of a pipeline for the perpetual advancement of a specific interdisciplinary interest.

ReCap: Majoring in STEM – Necessary, but still not Sufficient
While the statistics vary, the general consensus is that the demand for science, technology, engineering and mathematics (STEM) workers has and will continue to increase in the foreseeable future. This is good news for students who have endured the rigor of college level study to earn STEM degrees. However, the lack of alignment between what employers need, and what skills are taught and delivered, has become a critical problem for U.S. competitiveness. ii Project based learning has emerged as a promising educational approach to mastering skills for the workforce. In fact, there are universities that have completely abandoned their traditional lecture-based pedagogy. iii Also topping a list of the Five Ways to Better Prepare Students for Careers is “teamwork”. These components – project based learning and teamwork - considered together yield statements such as “Employers want people who understand how to manage a project, how to deliver a product on time and on budget, and how to work in teams with little or no oversight”. iv

Engagement in real world professional activities prior to entering the STEM workforce also increases the preparedness and competitiveness of the individual graduates. The desired outcome of such engagement activities may vary. However, in general the goal of engagement activities is to address, a priori, many of the following areas that according to Association of American Colleges and Universities (AACU) employers have identified as associated with lack of preparedness for the workforce v:
- Being innovative or creative
- Applying knowledge or skills to real world
- Locating, organizing and evaluating information
- Staying current on global developments
- Critical/analytical thinking
- Awareness/experience of diverse cultures both inside and outside the U.S.
- Ethical judgment and decision making
- Written communications

Internships are common avenues to acquire such experience. They have been described as “… a gateway for young students coming out of college, enabling them to learn practical skills while also applying what they have learned in the classroom” vi. Internships also help students match up with the right company prior to entering the job market. vi This is often a result of having the opportunity to try on a job before committing. But, even if the student and/or employer don’t wed for future employment an equally powerful residual benefit may be the creation and/or expansion of a network.

Networking prior to leaving the university environment can contribute to preparation, landing a job that fits, and overall professional growth. An unnamed scientopia.org author states “Networking is NOT about only looking forward... Networking is more about looking around in all directions. It is important (in lots of ways) that interactions are with people at ALL stages of their career.”viii Its value can be immediate, mid and/or long term when navigating a 35-45 year career.

What is a Perpetual Pod (or P-Pod™)?

Conceptually, P-Pods™ are perpetual scholarly units of students – undergraduate, graduate and pre-college; faculty, industry, government, community and alumni partners. They form, bond around, and focus on a specific interdisciplinary interest, initiative or cause to

1. Explore and contribute to the greater body of knowledge;
2. Network for discovery, research and other growth opportunities which include but are not limited to engagement and collaboration on grants, contracts, internships and other sponsored programs review and recommendation on curricula; and
3. Create a pipeline for the perpetual advancement of their respective members and the expansion of the collective pod.

In a very practical sense, a P-Pod™ is an open yet connected family-like unit that vertically explores a topic, subtopic or area of a discipline. The unit may be comprised of a unique set of faculty, students, alumni; corporate, government and/or other partners from different but interrelated disciplines. They engage in formal and informal interactions that promote high and focused interactivity around a specific area of discovery. The continuous engagement provides an atmosphere and resources to stimulate a natural and perpetual bonding process.

Formal interactions may include industry site visits, internships, seminars, speaker series, conferences, research, and work on grants or contracts. Informal interactions may take the form of campus meetings, peer-to-peer mentoring, service projects, and social networking. Any
activity that includes all or part of the unit and promotes critical and creative inquiry, leadership, and/or engagement is legitimate. The unit or pod will continue to expand with the addition of new members – whether by inclusion of a new student or cohort, or discovery of an additional connected alumnus, etc.

*Putting it Together: An Example – Bloodstain Analysis Patterns (BPA) P-Pod™*

A hypothetical XYZ University has distinguished undergraduate and graduate programs in biology, chemistry, mathematics, physics, computer science and engineering disciplines. Given the explosion of television series and movies that highlight and glorify the work of scientists in solving crimes, many students find the area of forensics interesting. A mathematics faculty at has dabbled in Bloodstain Analysis Patterns (BPA) defined as “the interpretation of bloodstains at a crime scene in order to recreate the actions that caused the bloodshed” primarily for presentation of mathematical problems in class. An XYZ U. mechanical engineering faculty member has done considerable work in developing instruments that produce bloodstain patterns for evaluation and comparison. An alumnus who majored in computer science works at a company that designs BPA software that performs directional analysis given varying impact patterns. Another alumnus of XYZ U. who majored in behavioral science and earned an advanced degree in chemistry, is a retired homicide investigator who now teaches chemistry at the local high school. A pod is formed under the leadership of the aforementioned faculty. Initially, they function similar to a special interest club engaged in demonstrative BPA educational activities and sessions. However, this embryotic pod encounters a challenge in BPA validation that if addressed can make a significant contribution to the reliability of a particular and/or set of BPA techniques – thus, contributing to the overall BPA body of knowledge. There is a cooperative agreement solicitation released by a federal agency with interest in development and validation of more reliable BPA techniques. Once funded, the effort can support faculty, and student assisted research at the alumnus’ company. The pod’s effort and its participants expand with the inclusion of their government partner and there is additional interest expressed by students in the subsequent cohort(s). Some of the undergraduates continue on to graduate studies at XYZ U. The network continues to expand and the corporate partner, now teamed with a hardware engineering company, advances its position to a competitive bid on a major contract for design of a reliability measurement instrument and applicable technique(s) that may eventually establish new global BPA standards. There is international interest giving way to study abroad. The company hires several of the pod graduates, now alumnus, to satisfy the contract. The P-Pod™ morphs and expands – naturally.

It is not difficult to see how the pod objectives of exploration and contribution
to the greater body of knowledge; networking for discovery, research and other growth opportunities which include but are not limited to engagement and collaboration on grants, contracts, internships and other sponsored programs review and recommendation on curricula; and the creation of a pipeline for the perpetual advancement of their respective members and the expansion of the collective pod, are met. Moreover, in more integrated university-industry environments such as Silicon Valley, similar activity exists both formally and informally. However, for many smaller, less strategically located, and/or economically restrained institutions a more intentional effort may be necessary.

The purpose of this writing is to spur consideration of an intentional effort to form such pods at these institutions.

Higher Educating STEM College Students Continued

The first position related to the promise of “higher educating” STEM college students explored exposure to Agile. The idea was to infuse a modified Agile methodology to be incorporated at different points or phases of the undergraduate and graduate matriculation. This Part II Perpetual Pods (P-Pods™) targets development of a human resource unit or pod that naturally forms, bonds around, and focuses on a specific interdisciplinary interest, initiative or cause as outlined above. It too is boundless in its execution and presents yet another opportunity to address voids in STEM college level preparation expressed by employers. The exact implementation is also flexible and adaptable to the particular higher education environment. Moreover, while the scope of this writing is competitive advantage and workforce readiness for STEM college students; the idea of infusing the P-Pods™ into other disciplines – not just science, technology, engineering and mathematics – also holds significant promise.

CITED REFERENCES

i [Staff] “Prepare the American Workforce to
ii Ibid
iii Helguera, Maria and Pow, Joseph “A Project-Based Pedagogy for Technical Education Among First Year College Students.” RIT Carlson Center for Imaging Science. Rochester Institute of Technology, 30 April 2014

vii Ibid

OTHER REFERENCES
