American Association of Physics Teachers
Arizona Section

Fall Meeting
Estrella Mountain Community College
September 30, 2017

Business Meeting Minutes

1. Welcome from David and EMCC *9:00 am*
2. Announcements
   a. Lunch pre-order and pay for Barro's
   b. New member introduction
      i. Owen, previously from Estrella Mountain, now at Mesa
      ii. Attendee introductions
3. Treasurer's Report.
   a. We have $3,700 in account prior to fall meeting expenditures (~$400).
4. Election of Officers
   a. New method to receive nominations via the website was unsuccessful.
   b. Received nominations will be announced, then open floor for additional nominations according to constitution.
   c. 2017-2018 Officers:
      i. *President:* Jim Ward
      ii. *Vice-President:* Amy Johnson
      iii. *Secretary:* Allison Van Liew
      iv. *Treasurer:* Michael Canham
      v. *Section Representative:* Eric Martell *(new officer)*
      vi. *High School Representative:* Zac Kovach
      vii. *College/2 Year Representative:* Jeff Hengesbach *(new officer)*
      viii. *University/4 Year Representative:* Kelli Warble
   d. Comments:
      i. Jim Ward intends not to be president next year. Need new nominations next fall.
      ii. Amy suggested using a secret ballot to encourage more people to consider running for an officer position.
      iii. John suggested having two high school reps: Northern AZ and Southern AZ.
         1. *If there low participation from North because they have no representation?*
5. Spring meeting date and tentative location selected
   a. April 7, 2018
   b. Bearizona in Williams
      i. www.bearizona.com
      ii. We'll check on discounts to bring family
6. Business meeting adjourned *9:32 am*

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General Meeting Minutes

1. *The STEAM Engine* by David Weaver & Dwain Desbien *9:40 am*
    a. History
        i. Grant from AZ Ramp Up program.
            1. Renovated existing lab space. Design might be different if creating from scratch.
                a. Ongoing goal to add more wood and metal tools.
            2. Required four key pieces of equipment. Added many more beyond minimum.
        ii. Key pieces of equipment
            1. CNC router
                a. Waiting for finances and facilities to meet requirements for using plasma torch bit
            2. Laser cutter
                a. Most used piece in many makerspaces.
                b. Playing with settings to etch pumpkins for sale.
            3. 3D printers
                a. MakerBot is good, but better options.
            4. Lathe
            5. Soft goods area includes sewing machine, embroidery, vinyl cutter, thermal transfer, & sublimation printer
                a. Can personalize tote bags, ball caps, awards, mugs, etc.
        iii. Opened for use in Spring 2017.
        iv. First community college to pilot EPICS (Engineering Projects in Community Service), which was founded by Purdue. EMCC managed by ASU.
            1. http://epics.engineering.asu.edu/
            2. https://engineering.purdue.edu/EPICS
    b. Tour
        i. Hijacked a display case in the building to show off artifacts (mostly 3D printed objects)
            1. Students designed and created a prosthetic for an arm without fingers (through EPICS).
                a. Maricopa Now reported about prosthetic.
            2. Currently perfecting design for a young girl whose foot was amputated.
            3. Printed prosthetic finger from scan of hand.
            4. Created miniature 3D print of Camelback Mountain which Calculus and Geology use to study the contours.
        ii. First lab devoted primarily to woodworking with router, drills, saws, lathe, and workspaces.
        iii. Second lab includes 3D printers, laser etcher, workspaces, storage for miscellaneous materials, and soft good areas.
            1. Dwain demonstrated use of 3D printed accessories for Vernier sensors.

a. Magnetic braking to reach terminal velocity for a *velocity vs. time* graph of a car on a ramp.
b. Can also do magnetic launching.
c. Radiation spectrometer
i. https://www.vernier.com/innovate/an-inexpensive-beta-radiation-spectrometer/

2. Dwain also demonstrated a 3D printed attachment to use fidget spinners for rotational motion.
a. When asked about using the printers to make the fidget spinners also, Dwain explained it is cheaper to buy them and only print the attachment.
3. All accessories printed using MakerBot
a. MakerBot uses proprietary thread (5¢ per gram)
b. Other machine uses any brand thread, but more complicated and less user friendly

iv. Time to make stuff! *10:20 am*
1. Laser etched key chains
2. 3D design using tinkercad.com and printed on MakerBot.

v. Pictures at the end of minutes.

c. Questions & Comments:
i. Contact Dwain and David about contract work if you don't have a 3D printer.
ii. Karie: How much are people in here?
1. David: We're open 20 hours a week. I'm in here more. Running Physics 240 special topics as a 1 credit class. Required to help me do jobs in here 2 hours each week. Last spring there were 8 people, now 14 honors projects being produced out of space. This is my primary job currently. We get 10 hours from lab techs, plus a work study being hired and bringing on part time. Jeff comes in to help too.
iii. Michael: What using a water cutter?
1. David: Too expensive!

2. *The Arizona Crisis in Physics Education (Update)* by Mike Vargas *11:10 am*
a. SB1038 passed, which was a tiring process but inspiring because it is the first time teachers have successfully initiated a new bill.
b. Great support from House and Senate.
i. Likely passed because due to frequent visits in person, articles written by teachers, and time spent speaking and listening to committees.
ii. Went through 8-9 committees and survived.
iii. 1-2 originally objected, but changed their minds and bill passed.
iv. Through each committee, it was edited and concessions made.
v. Mike had to take days off of school to complete this process.
c. Scholarships for all teachers to improve science education.

i. Originally the emphasis was on high school chemistry and physics professional development, but ultimately expanded to include CTE and elementary.
ii. No money allocated for ADE, so it is cheaper for them to let it die, then to work through assigning scholarships.
iii. 150 scholarships available. Of the 83 awarded, 15 for physics 5 for chemistry, and the remaining for elementary and other divisions.
1. A little disappointing since this was not the original intent of their efforts.
iv. The goal was to get more physics teachers, but ADE wants to get rid of money quickly.
v. ADE taking applications and awarding money quickly.

d. Students are the ones being disadvantages by teacher shortages.
i. Earl Barrett reported that 538 teachers have left the field since school started this year, which has affected a quarter million students.
ii. Easier for administrators to drop programs than to find specialized teachers.
iii. Students may be blocked from applying to certain universities if they lack the opportunity for certain classes, including physics.

e. Differing approaches about how to remedy lack of physics classes offered to high school students.
i. Legislation moving to get rid of requirements for teachers, but can these people last?

f. Questions & Comments:
i. Bruce: What about concurrent enrollment?
1. Kelli: Students have to get to campus.
ii. Jim: I watched a middle school class about the Apollo mission and the teacher explained how the astronauts opened the hatch and parachuted down.
1. Amy: So, maybe we do need to reteach teachers.

3. *AZ Science Standards Revision Process* by Zak Kovach *9:19 am*

a. Timeline
i. December 2017 – Release draft and public feedback
ii. Spring 2018 – Final version taken to AZ State Legislature
iii. 2018-19 and 2019-20 – Transition years
iv. 2020-21 – Implementation year
v. Spring 2021 – Administer science assessment aligned to new standards
1. AIMS until 2020
2. Test given in 3rd year (11th grade) over 4 subjects (physical sciences, life science, and earth science)
3. District decision how to handle content, possibly by combining subjects.

b. Development
i. Pulling from *A Framework for K-12 Science Education* and Wynne Harlen's article about big ideas in science.

ii. Same background as NGSS, but unique (committee emphasized this point).
    1. Not allowed to provide details, but Zak pulling for physical science elements: materials made of small stuff, objects affect other object, forces, and conservation of energy, etc.
iii. Merging big ideas with nature of science and scientific practices with content.

c. Questions & Comments:
    i. Bruce: What about math standards?
        1. Karie: They were revised in 2012. Math and science are not done concurrently.
    ii. Zak: Welcoming input. What do students need to know in the realm of physics?
    iii. How to Increase Physics Enrollment Workshop
        1. Zak Kovach and Melissa Girmscheid
        2. November 4 at ASU
        3. http://increasephysics.weebly.com/
        4. Demos/Projects: mystery cube/tube, singing rod, balancing nail, magnet and copper pipe, physics Olympics

4. *Aspiring to Lead* by Kelli Warble
    a. Description
        i. Task force to create a new set of professional development and leadership models for the K-12 physics education community.
        ii. Challenge is that a kindergarten teacher won't identify as a *physics* teacher.
        iii. Similar to SPIN-UP
    b. How do you measure physics teacher leadership?
        i. Local – instructional leadership
        ii. State – association leadership
        iii. National – policy leadership
    c. Where do teacher leaders come from?
        i. All had a great catalyst early in their careers like a great mentor, otherwise sought PD just to survive.
        ii. Growing requires ongoing community involvement and support.
    d. Why focus on K-12?
        i. The national average is 20 minutes a day of science in elementary grades.
        ii. There is a national inability to separate fact from fiction.
        iii. Science teaches evidence-based decision making.
        iv. K-8 teachers are not comfortable or equipped to teach science.
            1. 3% comfortable teaching physical science.
    e. Goal and possible solution
        i. We want participation across the career spectrum that provides community and support for teachers by teachers.

ii. Possibilities for regional boot camps for new graduates and elementary teachers provided by proficient teachers creating a stair-step model of training and leading.

f. Consider policy leadership framework and discussion
   i. Policy, like shifting to block scheduling, isn't the same as politics.
   ii. Foster a strong network of professional contacts, including administrators and district and state policymakers.
   iii. 90% of school funding comes from district and state level.
      1. Crisis with K-12 parents and voters.
      2. Parents must demand improvements to science education.
   iv. Generates ideas and opportunities for widespread benefits to the education community.

g. Questions & Comments:
   i. Eric: Property in Illinois was much greater. What effort is there to get citizens to kick in more money?
      1. Mike: I only need 10,000 people to vote for me and I win. If every teacher voted and get 3 more to do likewise, we would be electing different policymakers.

5. Lunch *12:10 pm*
6. Call to order *1:00 pm*
7. *Introducing Real Time STEAM* by Rebekah Brubaker *1:05 pm*
   a. About organization
      i. Rebekah is founder and CEO
      ii. 5 year old, non-profit
      iii. Small staff who work in the field outside of Real Time STEAM
      iv. Fostering connections with many organizations and passing on that benefit through professional development and classroom programs.
   b. Teacher/Classroom support
      i. Storytelling science.
         1. Reteaching professionals to teach better, so we don't rely on Bill Science and other programs.
      ii. STEAM specials
         1. 5 days to cover each branch
         2. Show students that scientists aren't experts in everything. People specialize.
      iii. Students have technology in the pocket, but are teachers maximizing its potential?
      iv. Teaching modules available (e-mail Rebekah)
      v. Using LinkedIn as a STEM professional
      vi. We need to train students in content that will be useful after high school graduation regardless of college choices.
         1. Coding teaches skills that are useful long-tem.
   c. Comicon
      i. Memorial Day weekend

ii. Check for discounted tickets for educators
iii. Professional development
1. 33+ hours can be achieved
2. All presentations must be applicable within the next year. Developing technologies are not good enough.
3. Presenters must have a graduate degree and 5+ years of experience.
iv. Prior panels that were popular:
1. Science of light – what light is and how it's being used to study things on Mars including interferometry.
2. How the show "The Expanse" does physics correctly. It's easy to find bad science, so nice to hear one done well (except for biology topics).
3. AZ Stars of Science
4. We'll Skype You In – classroom conversations with geologists on-site and more.
5. and more… variety of sessions from pop culture to hard science.
6. 2017 Sessions
v. Teachers can get involved by contributing theme ideas, present on panels, suggest a panel topic, or help at Comicon.
1. Free admission for volunteering 4+ hours.

d. Contact
i. Rebekah.brubaker@realtimesteam.org
ii. www.realtimesteam.org
iii. information@realtimesteam.org
1. Send ideas for Phoenix Comicon presentations

e. Questions & Comments:
i. Jim: How do you pick Comicon theme?
1. Rebekah: We bring together people who want to present and they select themes.
ii. Ajay: Are there resources on the website for teachers to access?
1. Rebekah: No, groups have stolen our materials. You may email us and we'll give it to you, but it can't be posted publicly.

8. Break *1:55 pm*
9. *Making Your Classroom an Active Learning Environment* by Karie Meyers *2:02 pm*

a. History (20+ years teaching)
i. Astronomer & worked in a hands on science museum
1. Dealt with a lot of equipment and computers
ii. College professor
1. Lecturer, but preferred teaching lab
iii. Public programs manager at NOAO
1. Taught general interest classes at the observatory.

iv. High school teacher
    1. 10 years at Amphi High School
    2. Not all students at Amphi attend college and those who do are celebrated on a wall at the school.
    3. Really learned to teach. Due to alternative credential, needed to learn pedagogy.
v. Community college teacher
    1. 12th year at Pima
    2. Recognized students have lives and college students experience bigger life events.

b. Development as a teacher
i. First year teaching high school = disaster
    1. Continued lecturing like college, but students don't like listening.
ii. Alternative credential obtained with training from two programs:
    1. Project ASSIST about inquiry based learning = completely different philosophy.
        a. Changed classroom design from rows to tables of 4
        b. Won an award as "Most Transformed".
    2. Modeling Workshops
        a. Found computers and rigged internet and electricity to each table.
iii. Student quote: "Why do you like physics? Meyers leaves us alone."

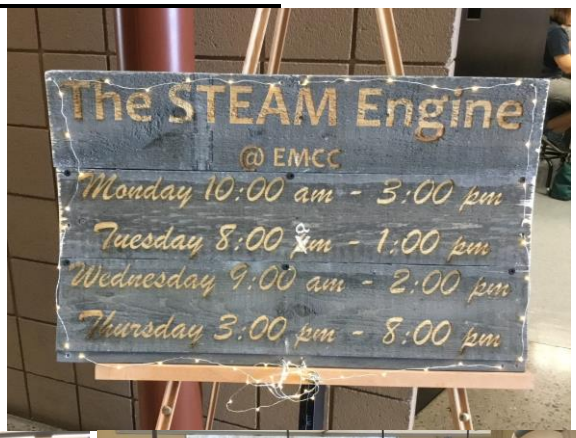
c. Currently…
i. What I've learned:
    1. It's not about me
    2. I can lose control without losing meaning in the classroom
    3. Students are amazing
ii. Goal: Make my class a learning community.
iii. Methods:
    1. 1/3 of class is women and see benefits when they are grouped
        a. Research show it increases grades of men and women.
        b. Women are empowered through this grouping.
    2. Presentation is a big part of modeling and that builds community.
        a. Everyone is reading and critiquing work.
        b. It can be hard to make your students do something uncomfortable.
        c. I never waver that we're presenting at least every other day.
        d. Teacher doesn't talk. Students talk. We don't just verify.
    3. You can't learn it by being told, but by finding it for yourself.
        a. Derek Muller (Veritasium) video https://youtu.be/RQaW2bFieo8
iv. Advice:
    1. "I'm not Dwain or David or Zak"

2. Don't try to be another teacher that you aren't.
3. You have to make it work for your personality and your students.

d. Questions & Comments:
   i. Ajay: How do you leave them alone?
      1. Karie: Learned from a parenting class to answer questions with questions. *How do you do this problem?* What have you done so far? Why did you do that? I don't really know how to do it, but try.
      2. Story about a teacher called into principal's office with parent and student. *He doesn't give us the answer!* Well, what happened? *We figured it out and did it on our own.* Oh, nevermind.
   ii. Ajay: Do you think students have changed? More hyperactive?
      1. Karie: I don't think students have changed.
      2. Amy: Students used to not have cell phones in their pockets.
      3. Karie: If you make a learning community, they will want to participate.

10. Closing statements and door prizes *2:39 pm*
11. Meeting adjourned *2:41 pm*

Pictures



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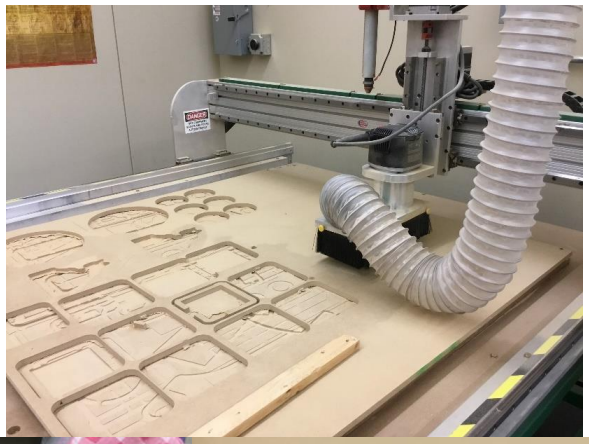


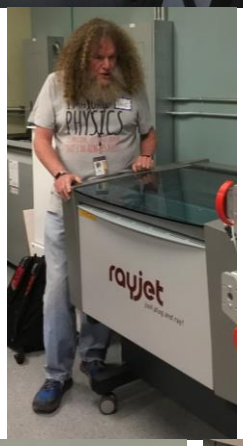



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