STEM Leadership PD Final Paper
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I. Successful Tech/STEM Integration
II. Curriculum Topics
   a. Curriculum - Technology integration in math, science, social studies and language arts. This professional development explains trending technology such as coding, robotics, 3D printing, green screen usage and Google Apps and how these tools can enhance other curricular areas. Discussion of the SAMR model will be used as an introduction to guide teachers from the Substitution phase to the Redefinition phase.
   b. Upper Pittsgrove School, Monroeville, NJ
   c. Fourteen educators teaching grades 3-8 were present
   d. Three were computer lab teachers, eleven were core content teachers who wanted to learn more about technology integration
      i. Jillian DeBarba jdebarba@upsmailbox.net
      ii. Kelly Houck khouck@pgcpschools.org
      iii. Stephanie Painter spainter@quintonschool.info
      iv. Harriet Hubbard hhubbard@pgcpschool.org
III. 2014 New Jersey Core Curriculum Content Standards – Technology
   a. 8.2 Technology Education, Engineering, Design, and Computational Thinking - Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.
IV. Summary
   a. I wanted to design a professional development opportunity for other technology teachers as well as core subject teachers who want to incorporate more technology into their teaching. My PD introduced different kinds of robots including their cost, age appropriateness and ideas for use. I also offered ideas of how to use the green screen to enhance creativity in student projects as well as online resources. Showing the teachers how I integrate 3D printing into my curriculum to create meaningful STEM challenges was a big hit! At the end of my presentation, I offered ample time for the teaches to explore the robots and try out several stations I had set up.
V. Pre-Survey Questions (1-5 rating)
   a. How comprehensive is your coding knowledge?
   b. Have you ever coded a robot?
   c. Do you think there is room in your curriculum for robotics or coding?
   d. Do you feel students should express creativity in their assignments?
   e. Have you ever heard of green screen technology?
   f. If you had access to a 3D printer, how comfortable would you feel using it?
   g. Do you use STEM in your curriculum?
VI. Brief Description of the Actual Professional Development Training

a. Focus for the Day: Using robotics across the curriculum; green screen technology; integrating STEM into the computer lab and classroom; look for resources

b. Explanation of computational concepts taught in Scratch as well as with the robots. Gave an overview of robots I have in my lab (code-a-pillar, code & go mouse, ozobots, dash, dot, and cue) with ideas of how to incorporate them. Offered links to print and use materials to accompany the robots.

c. Offered suggestions for using the green screen in the classroom to enhance student creativity and choice for projects, including book reports, poetry performances, orientation videos, how to videos, weather discussions, etc.

d. Showed examples of how I include 3D printing in my lab to create true STEM experiences. My examples were: "Best Boat" where my 7th graders test sample boats to see which designs are the most stable and hold the most pennies, they then design and print their own boat to enter into the class competition; "Rubber Band Powered Car" where my 8th graders test sample rubber band powered cars and then create and print their own to compete on race day; and my "Alien" project for 6th grade where we study the Solar System and then add a twist of pretending there is life on one of the planets, what would it look like? They design and print an alien that we put a coin battery and LED light into to make them glow.

e. Lastly, I offered suggestions of websites like Nearpod and Flipgrid to allow for more differentiation.

f. Once I was through with the discussion, I invited the teachers to browse my lab and try the various challenges I had set up. Teachers enjoyed coding the robots and exploring ideas with the green screen.

VII. Brief outline of the activities in the professional development training

a. Pre-question survey

b. Presentation using PowerPoint and projector

c. Discussion/questions throughout presentation

d. Code n Go Mouse robot stations set up with rhyming and opposite games

e. Dash robot stations set up with spelling and fractions games

f. Green screen set up for teachers to take pictures/videos and practice editing

g. 3D printer printing a student project so teachers could see how it worked

h. Computers set up with TinkerCad and other websites running so teachers could explore

i. Post-question survey

VIII. NASA mission data or Endeavor resources

a. Endeavor courses have helped me to transform from a teacher to a facilitator. The main content I'd like to focus on is integrating robotics and coding into core content areas and advocating for student creativity and differentiation.

IX. Follow-up activities & Post-Survey Questions (open ended)

a. Which robot do you feel could easily fit in to your curriculum?

b. Which resource did you find most useful?
c. Are there any resources you are going to try immediately?
d. Would you like to learn more about any of the topics discussed?
e. Can you think of one way to incorporate green screen technology into your curriculum?
f. Was the content of this workshop beneficial to your curriculum?

X. Outcomes
    a. Survey Results (content)
        i. "I was hoping to learn more about the benefits of adding coding to my classroom." **I emailed this teacher some more ideas and information. **
        ii. "Your how-to videos are a great idea to use with a substitute! I'm stealing this idea!"
        iii. "The 3D printing lessons look very engaging for your students."
        iv. "So many useful ways to use the green screen that I didn't think of!"
    b. Survey Results (pedagogy)
        i. "You seem very comfortable in your lab. Your students are lucky to have you teach them such wonderful skills needed for the future."
        ii. "A lot of information to take in. Thank for allowing time to explore."
        iii. "I was appreciative for the time to explore the robots."
    c. Successful?
        i. I think it was very successful. It seemed as though every teacher came out of the workshop with SOMETHING to take back to their classroom. Based on the feedback, the teachers were very happy to have time to look into the resources to explore them further.
    d. Relate to the readings:
        i. "This project revealed that even our most passionate science teachers are engaged in relatively small amounts of professional development. While it is unclear why they spend so little time in professional development programs, it is problematic when science teachers are expected to participate in professional development programs that have a specific time and duration requirement." (Luft, Dubois, Kaufman & Plank, 2016) I feel other technology teachers as well as those who simply wanted to learn how to incorporate more technology had a PD that was valuable. I went to a PD similar to the one I delivered and was so excited to bring back fresh ideas to my district. All too often special area teachers are spent wasting PD days.
        ii. "Groups of teachers from the same grade, subject, or school should participate in professional development activities together to build an interactive learning community." (Desimone, 2011) It is so important that teachers feel validated and like their time matters during professional development days. All too often, non-math and non-ELA teachers sit through hours of PD that they will never use.
    e. Will the teacher do these activities again?

         i. Based on the feedback from the question "Are there any resources you are going to try immediately?" most said the regular websites like Nearpod and Flipgrid due to budgetary constraints for robots and 3d printers.

    f. Reflection

        i. Content: how does the PD help teachers understand content

            1. I broke down each section (robots, green screen, 3D printing, basic websites) giving an overview of what they are, showed an example, offered suggestions and lesson ideas and gave them time to explore those sections of particular interest. Majority of the teachers commented on how much they enjoyed the time allowed to simply explore.

        ii. Pedagogy: how are STEM activities implemented in the classroom

            1. I offered examples of STEM projects completed in my 6th through 8th grade classes with links to the lesson. I also offered links to resources and links for using the green screen as well as coding with the robots.

            2. I know that I am required to implement STEM into my classroom, but I do not know the requirements of those who came from other schools. No one has contacted me since the PD for additional resources, although one lady took extensive notes on what she liked the best when she was exploring.

XI. Classroom Activities for teachers to use in other classrooms

    a. Code n Go Mouse robot stations set up with rhyming and opposite games

    b. Dash robot stations set up with spelling and fractions games

    c. Green screen set up for teachers to take pictures/videos and practice editing

    d. 3D printer printing a student project so teachers could see how it worked

    e. Computers set up with TinkerCad and other websites running so teachers could explore

    f. Hyperlinks to robot resources

    g. Hyperlinks to 3d printing lesson plan ideas and videos

    h. List of ways to incorporate green screen technology

    i. Hyperlinks to websites that allow student creativity