Blending Curriculum with Career Skills

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Session Description

Project based courses challenge students through activity questions that help them work on research skills and development. Unfortunately, these projects often blend into the curriculum and students fail to recognize the main goals behind the projects. The goals of the activities turn from career exploration and training into merely test preparation. During this session we will describe case scenarios where graduate student scientists were able to bring activities designed to mimic real life situations into high school Project Lead the Way courses. Project Lead the Way is a not-for-profit organization that provides resources to support rigorous and innovative science, technology, engineering and math education in schools across the country. These courses are project centered and focus on learning by application and research. As part of the Urban Educators GK-12 Program at IUPUI sponsored by the National Science Foundation (NSF), graduate students were able to bring scientific excitement and exploration back into these courses. They brought in real life situations designed to simulate science work environments including aspects of grant writing, peer competition and patent development. The students were able to recognize the main goals behind projects and showed improvements in their research, reading and writing skills. These benefits can be attributed to the unique perspectives and skills that research scientists have obtain through their experiences. They are able to bring new ideas from their experiences in industry, academia and government into these courses. This session features an interactive presentation and resources, including examples of ways participants can incorporate grant writing, peer competition and patent research to promote real world skills that students will use in their future scientific careers. Students and teacher partners will share the impact that these specific projects have had on their project based science courses. Participants will gain new ideas to include in their courses and how an effective partnership works, especially in project based courses.

Acknowledgements

Other Resources and Link

Indiana U. - Purdue U. Indianapolis	http://www.iupui.edu/
IUPUI GK-12 Program Overview	http://www.gk12-iupui.org/
Project Lead the Way Overview	http://www.pltw.org/
National GK-12 Program	http://www.gk12.org/
National Science Foundation	http://www.nsf.gov/news/classroom/
AAAS Science Update	http://www.scienceupdate.com/
AAAS Science NetLinks	http://sciencenetlinks.com/
TED-Ed	http://ed.ted.com/
Mission Geographic	http://missiongeography.org/

GRANT PROPOSAL AND PEER REVIEW EXAMPLES

General Steps for the Peer Competition Model:
1. Select two groups (Group A and Group B) of similar age students to work with.
2. Develop a project for each group of students to work on.
3. Write an instruction sheet describing the project's objectives and report format.
4. Create a "Peer Review Survey" (PRS) for the students to use to evaluate their peer's report (see attached example).
5. Assign the project to each student by handing them the instructions sheet.
6. Coach the students by answering any questions they may have about the project.
7. Collect the individual reports from each group.
8. Distribute the reports from Group A to students of Group B and the reports from Group B to students of Group A
9. Hand out a copy of the PRS to each student and ask them to evaluate the report assigned to them based on the PRS.
10. Collect all the reports along with the completed PRS.
11. Make a copy of all the reports and PRS or keep a record of the PRS results in a spreadsheet for future reference.
12. Return the reports to their authors along with the corresponding PRS.
13. Ask each student to review their work and improve their report based on the reviewer's comments and resubmit their report for teacher's evaluation.
14. Collect all the improved reports and evaluate them based on the objectives of the project, report format instructions and PRS comments.
15. Add the PRS evaluation to the teacher's evaluation to produce a final score for each report. Sort the reports by score and award the winner with an incentive

Possible Grant Proposal Instructions:
Instructions to the Applicant:
1. Research a scientific topic or idea and develop a hypothesis that you would be interested in researching.
2. Submit a 2-5 page research/design proposal on why your research/design is the best and should receive the grant.
3. A good submission will cite the literature and have a good hypothesis with carefully planned independent and dependent variables.
4. Include the following sections in the grant proposal:
    a. <u>Title</u>
    b. <u>Summary / Abstract</u>
    c. <u>Aim / Hypothesis</u>
    d. <u>Independent and Dependent Variables</u>
    e. Relevant <u>Research Background</u>
    f. <u>Research Plan</u> including controls and possible <u>Experimental Pitfalls</u> (<u>Design and Possible Design Pitfalls</u>)
    g. Predicted Conclusions and <u>Benefits to the Field (User)</u>

Possible Outline of Peer Review Survey (PRS)
Please look at each section independently to determine the quality of each section:

1 = Unsatisfactory-----------------------4 = Satisfactory--------------------7 = Extreme Satisfactory

Font, margins, length
Title
Summary
Aim
Independent and Dependent Variables
Research Background
Research Plan
Experimental Pitfalls
Benefits to the Field

Does the applicant follow the guidelines for submission?
Does the applicant have an exciting idea?
Can the work be accomplished in class time?
Will the work be of benefit to the field?
Overall impression of the work as a whole.
(Are the drawings, figures and variables properly labeled and defined?)
(Will the work be of benefit to the user?)
Does the applicant have an exciting idea or design?

<u>Reviewer Comments and Recommendations</u> (most important section)
Please list ways that the applicant could improve (positive and negative critiques)

Notes