AC 2012-3580: IMPACT OF INNOVATIVE STUDENT PROJECT FOR THE INCREASED RECRUITMENT OF ENGINEERING AND SCIENCE STUDENTS (INSPIRESS)

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Impact of Innovative Student Project for the Increased Recruitment of Engineering and Science Students (InSPIRESS)

Introduction

Industry and community organizations have indicated that there is a significant need nationally for engineers, especially in the aerospace industry.[16,21] According to a recent study conducted by the RAND Corporation, the federal STEM workforce is rapidly aging.[5] The Department of Defense, the largest employer of engineers in the country, predicts that by June 2012, the portion of their STEM workforce eligible to retire will more than double to 69.5 percent. Likewise, NASA is seeing similar trends in its workforce.[5] The National Research Council's 2007 report entitled, "Building a Better NASA Workforce: Meeting the Workforce Needs for the National Vision for Space Exploration," reported that the NASA workforce has been steadily aging since the early 1990s.[17] As of 2007, the average age of a NASA scientist or engineer was 45.8 years as shown in Figure 1. In contrast, during the Apollo years, when the nation was developing the vehicles needed to begin our initial lunar exploration campaign, the average age of a NASA scientist or engineer was 26.[1] Locally, there is an acute need in Alabama where the Alabama Department of Labor estimated that the demand for engineers in the state would be 1000+ per year for the next decade.[14] The technical focus of Huntsville and the surrounding area is driving the state's need for engineering talent. As a result, there is a need to attract high quality students with strong science and mathematics backgrounds who will earn degrees in engineering.

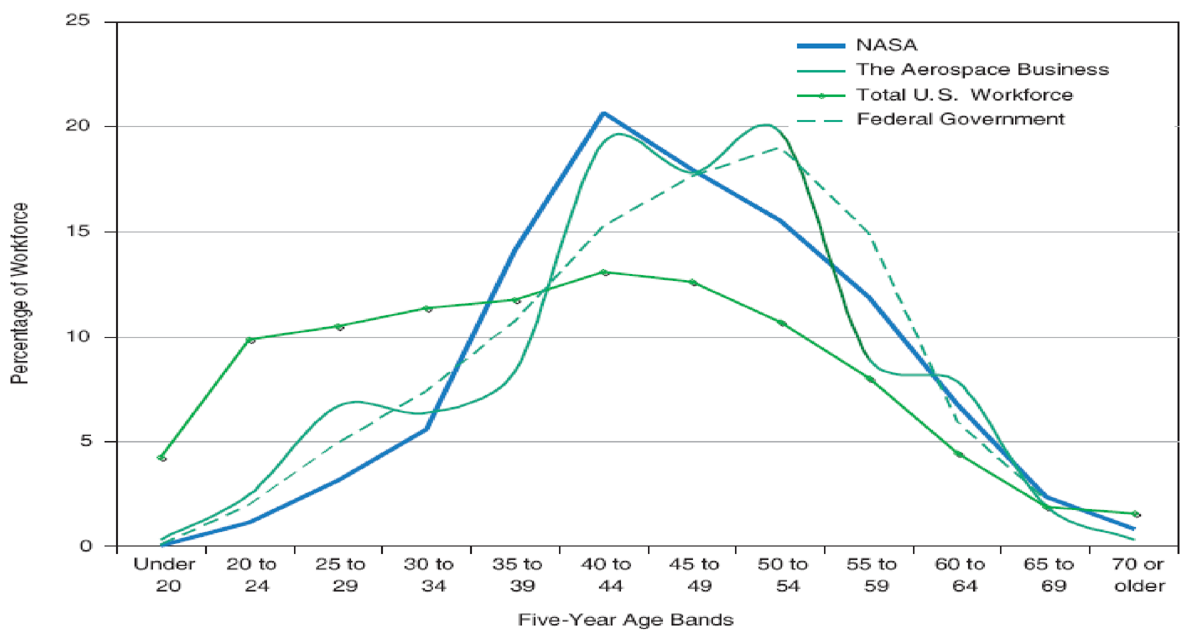

Figure 1. Age Distribution of NASA compared to the aerospace industry, the total workforce, and the federal government. [17]

While these trends are alarming there are other concerns as well. Boylan[3] provides data from the American College Test (ACT) high school profile that shows the percentage of students planning to major in engineering has decreased from 8.6% in 1992 to 5.3% in 2003 which magnifies concerns given the rising need for engineers and the aging of the current engineering workforce. Furthermore, findings from a 2010 study by the National Research Council's Committee on Examination of the U.S. Air Force's Science, Technology, Engineering, and Mathematics (STEM) Workforce Needs in the Future and Its Strategy to Meet Those Needs indicate that "as a consequence of inadequate educational opportunities in elementary and high school, careers in science and engineering (S&E) become beyond the reach of students who might otherwise pursue a STEM degree" .[20] Together these trends (i.e., rapidly aging STEM workforce and decreasing student interest in STEM careers) provide significant motivation to develop programs that increase student interest in STEM careers and correspondingly help to better prepare them to be successful in their college studies. At the same time, the low test scores for students from the United States compared with other developed countries in the Trends in International Mathematics and Science Study, have established a national call to develop innovative ways to encourage math and science education.[15] In reaction to this call, both the National Council of Teachers of Mathematics (NCTM) and the National Science Teachers Association (NSTA) have challenged educators to develop innovative ways to teach mathematics and science.[15,22] In particular, both the NCTM and NSTA focus on the use of "inquiry-based" and "authentic learning" experiences that focus the applications of math and science in a "real-world" context.[22,20]

According to Subotnik et al., high school appears to be a key point at which young people's impressions of science influence their career decisions.[30] Brody outlined elements of successful pre-collegiate STEM programs with an exposure to strong content knowledge in mathematics and science based on academic instruction and hands-on demonstration as well as an appreciation for the utility of STEM subjects in the workplace.[3] Further evidence from Bloom, Pyryt, Subotnik et al., and Tai et al., suggests that adolescents with interests and talents in mathematics and science are more likely to pursue STEM disciplines in postsecondary environments when provided with challenging curricula, expert instruction, and peer stimulation.[2,26,29,31] However, Marshall, Lynne, and Joyce found that most K-12 students do not really understand what "engineers do".[11] It is not uncommon for students (and their parents) to equate engineers with auto mechanics or technicians.[28] This would seem to indicate that there is still a need to help perspective students develop a correct perception of the engineering profession and what "engineers do." In particular, there is a need to help students understand the difference between engineers and technicians. That distinction is focused on design; engineers design products, processes, and systems. Martinez-Ortiz argues that engineering design is the distinct element that is most important to engineering education.[12] Recent reports highlight the need for incorporating engineering design into the high school curriculum.[19] Several studies report that students not only gain in technology literacy, but also make gains in science and mathematics when exposed to engineering design in the classroom.[4,7,8,12]

In order to meet these needs, the faculty at the University of Alabama in Huntsville (UAHuntsville) established the *Experience for the Next Generation of Innovators through Networked Engineering Education and Research* (ENGINEER) program. ENGINEER is a multifaceted educational and outreach program, which seeks to extend engineering design education into high schools and eventually middle and elementary schools. The goal of the ENGINEER program is the development of the engineering supply chain by strengthening the relationship between the university and area K-12 schools. ENGINEER is currently composed of two projects: The *Integrated Product Teams* (IPT) course and the *Innovative Student Project for the Increased Recruitment of Engineering and Science Students*.[10] Over the last several years, engineering colleges throughout the country have developed cornerstone (freshmen/sophomore) design classes in an effort to retain current engineering students. Dym et al., argue that cornerstone courses are seen as a means to enhance students' motivation and their retention in engineering, in part because they introduce engineering content and experience early in the curriculum.[9] Oakes, Jamison, and Coyle argue that cornerstone courses provide a better basis for students to make choices of disciplines and to gain valuable engineering experience and appreciation for the math and science courses they are taking as pre- and co-requisites to their engineering courses.[23] Furthermore, engineering design is inquiry-based learning which encourages and supports collaborative work [6] and improves retention and enhances design thinking[9] and is consistent with the skills needed to be successful in STEM areas.[24] The InSPIRESS project at UAHuntsville in many ways emulates the cornerstone experience, but at the high school level instead of the freshman year of college.

The IPT project is the capstone senior design course for students in Mechanical and Aerospace Engineering and Industrial and Systems Engineering. Students in this course, working with students from two other universities, design a spacecraft to accomplish a planetary science mission. The (InSPIRESS) project is a new outreach program that is linked to the IPT project at UAHuntsville with a focus on high-school students. This outreach project introduces high school students to engineering design in order to help them understand what engineers "do", motivate them to take the foundational courses in math and science necessary to study engineering in college, and to establish a context in which they can understand why they need to take these courses to become engineers. InSPIRESS is built around a design project in which teams of high school students design a science payload for a NASA mission that is being designed by senior engineering students in the IPT course at UAHuntsville. The two projects are based upon the development framework for planetary science missions used by NASA.

Methodology

Participants: Ninety-two students participated in the study. The students were from five high schools in north Alabama and Southern Tennessee. . The participating students were either taking a high school engineering class or physics class. While all of the students participated in the InSPIRESS project not all of them were planning to pursue a STEM career in college if they planned to attend college at all.

Implementation: The researchers in this study collected multiple measures and utilized a quasi-experimental design to assess the impact of the project's authentic learning activities on the students' attitudes, motivation and self-efficacy toward engineering.

At the beginning of the school year, the students were provided with consent forms explaining the research study. After receipt of the signed consent forms, the Pre-surveys were administered by the researchers to students who, along with their parents, agreed to participate in the project. The rest of the semester involved two research faculty from UAHuntsville meeting with the high school teams weekly to guide them through the engineering design process. These meetings lasted about 12 weeks. These weekly meetings consisted of interactive discussions of the requirements for the design, formulation of alternative designs, trade-studies, etc. The teams also made presentations to a faculty review panel twice during the semester. This review panel provided feedback on the proposed design as well as feedback on the teams' proposal presentation. The semester culminated in four activities/actions: 1) the student teams submitted a report on their proposed payload to their college team, 2) the college team reviewed the proposals from all their high school teams and selects the payload that they would include with their mission, 3) the student teams participated in an end of semester IPT/InSPIRESS Open House in which they developed a poster and booth to present their payload design idea to attendees, and 4) at the end of the semester the teams came to UAHuntsville and presented their final designs to a NASA review board which selected the outstanding design. With regards to data collection, the Post-surveys were administered at the end of the fall semester. In prior semesters there was evidence that students attitudes had change, as a result the research team wanted to further investigate the impact of the InSPIRESS project on the high school students attitudes towards math, science, and engineering. Hence the use of the Pre and Post surveys. The Pre and Post Surveys were coded with school codes and unique id codes for each student. All raw data was compiled by the evaluation team from the UAHuntsville Department of Education. They input and coded the data in SPSS 18.0 and completed all relevant statistical analysis of the data.

Instrumentation: This study utilizes the following instruments:

Demographic information. The surveys included a simple demographic section that focused on the students' gender, race/ethnicity, academic standing (i.e., grade level), parental status, parental educational background and parental income.

Mathematics and Science Attitude Inventory (MSAI)[25] was administered as well as the *Engineering Attitude Survey (EAS)*.[27] The MASI was administered to determine the students understanding of the importance of math in everyday life as well as their attitudes towards math and science. In order to determine what students know about the field of engineering and "what engineers do", we administered the EAS. The MSAI is a 62-item questionnaire while the EAS is a 25 item questionnaire. Both instruments were scored using a 5-point Likert scale with 1 being strongly agree and 5 being strongly disagree. We also wanted to determine the students' academic self-efficacy. In order to measure this objective, the project team administered a modified version of *Patterns of Adaptive Learning Scales (PALS)*.[13] PALS consists of 58, self-reported items divided into four subscales: (1) personal achievement goal orientations; (2) perceptions of the goal structures in the classroom; (3) achievement-related beliefs and attitudes; and (4) perceptions of their parents. Items on the PALS were scored using a five point Likert scale with 1 being "not at all true" and 5 being "very true". To glean what students understand about the skills necessary to be a good engineer, we administered the *NASA Pre/Post Long Engagement Student Survey*.

Results

A paired-samples t-test was conducted to compare the pre-test to the post-test at the end of the semester for each the *MSAI, EAS, PALS* and the *NASA Pre/Post Long Engagement Student Survey(PLES).* Tables 1 through 4 provides the pre- and post-test means and standard deviations in parenthesis as well as the t-score and p-value for the above instruments respectively.

Table 1

	Pre-test Mean	Post-test Mean	t-value	p-value
MASI	2.406 (0.05)	2.520 (0.05)	-1.784	0.078

α = >0.05, df =91, * indicates significant difference

The MSAI results show a slight increase in the mean scores but not a significant difference.

Table 2

	Pre-test Mean	Post-test Mean	t-value	p-value
EAS	3.328 (0.35)	2.533 (0.57)	11.50	0.0005*

α = >0.05, df =91, * indicates significant difference

The EAS results reveal a significant decrease in post-test scores, indicating a statistically significant change in the students' attitudes towards engineering and "what engineers do."

Table 3

PALS Subsections	Pre-test Mean	Post-test Mean	t-score	p-value
Mastery Goal Orientation	3.269 (0.75)	3.252 (0.95)	0.136	0.892*
Performance-Approach Goal Orientation	3.591 (0.93)	3.033 (1.16)	3.376	0.001*
Classroom Mastery Goal	4.045 (0.67)	2.859 (1.15)	7.786	<0.0005*
Classroom Performance Goal Structure	3.818 (0.70)	2.833 (1.20)	6.236	<0.0005*
Academic Efficacy	3.624 (0.88)	2.937 (1.16)	4.158	<0.0005*
Self-Handicapping	2.123 (0.79)	3.601 (1.07)	-9.658	<0.0005*
Avoidance of Unfamiliar Work	2.780 (0.92)	3.376 (1.09)	-3.506	0.001*
Skepticism About the Relevance of School for Future Success	1.902 (0.80)	3.638 (1.20)	-11.013	<0.0005*
Parent Mastery Goal	3.464 (0.96)	2.813 (1.19)	3.593	0.001*
Parent Performance Goal	3.402 (0.92)	2.850 (1.21)	3.174	0.002*
Dissonance Between Home and School	2.098 (0.99)	3.648 (1.22)	-8.330	<0.0005*

α = >0.05, df =91, * indicates statistically significant difference

A paired-samples t-test of the PALS results indicated that the scores varied with regard to significance from pre-test to post-test.

Table 4

	Pre-test Mean	Post-test Mean	t-value	p-value
PLES	2.5074 (0.73)	2.513 (0.98)	-0.050	0.960

α = >0.05, df =91, * indicates statistically significant difference

T-test results indicate a slight increase from pre-test to post-test; but it was not a statistically significant difference.

Discussion

For this research study, 92 high school students; enrolled in either a physics or engineering class were asked to complete four assessments that would allow the researchers to determine the impact of the InSPIRESS project on various factors. Given that the students were in either a physics or engineering class one would think they would already be predisposed to the activities involved in each field. However, previously collected anecdotal data revealed that students remained unclear of how these fields related to the field of engineering and what engineers "do". While previously collected anecdotal data indicated students enjoyed the project and student interest in engineering and science increased; the current data would be considered the "pilot" data. As this data will be evaluated in assisting to make adjustments to the amount of data and the types of instruments actually needed to answer the research questions of the study.

The results of the study were mixed. The students' scores determined from the MSAI and the PLES show a slight increase from pre-test to post-test. Although this increase was not significant it should still be noted that some of the students' knowledge of math and science and its importance to the field of engineering did increase as well as a slight increase in students' knowledge of what it takes to be an engineer. The InSPIRESS curriculum provides students with a constructivist way of learning the content. The students construct meaning of content information while engaged in authentic learning tasks. The InSPIRESS curriculum is also provided to students in phases therefore some of the connections to the math and science content did not become clear until students began completing their final projects. As with all types of authentic learning tasks some of the connections and learning may or may not be observable.

The results on the EAS provide a different picture. Results show that there was a significant decrease in scores from pre-test to post-test. According to the data, you would think that InSPIRESS had a negative effect on the students' comprehension of the field of engineering and what engineers "do". However, This is a positive result because several of the questions on the EAS relate stereotypical views of engineering (i.e., A problem with engineering is that engineers seldom get to do anything practical, To be a good engineer requires an IQ in the genius range, Engineers seldom get involved in business decisions, etc.). As a result high scores (i.e., strong agreement with these scores) would indicate an incorrect attitude about engineering. Thus, a lower score on the post-test is in fact a desirable outcome and as such is indicative of a definite improvement in the participants' view of the engineering profession. In InSPIRESS student participants were able to see first hand examples of what "engineers do". Working together in teams to build payloads, participants saw first hand the skills needed not just in science and math, but also in communication and teamwork.

PALS results provided unique mixed results as well. The PALS instrument focuses on the impact of the learning environment on the student. Constructs that measured students' purpose for engaging in academic behavior, student's purpose or goals in achievement, perceptions for engaging in academic tasks, and perceptions that parents want them to develop their competence all decreased significantly. However, constructs that addressed academic self-handicapping, preference in avoiding unfamiliar new work, and beliefs that doing well in school will not help them achieve success in the future, significantly increased. What the researchers can learn from this is that more emphasis and connections to content and real life experiences should be made clearer along with the authentic tasks that the students are engaged in.

Conclusion

This research study provides the first set of results for the InSPIRESS project. Overall the results were mixed. We believe that this was due to several factors: 1) Too many instruments were used in this pilot - we got several comments, particularly in the post surveys about the length of the survey; 2) instrument selection - these may not be the correct instruments to assess this project - the research team is giving serious consideration to creating and validating a new instrument; and 3) survey administration - there appear to have been some problems particularly with the post survey which had a number of issues (i.e., incomplete response, double entries, etc.) resulting in almost half the data not being useable. It must be stressed that this is preliminary data and it will be used over the next few years to modify, adapt and refine the instruments administered. The researchers will also use this information to enhance the way in which the curriculum is being presented. The collaborating departments at UAHuntsville plan to continue to collect data to determine the long-term impact of the InSPIRESS project. The response to the course by students, teachers, parents, and program sponsors has been enthusiastic with more schools are asking to participate. In addition, students are telling their teachers that InSPIRESS has caused them to seriously consider careers in engineering and science, which on the surface seems oddly out of synch with some of the results from this pilot study.

At quick glace the data gender differences and Socio-Economic Status (SES) may have been influenced by the InSPIRESS project. Future research will look closer at this data and specifically analyze gender and socio-economic differences. Given the diverse population in the current schools involved in the study, the researchers would like to see what impact this type of authentic learning has on this varied population while encouraging more women to become more interested in STEM disciplines.

References

American Student Moon Orbiter website, http://asmo.arc.nasa.gov/

Bloom, B.S. 1985. *Developing talent in your people*. New York: Ballatine Books.

Boylan, M. 2003. "Assessing Changes in Student Interest in Engineering Careers Over the Last Decade", Center for the Advancement of Scholarship on Engineering Education.

Burghardt, M.D. and C. Knowles. 2007. "Enhancing mathematics instruction with engineering design", *Proceedings of the 2007 ASEE Annual Conference*, Honolulu, HI, June 24-27.

Butz, W.P., T.K. Kelly, D.M. Adamson, G.A. Bloom, D. Fossum, and M.E. Gross. 2004. *Will the Scientific and Technology Workforce Meet the Requirements of the FederalGovernment?* The RAND Corporation.

Christophersen, E., P.S. Coupe, R.J. Lenschow, and J. Townson. 1994. *Evaluation of Civil and Construction Engineering Education in Denmark*. Centre for Quality Assurance and Evaluation of Higher Education in Denmark. Copenhagen, Denmark.

Cunningham, C., C. Lachapelle, and A. Lindgren-Streicher. 2005. "Assessing elementary school students' conceptions of engineering and technology," *Proceedings of the 2005 ASEE Annual Conference*. Portland, OR, June 12-15.

Davis, D.C, K.L. Gentili, M.S. Trevisan, R.K. Christianson, and J.F. McCauley. 2000. "Measuring Learning Outcomes for Engineering Design Education," Proceedings of the 2000 ASEE Annual Conference, St. Lous, MO, June 18-21.

Dym, Clive L., Alice M. Agogino, Ozgur, Eris, Daniel D. Frey, and Larry J. Leifer. 2005. "Engineering Design Thinking, Teaching, and Learning," *Journal of Engineering Education*, 94(2): 103-120.

Farrington, P.A., M. Benfield, M. Turner. 2011. "The IPT Program at UNIVERSITY: An Innovative Approach to Design Education and STEM Outreach," *Proceedings of the ASEE 2011 Annual Conference,* Vancouver, B.C., June 26-29.

Marshall, Helen, Lynne McClymont and Lucy Joyce. 2007. *Public Attitudes and Perceptions of Engineering and Engineers 2007,* Royal Academy of Engineering.

Martinez-Ortiz, A. 2008. "Engineering design as a contextual learning and teaching framework: How elementary students learn math and technological literacy," *Proceedings of the Pupils Attitudes Toward Technology Annual Conference*.

Midgley, C., M.L. Maehr, L.Z. Hruda, E. Anderman, L. Anderman, K.E. Freeman, M. Gheen, A. Kaplan, R. Kumar, M.J. Middleton, J. Nelson, R. Roeser, and T. Urdan, 2000. *Manual for the Patterns of Adaptive Learrning Scales*, University of Michigan, Ann Arbor, MI.

Mobile Press-Register "State needs a plan to produce engineers." December 22, 2008, p. 6.

National Council of Teachers of Mathematics. 2000. *Principles and Standards for School Mathematics*. Reston, VA.

National Research Council, Committee on Meeting the Workforce Needs for the National Vision for Space Exploration. 2006. *Issues Affecting the Future of the U.S. Space Science and Engineering Workforce: Interim Report*. http://nap.edu/catalog/11642.html.

National Research Council, Committee on Meeting the Workforce Needs for the National Vision for Space Exploration. 2007. *Building a Better NASA Workforce: Meeting the Workforce Needs for the National Vision for Space Exploration*.

National Research Council, Committee on Pre-Milestone A Systems Engineering: A Retrospective Review and

Benefits for Future Air Force Systems Acquisition. (2008). *Pre-Milestone A and Early-Phase Systems Engineering: A Retrospective Review and Benefits for Future Air Force Acquisition*.

National Research Council. 2009. Committee on K-12 Engineering Education.

National Research Council. 2010. Committee on Examination of the U.S. Air Force's Science, Technology, Engineering, and Mathematics (STEM) Workforce Needs in the Future and Its Strategy to Meet Those Needs.

National Science Board. 2010. *Science and Engineering Indicators 2010*. Arlington, VA: National Science Foundation (NSB 10-01).

National Science Teachers Association. 2003. *Standards for science teacher preparation*. Retrieved from, http://www.nsta.org/pdfs/NSTAstandards2003.pdf

Oakes, W.C., L.W. Jamison, and E.J. Coyle. 2001. "EPICS: meeting EC 2000 through Service-Learning," Proceedings, ASEE Conference and Exhibition, Session 3461.

Olson, S. and S. Loucks-Horsley, editors, 2000. *Inquiry and the National Science Education Standards: A Guide for Teaching and Learning*, National Academies Press, Washington D.C.

Online Evaluation Resource Library, http://oerl.sri.com/instruments/up/studsurv/instr129.html

Pyryt, M.C. 2000. "Talent development in science and technology," *International Handbook of Giftedness and Talent*, 2nd ed.

Robinson, M., M.S. Fadali, J. Carr, C. Maddux. 1999. "Engineering Principle for High School Students", *Frontiers in Education*.

Smith, N., and M. Monk. 2005 "Attracting tomorrow's engineers: an evaluation of a scheme to e*nhance recruitment into engineering," European Journal of Engineering Education*, 30(2): 233-243.

Subotnik, R.F., R. Duschl, and E. Selmon. 1993. "Retention and attrition of science talent: A longitudinal study of Westinghouse Science Talent Search Winners," *International Journal of Science Education*, 15(1), 61-72.

Subotnik, R.F., R.H. Tai, R. Rickoff, and J. Almarode. 2010. "Specialized public high schools of science, mathematics, and technology and the STEM pipeline: What do we know now and what will we know in 5 years?" *Roeper Review*, 32, 7-16.

Tai, R.H., C.Q. Liu, A.V. Maltese, and X. Fan. 2006. "Planning early for careers in science," *Science*, 313(5777), 1143-1144.

One possible solution to help students and engineering teachers to improve the teaching and learning quality of students, as well as to raise their attainment levels, and to build the capacity of faculty staff, is probably the fostering and promoting of new sets of competences in inevitable for good teaching.Â In industrial processes, digitalisation will have an even stronger impact through increased automation, communication and software dominance. It is therefore the foremost responsibility of excellent engineering education institutions and staff to provide excellent training for those who have to solve these engineering problems in the future. Studentsâ€™ creativity requires special attention. The educational impact to create independent and creative thinking skills cannot be acquired just because of the learning process. Thus, it needs fostering and cultivation.Â Project-based training activity is a component of the project-based learning related to discovering and meeting studentsâ€™ needs via projects and creation of ideal or material outcome with objective or subjective novelty.Â 1.Department Applied mechanics, physics and engineering pedagogyKyrgyz National Agrarian University named after K. I. ScriabinBishkekKyrgyzstan. About this chapter. CrossMark. Learn project management techniques to increase your project success rate as a Business Analyst! Learn Programming Computer Programming Computer Coding Python Programming Computer Science Different Programming Languages Coding Languages Business Web Design Learn Web Design. 85 Best Resources to Learn Coding.Â Show your students how broad, diverse, and exciting the world of engineering is! With this simple yet visually appealing poster, students will learn about 24 different types of engineers, with a brief description of what each career in engineering entails. Do you know what a geomatics engineer does?Â These are the things a computer science and computer engineer student must know! Iâ€™m gonna answer this from my experience. â€œInnovation, to me, means finding any way you can to reach all of your students. This means being willing and flexible to adjust what you teach and how you teach. We have to keep our students engaged and excited to learn. We have to create a safe place for them to make mistakes, take risks, and ask questions.â€ â€“ Ashley.Â Students start with picking a particular major and at the end of the unit, we work on making connections on how each lesson relates to the real world and the job they each choose individually. My students absolutely love the opportunity to be treated like adults and explore future options.â€ â€“ Jade.