Engineering Technology (ET) Summer Camp Guide

a FLATE Best Practices Guide

www.fl-ate.org

ET High Tech Camps for High School Students

Creating College and Career Excitement for STEM

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Take Every Opportunity to Make the Career Connection During Camp Activities

Because the world of work is changing, the U.S. Departments of Labor and Education formed the Secretary's Commission on Achieving Necessary Skills (SCANS) to study the kinds of competencies and skills that workers must have to succeed in today's workplace. The results of the study are published in a document entitled *What Work Requires of Schools: A SCANS Report for America 2000,* and include five core competencies, many of which can be useful when integrated into a technical camp curriculum for high school students: I. Resources, II. Technology, III. Interpersonal, IV. Systems, and V. Technology.

I. SCANS-Resources: Identifies, organizes, plans, and allocates resources

- Time - selects goal-relevant activities, ranks them, allocates time, and prepares and follows schedules
- Money - uses or prepares budgets, makes forecasts, keeps records, and makes adjustments to meet objectives
- Material and facilities - acquires, stores, allocates, and uses materials or space efficiently
- Human resources - assesses skills and distributes work accordingly, evaluates performance and provides feedback

Camp activity interpretation:

- Students work with an online stopwatch countdown projected on a large screen for activities and challenges (find one at www.online-stopwatch.com/)
- Money – Grow student awareness of cost/resource savings associated with American manufacturing vs shipping jobs offshore. This is a broad topic and can include environmental impact, human resources, and economic impact such as loss of American manufacturing jobs.

II. SCANS-Information: Acquires, organizes, uses, and evaluates information

- Applies research practices to find possible answers
- Organizes and maintains information
- Interprets and communicates information
- Uses computers to process information

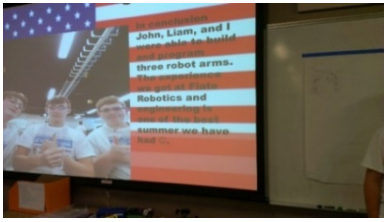
III. SCANS-Interpersonal: Participates as member of a team

- Contributes to group effort
- Teaches others new skills and learns from others
- Works to satisfy customer/client expectations
- Exercises leadership - communicates ideas and convinces others
- Responsibly challenges existing procedures and policies
- Negotiates with others to arrive at decisions
- Works with cultural diversity - works well with others from diverse backgrounds and abilities to accomplish goals

Camp activity interpretation:

- Our camps work on the premise that there is no "I" in team. Student leadership, negotiation, and diversity is evident in the final project and presentation to parents.

- Campers learn to work on their "WOO." Winning others over (WOO) is considered to be a key skill for the 21st century worker. Presenting in front of a group (typically parents and peers) provides a valuable experience at any age.
- End of camp projects help students learn to explain thinking and processes, work in teams to accomplish goals, and practice speaking before a group.



IV. SCANS- Systems: Understands interrelationships among systems

- Understands how social, organizational, and technological systems work together and operates
- Monitors and corrects performance - distinguishes trends, predicts impacts on system operations, diagnoses deviations in systems performance and corrects malfunctions
- Improves or designs systems - suggests modifications to existing systems and develops new or alternative systems to improve performance

Camp activity interpretation:

- Keying code for the robotic arm, troubleshooting programs for robots, and competitions
- Understanding and applying the engineering process in troubleshooting situations

V. SCANS- Technology: Works with a variety of technologies to accomplish goals

- Selects technology - chooses procedures, tools, or equipment including computers and related technologies
- Applies technology to task - understands intent and proper procedures for setup and operation of equipment
- Maintains and troubleshoots equipment - prevents, identifies, or solves problems with equipment, including computers and other technologies

Camp activity interpretation:

- Programming 3-D modeling systems
- Hands on activities with the college ET program's high tech lab equipment

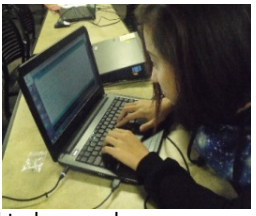
Other ideas to consider:

- Take students on field trips to advanced manufacturing facilities
- Introduce students to terms, tools, and resources used in industry
- Find industry connected curriculum content to help support student learning and provide application opportunities for new terms and skills (free, ready-to-use content is available online from FLATE at www.pbwiki.com)

Marketing Your High School Camp

Summer camps are typically advertised through a variety of media such as newspapers, websites, social media, and promotional flyers. Colleges with an eye on recruitment who wish to offer summer camps to high school students can check with their college recruitment office for a list of targeted "feeder" high schools. This list will often include complete contact information. Check for any preferred protocol to follow when marketing your camp. High schools seeking opportunities for their students with local colleges can reach out to their local community or state college through their STEM coordinator or career academy liaison.

Learn more about where your high school student campers may be headed



To work? Use industry, regional manufacturing association, chamber of commerce, and/or economic development council feedback to help identify jobs in your community and the education and the skills required for those jobs. You can then introduce some of these skills into your ET high school camp experience. 3-D modeling, programming and troubleshooting robots, and automated processes are a few which we have found to be popular. Introductions or overviews presented in the context of a summer camp provide a fun way to introduce students to some of the high tech skills and jobs needed in the 21st century workforce. Ways to gather feedback include:

- Current published information regarding local job skill needs & growth
- Economic and industry panels
- Advisory committees and focus groups
- Training gaps identified at conferences and presentations

To college? Ensure that your high school campers know their local community and state college options. Some students may not be aware of the good jobs available to them through Associate of Science (A.S.) degree programs. Provide websites and good contact information for students who want to know more about high tech college degree and certificate programs.

Keep special abilities in mind

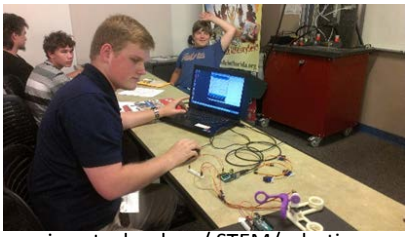
Adding advanced challenges is another good way to keep more advanced students engaged. Consider hiring college or high school students who are in STEM majors or fields as student assistants for the camp. Successful students who are closer in age to campers than instructors may be make excellent mentors. Students who speaks a second language provide clarity as well as mentoring for students who speak English as a second language (ESOL). High school camps can provide an inclusive environment for students. Camp adaptions based on special abilities, or a special focus on special camp goals (such as earning college or certificate credits) are good options to consider. Taking into consideration and adapting to a wide range of student abilities provides an opportunity to encourage student participation in secondary STEM coursework, as well as explore jobs and postsecondary education leading to technology-related careers.

Building the Camp Curriculum

Whether you are offering an Engineering Technology Camp or a camp in a related technology, a good place to begin is with the curriculum you plan to offer. We use an experiential-based curriculum model as our contextual framework, with a goal to purposefully teach students to develop abilities that facilitate "doing" what they have learned through hands-on performance and action. We believe it is important to teach students how to transfer STEM curriculum content and school experiences to new situations, as well as begin thinking about how STEM fits into the world of work. The camp is designed to be a "hands-on, minds-on" way in which students can see STEM in action.

Narrow your participant population by achieved skill level

Students with a wide range of starting skill sets may sign up for camps because they sound interesting. The first time offering a camp you may wish to clearly identify parameters which define things like skill level and grade level in order to best serve those you believe will receive the greatest benefit from the camp. Providing specifics such as Beginner (little or no robotics or similar technical skills), Mid-skilled (attended a previous technology/ STEM/robotics camp), or Advanced (at least one year of experience) helps keep those new to the topic from becoming overwhelmed and the more experienced from becoming bored. Ensure enough camp instructors and mentors are available to facilitate break out sections.

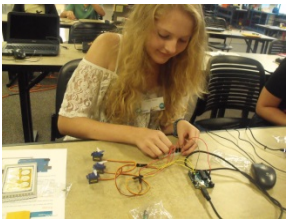


Develop the curriculum

Remember your goals for the camp? When you have a good idea about what you'd like to offer to meet needs and fill gaps, the next step is developing curriculum content. When developing curriculum, keep in mind the idea that the curriculum you offer should be adaptable. Your students may vary widely in how they picture your camp.

- Provide ideas to adapt the presented curriculum for use with appropriate grade levels and abilities
- Address the variability of student populations (gifted, special abilities, remedial, English for speakers of Other Languages (ESOL)
- Provide adaptations to accommodate learning style differences (how students prefer to learn). Whether students are auditory, hands on, or visual learners, ensure that your curriculum is appealing and designed to hold the interest level of different types of learners
- The more hands on, the better
- Keep slide shows brief, and add hands on interactions which provide students with additional opportunities to express themselves such as:
- Verbally test students' content knowledge by using games and team competitions
- Provide content related tasks with a creative emphasis

- Consider using Think-Pair-Share or group report outs to provide students with the valuable practice of speaking before a group



Interactive work with peers helps students move theories into practice and provides opportunities to practice teamwork. Try to offer minimal guidance for hands on sessions which require high levels of creativity or "out of the box" thinking. If too much guidance is provided, students tend to model teacher-led activities. The goal here is to tap into creativity and support individual expression. Allow time for learning from each other, group discussion and presentation.

Curriculum considerations

Consider the curriculum you plan to offer well in advance of the camp. In the ET high school camp, as well as in other FLATE Robotics Camps for middle and high school age students, we used a constructivist approach to developing the learning agenda. This approach includes:

- Problem based learning is used where learning activities are anchored to a larger task or problem.
- Troubleshooting, testing, and trying out (all part of the engineering process) are introduced and practiced
- The learner is given ownership of the process; team ownership for a task or problem is encouraged.
- Authentic tasks (such as real problems found in a high tech industrial setting) are used, and learning occurs within context.
- The learning environment (such as the ET high tech lab) reflects the complexity of the environment in which learners should be able to function (a job in a high tech industry).
- The learning environment supports and challenges the learner's thinking.
- Learning from errors and experience is encouraged and expected.
- Reflection and critical thinking is encouraged.

Facilitate diversity

The camp in some ways becomes a microcosm of the classroom. Encourage teamwork, but make room for those who prefer to work alone. Diversity in the 21st century is about so much more than ethnicity. One size does not fit all students, and this same concept applies to your students. Differences to consider include age, physiological/psychological ability, language ability, technical ability, and Interest level in the subject. Are students enthusiastic or were they assigned to attend? In teamwork activities, try to ensure that some students (or instructors!) don't dominate others or take over the conversation. Walk out into the students' area rather than speak only from a stationary point in the front of the room. Some students may prefer and/or be used to working alone – working in teams could be a new and potentially stressful experience. Engage in conversations with students, ensure that everyone understands, is able to keep up, and is enjoying themselves.

Include value added experiences

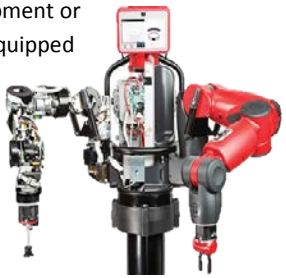
Make time and a place for participant expression and creativity. Combining a variety of activities keeps your camp lively and makes for a more memorable experience for students...**Samples of Value Added Activities**

- Presentations and guest speakers
- Videos, online games or simulations
- Hands on activities
- Field trips to advanced manufacturing facilities
- Student presentations and panel discussions

Camp Format

High tech typically calls for a "hands on" experience. High tech equipment or items can be expensive. Many community and state colleges are equipped with ET high tech labs. If not, vendors may sometimes supply items "to use" to make colleges aware of their products and services. Examples include:

- Hardware, software
- Specialty items (such as robots)
- Technical training stations



Did you know? This robot is actually found in an ET college's high tech lab!

Online training and remote access to equipment using simulated situations is another way to provide a wide range of high tech experiences; high speed internet access will be required.

The logistics of time and place

Camps will need to be developed around participant (and parent!) availability. Some parents may only be available to provide transportation "after work" or during weekend hours. Instructor availability for your camp may be limited to teacher workdays or summer offerings. In order to fill your camp with attendees, consider:

- Partnering with schools and school districts to help market and/or support your summer ET camp
- Working with business and educator partners to leverage use of high tech labs and equipment and for tours to advanced manufacturing facilities
- When using your college's ET lab, check with the faculty and program coordinator to coordinate room and equipment availability

Access and availability

Ensure that access is available for all students by inquiring about special needs or restrictions in pre-camp communication. Ascertain and address any restrictions and special needs for your attendees up front. Include consideration of meal restrictions and any special participation requirements, such as note takers or interpreters.

Make it easy to get in touch with you or your staff in order to address any concerns up to and including the day of the camp.

Be sure to address:

- Location (provide good directions and a map)
- Parking
- Fees or associated materials costs
- Meal arrangements
- Required forms and paperwork
- Attendance confirmation
- Start and end times
- Room set up
- Special dress requirements (if appropriate)

Permission *IS* required: You may wish to include a photo/media release form in your pre-camp packet so that you can use photo images and quotes in news releases, reports, and promotions for future camps.

College Program Recruitment

Opportunity Knocks! Our surveys from regular summer robotics camps revealed that students didn't know about advanced technological education available at local community and state colleges, and most were not aware of career options in technical fields. Technical careers offer good paying jobs to 2-year college graduates earning A.S. Degrees. For our camp, we provided a brief (20 minute) recruitment packet for the college hosting the camp. This included a career video focused on 2-year technical degree programs, website resources, and information about contacting the instructor to learn more about the ET program. Information about the program and the college was assembled into a folder, and on the final day when parents visited the camp, parents were welcomed to the college, invited to view the college materials with their students, and encouraged to find out more.

Cost Considerations

- $ Curriculum
- $ Certification Testing (if applicable) - an example is Manufacturing Skills Standard Certification (MSSC)
- $ Instructors, Subject Matter Experts
- $ Transportation for Tours
- $ Location, Materials & Computer access
- $ Food
- $ Name Tags/Lanyards
- $ Giveaways
- $ Completion Certificates
- $

Provide recognition

It is customary to prove a certificate of completion at the end of the camp. There are a variety of "pre-packaged" certificates which are readily available at office supply stores, or, use an online template. Online templates not only have the cost advantage, but save time with scanned signatures, quick name edits or additions, and can be used again and again with a simple change to the camp name and date. Add value to the certificate by including as a formal attachment a list of skills and knowledge acquired in the camp.

Send partners excerpts from survey results along with a formal thank you letter. Partners often report camp support as community service efforts to their stakeholders, and a formal letter can be printed, shared, or even framed. If pressed for time, at the very least a timely email is called for, no later than the week following the event. Instructors will benefit from the same treatment, and can use formal letters toward tenure earning activities or in their teaching portfolio. It's easy to thank parents of students via email along with a link to information resources on your website where they may information about advanced manufacturing college and career pathways.

Camp debrief

Thank your camp support team too! Gather your team to discuss any disconnects or challenges with the camp, as well as what "went right." Would you offer this or a similar camp again? Have survey results on hand to discuss high points and opportunities for improvement. If your organization provides employee recognition opportunities, this provides you with a chance to use that program. If not, a simple "job well done" supports effective teamwork. The debriefing provides the perfect opportunity to plan the next camp.

Evaluating Your Camp

How will you determine success?

One way that we know we are successful with our camps is through survey scores. The examples below of post-camp survey information was collected from our high school campers, and shows one way to measure and demonstrate impact for a camp. This is a small survey population (n=26), because the high school ET camp was new in 2015. We have collected data from hundreds of robotics camp participants, and used a similar survey for the high school ET Camp. Examples of camp surveys we use are provided in the appendix. FLATE keeps generic online forms which are readily adaptable. We will compare future high school ET camps with our 2015 baseline.

For 26 high school students surveyed after a FLATE high school ET camp:
92% said they were very likely or extremely likely to take a course in engineering, technology, or robotics in school next year.
96% stated that the camp helped them better understand how science, technology, engineering, and math are used in industry.
96% said that learning to program the robot by thinking logically will help in solving other problems in STEM subjects in school.
100% of students who answered the questions (n=24) would recommend the camp to others.

Ways to collect impact data

Here are a few suggestions for different ways of collecting data which you may want to consider:

Satisfaction and Likert-type survey responses are a common standard for camp surveys, and you can use these type of data for benchmark/ comparisons, and make comments such as "90% of students would recommend the camp to others," meaning your camp was successful for the majority of students. First, decide what you wish to know more about, and how the information you collect will help you improve your camp. Are you looking for "overall satisfaction?" Although it is very difficult to 100% satisfy everyone, adding specifics to your satisfaction survey will help you identify areas for improvement.

Content learning is another success measure you may wish to consider. "Test type" content questions will need to be "graded" by the instructor and can be administered at the conclusion of the camp or provided as pre- and post-tests, yielding comparative data to illustrate change in ability to answer the test questions correctly.

Comparing pre and post camp survey data is a good way to demonstrate before and after results. Evaluation of pre and post survey data is typically the percent change between pre and post survey answers. Questions are typically based on a student's opinion of their own learning, or self-rating. Self-ratings of content knowledge give students the opportunity to respond about the degree to which they feel they improved their content knowledge.

Survey strategies

Developing meaningful measures based on your individual program's needs is important since one size does not fit all. Think about how you will use your survey data to improve your camp. As well, consider the reports that you need data to help define, news articles or other publications, and include criteria which will provide data to help you meet these needs in your surveys.

Online vs Paper Surveys

Paper surveys which are turned in when certificates of participation are picked up on the last day of camp typically provide more participant data than do online surveys. Unfortunately, paper surveys are time consuming to manually enter the data, and manual data entry is more prone to error. Troubleshooting, time spent in spreadsheet error resolution, lost paperwork, and manually developing graphs are all considerations of reliance on paper copies. For both online and print survey models, consider annual revisions to leave out questions which are not returning usable data, and add new questions based on new technologies or benchmarking with other high school ET/STEM/technology camps. Compare camps to each other to see which return the highest survey ratings and use this information to improve lower performing camps. You may find that a particular location, instructor, whether or not

free pizza is served, or a particular subject is a consistent high (or low) performer, and this is information which can help you craft future camps. We have found that adding activities such as "Made in Florida" trips to advanced manufacturing facilities helps us achieve our goals for the camp (based on high survey scores) of building high school pipelines for technical college and career opportunities in Florida advanced manufacturing.

Quantitative vs Qualitative Survey Questions

Responses to quantitative questions provide those statistics which look so good in reports, such as *92% of students (n=26) agree that the camp provided opportunities for team work and collaboration with others.* Be sure to include how many students you are referring to, such as the n=26 in this example, in order to provide an accurate context for your data. Demographics such as age, gender and ethnicity may be important statistics to collect if you wish to reflect your participant population. We collect that information using cover sheets which we keep with the surveys. The cover sheets provide a fast and easy way to collect cumulative demographics.

It is important to include qualitative or "open ended" questions in order to allow students to provide a complete response. In open ended questions you will:

- Collect some quotes you can use in reports about your ET high school camp and to market future camps
- Learn about issues you didn't include in the quantitative part of the survey
- Give students the opportunity to fully express their opinion
- Obtain a more complete picture of your camp

Qualitative comments from our camp indicated (among other things) that:

Students wished that the camp was longer.
Students wished they could have picked their own teams.
Students wanted to come back next summer for an advanced camp for returning students.
Building and programming fully functioning robot prototypes was their favorite activity

Our surveys combine quantitative and qualitative data to provide a more complete picture of the camp, give suggestions for improvement, and let us know if we should offer the same type of camp again and consider expanding camp offerings.

Content vs Opinion Surveys

As earlier, if you teach technical content, you may wish to see if students learned the content. Surveys are not a "test," but they allow for self-assessment of learning specific content. For content questions, as with qualitative questions, keep only the questions you plan to actually use…don't try to survey "everything." A self-assessment is sometimes used in lieu of an administered "test" of the content. Keep in mind that a pre and post survey provides only a *self*-assessment of learning. For our surveys, we have found that students appear to provide candid and useful self assessments Examples of surveys we've used are provided in the appendix.

Partner Surveys

Just ask! If the partnership was beneficial to your camp, such as providing access to a location or high tech equipment, ensure that the partnership met your partner's needs and was a good use of their time and effort by asking about their experience. An online survey is the best way to give partners the chance to provide feedback. Make room in the survey for open ended responses. Open ended responses provide useful information you may not have addressed in the body of a generic survey.

Parent Surveys

Parents appreciate the opportunity to provide candid feedback. Allow plenty of space for candid and anonymous responses. We have learned a great deal from parent responses to surveys. For instance, parents shared concerns about the low number of schools offering STEM electives in technology and engineering. They also ask for scholarships to help with the cost of camp. Parents are encouraged to discuss the camp with their students before answering the survey and returning it on the final day of camp. Overall, parents are very satisfied with the camp experience:

100% of parents returning surveys would recommend the ET high school camp to others.

Anonymous vs Identifiable Surveys

Due to working with high school age students, surveys need to be anonymous. A benefit: anonymous surveys may provide greater opportunities for more candid comments, especially in the area of complaints. You can still collect gender, ethnicity, age, and grade information on surveys and compile aggregated data to help create a complete picture of your camp. Aggregated data is compiled together so that individual students are not identified.

Identifiable surveys are best used with adults, such as teachers. Identifiable surveys facilitate feedback to ascertain if information or materials were put into practice and if so, how, to what extent, and what was the level of success. In the event of a complaint, you have the ability to contact the participant and deal with any issues directly. You can also extract particular information, such as responses from a certain school or location

Annotated Appendix List

Note: Always include your "brand" when communicating with the publc to raise awareness of your program, college, association, etc. Be sure to include complete contact information, websites, blogs, and social media sites. Have your press release in a "ready-to-go" format which can be easily shared with both high tech (facebook, Linked In) or low tech (fax machines) audiences. Be aware of any dissemination rules if you have funding from such organizations as the National Science Foundation, (NSF) which requires a special caveat for publications and press releases:

This work is funded under grant DUE#1204751 from the National Science Foundation Advanced Technological Education (ATE) program. Opinions and findings expressed herein are those of the authors and do not necessarily reflect the views of the National Science Foundation.

Our camp curriculum focuses on the "T & E" side of STEM. Naturally, it starts our with the Engineering Design Process which is "customized for our camp." The camp objective and how to meet it are clearly stated.

A visual guide helps campers prepare for success in the presentation to parents on the final day of camp.

FLATE relies on survey data to help us better understand the impressions and impact of our camp.

FLATE uses coversheets to collect aggregated demographic data and to help organize surveys when we have multiple camps.

FLATE's "Made in Florida" postcards help students connect with online resources to high tech careers. FLATE's wiki provides free instructional resources including lesson plans, curriculum, and presentations.

Our free guides are available as online flipbooks at http://fl-ate.org/best-practices/ or can be downloaded and printed.

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Sample Press Release About the Camp …share with newspapers, blogs, schools, etc.

Contact: Janice Mukhia
Communications Specialist
FLATE
Tel: 813-259-6581
Email: news@fl-ate.org

Camp Teaches High School Students Entrepreneurial Skills & Applications of 3D Printing in High-Tech Manufacturing/Space Missions

High school students in the greater Tampa bay area are set to get a 'hands-on, minds-on' overview of complex, everyday high-tech operations using 3D printing and robotics at the robotics & engineering summer camp. The camp will be held July 27-31 at the student services building at Hillsborough Community College in Brandon**,** and is hosted by FLATE, the Florida-based, National Science Foundation Regional Center of Excellence.

Curriculum for the high school engineering & robotics camp is based on a fun concept whereby students will be tasked to help astronauts on a space mission. Campers will 3D print parts for a robotic arm using Solidworks, Arduino microprocessors, servo motors and additive manufacturing techniques to design a functional robotic arm while gaining an understanding of the entrepreneurial process. They will learn how to program an Arduino microprocessor to operate servo motors, and troubleshoot the design to manufacture a prototype of a tool that could be used in space. Campers will also learn about the pros, cons and costs of using 3D printing in space and manufacturing custom tools to create a sustainable living environment in space.

WHAT: Engineering Technology (ET) Camp for High School Students

WHERE: Hillsborough Community College-Brandon

Camp Schedule:

- July 27: Overview of Advanced Manufacturing, SolidWorks and 3D Printing in Space
- July 28: Manufacturing process using Arduino, Servo motors & SolidWorks
- July 29: *Made in Florida* Industry tour to Chromalloy Castings in Tampa
- July 30: Assembling of the robotic arms
- Video of finished product at http://youtu.be/px2rBJwcTqw
- July 31: Final Student Presentations demonstrating robotic arm prototypes

With the support of Nuts, Bolts, and Thingamajigs® (NBT), the Foundation for the Fabricators and Manufacturers Association, the High School campers will take home the Arduino microprocessors and 3D printed projects that they manufacture during the camp. For more information, contact Dr. Marilyn Barger, executive director of FLATE at barger@fl-ate.org, or visit at www.fl-ate.org/projects/camps.html, and http://www.madeinflorida.org.

EDITOR'S NOTE*: Campers and camp administrators will be available for interviews. Opportunity for photo and video coverage will also be available.*

Sample ET Camp Curriculum

Engineering Design Process

ASK	***Define the problem and identify the criteria and constraints.***
IMAGINE	***Brainstorm possible solutions to the problem. Choose the best design idea and move on to the planning step.***
PLAN	***Draw a model of your chosen design and write out the pseudo code for your program.***
CREATE	***Build your robot based on your chosen design plan, and program your robot by referring to your pseudo code.***
IMPROVE	***Test your robot. Make improvements to the design and/or program as needed.***

Camp Objective

Imagine that you are part of an engineering firm responsible for developing a prototype robotic arm for Space X that can be constructed using additive manufacturing. The prototype should present an example of how additive manufacturing may help future astronauts become more self-reliant as humans develop colonies in space and on other planets like Mars.

The cost of launching one pound of material into Earth's orbit is approximately $10,000. The amount of cargo that one rocket can carry into space is limited by both the mass and shape of the cargo.

Think about how being able to 3D print tools and parts in space might change space exploration.
Using source materials found on other planets as the printing medium is another possibility for the future.

To Meet the Camp Objective You Must …

1. *Assemble robotic arm that completes the task*
2. *Complete materials list that includes <u>ALL</u> components and materials needed to build a functioning robot.*
3. *Prepare a budget sheet that includes prices for all necessary materials. This does not include the wires, servos, 3D printed robot parts, Arduino, or the bread board.*

End of Camp Student Presentation Outline Example

Category	*Details*
Objective	*Be able to elaborate on the objective of the week. Include details about the storyline explaining what your engineering firm is trying to accomplish and why.*
Components of the week	*Include in your presentation a separate discussion on the components needed to get to the final product.* • *SolidWorks* • *Arduino* • *3D Printing* • *Cost Analysis*
Obstacles	*Identify examples of obstacles that you encountered throughout the process. Elaborate on how your group worked to develop solutions to the problems you encountered.*
Rehearse	*Be prepared to present this information to our guests on the final day of camp.* *Team members should have equal participation.*

Sample End of Camp Student Survey

(survey spacing has been modified to fit this page)

Thank you for attending our summer camp. We hope you found it a useful way to learn more about robotics and advanced manufacturing college and career options. Please circle the number which best represents your answer.

1. Please rate your awareness of career options in advanced manufacturing.

1	2	3	4	5
Not at all aware	A little aware	Aware	Very Aware	Extremely Aware

2. Please rate your interest in a career in advanced manufacturing.

1	2	3	4	5
Not at all interested	A little interested	Interested	Very interested	Extremely Interested

3. Please rate how realistic you feel careers in advanced manufacturing are for women.

1	2	3	4	5
Not at all realistic	A little realistic	Realistic	Very Realistic	Extremely Realistic

4. Please rate your familiarity with the Engineering Technology AS Degree program.

1	2	3	4	5
Not at all familiar	A little familiar	Familiar	Very Familiar	Extremely Familiar

5. Please rate your familiarity with science, technology, engineering/robotics, mathematics (STEM) courses needed in middle and high school in order to prepare for careers in engineering and advanced technology college programs.

1	2	3	4	5
Not at all familiar	A little familiar	Familiar	Very Familiar	Extremely Familiar

6. How likely are you to take a course in engineering, technology, or robotics in school next year?

1	2	3	4	5
Not at all likely	A little likely	Likely	Very Likely	Extremely Likely

7. I am now considering a career in advanced manufacturing or related technical industries.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

8. The camp helped me better understand how science, technology, engineering, and math (STEM) are used in industry.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

9. The field trip helped me make the connection between the camp activities and real world applications.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

10. Programming the robot helped me to see how automated systems are programmed and controlled.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

11. Learning to program the robot by thinking logically will help me when solving other problems in science, technology, engineering, and math (STEM) subjects in school.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

12. The camp provided opportunities for teamwork and collaboration with others.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

13. What did you like best about the camp?

14. What did you like least about the camp?

15. What would you change about the camp?

16. Would you recommend this camp to a friend? Yes ☐ No ☐

SAMPLE

Sample Camp Survey Cover Sheet

Date:

Facility and Location:

County:

Camp Type (circle one or write out complete name if specialty camp):

MS Intro MS Intermediate MS All Girls High School

Other _____

Special Population Served if Applicable:_____

Instructor Name:

Total Number of Campers:

Number of Girls:

Number of Boys:

Ethnicity:

African American: _____

Caucasian: _____

Hispanic: _____

All other: _____

SAMPLE

"Made In Florida" Website and Wiki Postcards

FLATE postcards are available as handouts.
To request, please contact FLATE.

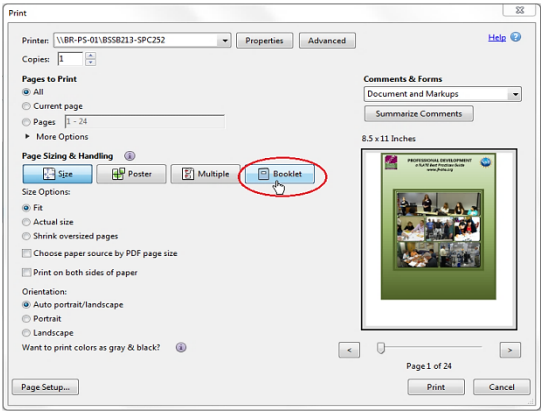
How to Print this Guide as a Booklet

If you would like to print your guide in a "booklet" format (from the original PDF file), please use the following steps, you will need a printer that can print double sided documents:

Step 1 – select Booklet under Page Sizing and Handling *(please make sure you are using a printer that prints double sided documents).*

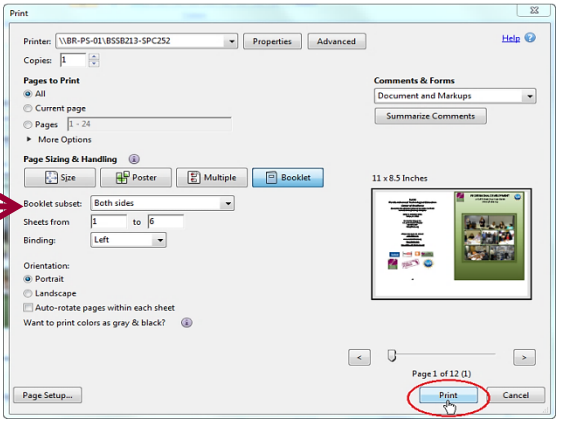
Step 2 – make sure Booklet subset is for Both sides

Step 3 – select Print



Select Booklet

Before selecting Print, make sure that the Booklet subset is for Both Sides.



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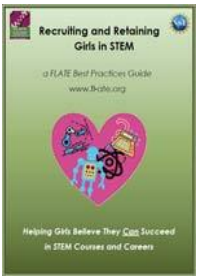
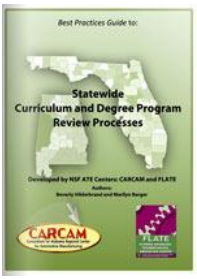
Communities of Practice

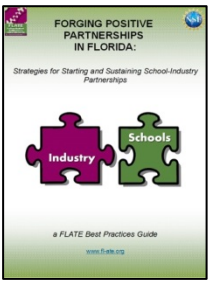


Recruiting & Retaining Girls in STEM

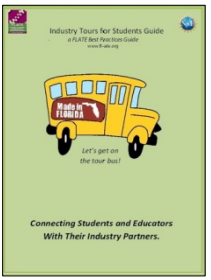
Professional Development



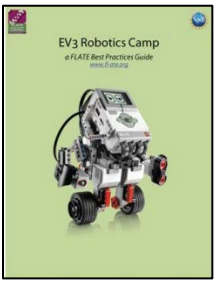
Curriculum Review Processes



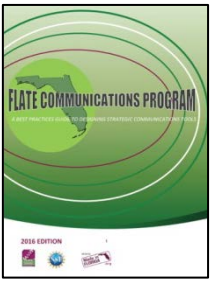
Forging Positive Partnerships in Florida



Industry Tours for Students Guide



Robotics Camp Best Practice Guide



FLATE Communications Program

Curriculum Alignment Credentials Guide

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