Grant Writer's Grant Packet

STEM Learning with Aldebaran Robotics

NAO Solution

10/14/2011

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What is a Grant Packet?

The Grant Packet is a resource designed to assist you in the grant-writing process. Not a template, the Grant Packet is meant to stand as a companion to the Request for Proposal or Application. The sample text in this Grant Packet will provide you with ideas on how to structure your response.

How do I use the Grant Packet?

This Grant Packet should be thought of as a handbook. Because your institution's needs and facilities are unique, you should customize the suggested narrative to reflect your specific plans.

Can I cut and paste from the Grant Packet?

You may cut and paste small sections as needed. However, your project has the best chance of being funded if it is customized to your institution's unique needs. Use the sample narrative as a resource, not as a final product. As you use the sample narrative, revise it to reflect your institution's unique needs, project goals, and coordinating programs.

Why aren't the products and services named more frequently?

It is important to minimize vendor presence by limiting your use of trade names. Focus primarily on describing the program rather than drawing excessive attention to the product name. The sample narrative models this approach, providing specific descriptions of Aldebaran's NAO Robot, while limiting references to the product by name.

Should my finished application look like the Grant Packet?

Your finished grant application should reflect the formatting requirements of the application. However, this Grant Packet models several techniques that make the document more readable. You should use a table of contents, headings, bullets, and lists, as appropriate, to make the main ideas of your narrative clearly stated and easy to find.

What if I need additional guidance?

Please contact your Aldebaran Account Executive for additional information on our solutions or grant-specific questions.

Stages of Grant Writing

To help you succeed and develop a thorough application, the stages below will guide you through the grant-writing process. School Improvement Network can provide assistance throughout these stages.

Stage 1: Reading the grant application documents

- ☐ Download all available documents from the grant Web site.
- ☐ Identify format requirements such as page limitations, margin settings, font size, and line spacing.
- ☐ Identify the number of copies that need to be submitted.
- ☐ Note the authorized signature(s) needed before submitting your application.
- ☐ Note the dates and times for submitting the application.
- ☐ Note all priority requirements.
- ☐ Review the scoring rubric, if provided, for criteria to cover during the writing stage.

Stage 2: Gathering information and research

- ☐ Demographic data for your target population
- ☐ Achievement data from your target population
- ☐ Research to support the project design

Aldebaran Robotics Assistance:
Refer to the ***Resources*** section of this Grant Packet for a list of pertinent research documents.

Stage 3: Writing the project narrative

- ☐ Include all stakeholders in creating responses to application components.
- ☐ Incorporate demographic and achievement data, as well as research, to make your application convincing and informative.
- ☐ Use the Grant Packet sample narrative as a resource, not a final product.
- ☐ Use headings, tables, and lists to clearly convey the project's focus and to make priority items easy to find.
- ☐ Use the RFA scoring rubric criteria in crafting component responses.

Aldebaran Robotics Assistance:
Use the Grant Packet as a guide and model while crafting your response to the grant application or RFP/RFA. Contact your Aldebaran Account Executive for assistance, as needed.

Stage 4: Completing budget narrative and required forms

- ☐ Develop the budget narrative based on project activities and Application requirements.
- ☐ Double-check budget totals for accuracy.

Aldebaran Robotics Assistance:
Contact your Aldebaran Account Executive for budget assistance.

Stage 5: Reviewing your application

- ☐ Proofread the application for spelling, grammar, changes and revisions.
- ☐ Ensure that formatting requirements are consistent throughout the application.
- ☐ Ask a qualified person to review/edit the application. Provide ample time to review the application and to identify areas that need to be strengthened.
- ☐ Use the Reviewer's recommendations to revise the application narrative.
- ☐ Include all stakeholders in reviewing the final draft.

Aldebaran Robotics Assistance:
Contact your Aldebaran Account Executive for more information.

Stage 6: Submitting your application on time

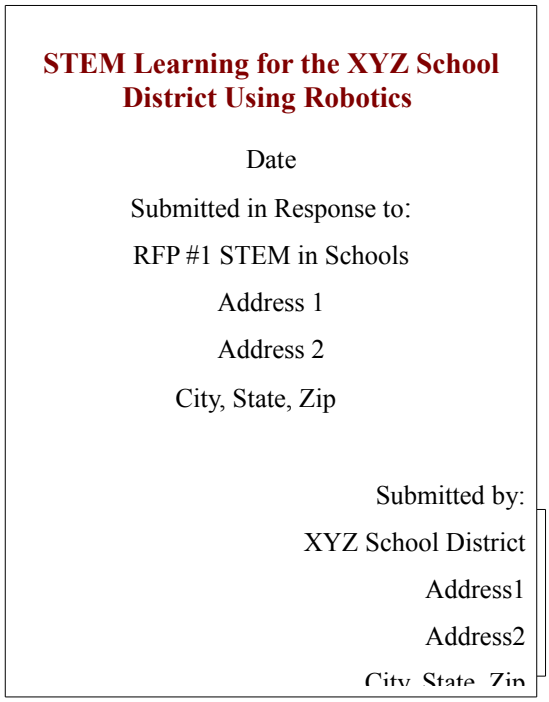
- ☐ Gather all authorized signatures and submit the application. Applications must arrive on or before the specified deadline for application submission. If you are mailing your application or using a delivery service, ask for confirmation of delivery from the mail or delivery service.

Writing the Proposal

Requests for Proposals and Applications share a number of common elements that are presented below.

Cover Page and Table of Contents

Always have a cover page with the title of your project, the name and address of the RFP/RFA or foundation funding source, your district name, address and contact information, the primary contact person, title, and all contact information—office phone, cell phone, fax, email. For example:



Your second page should be the Table of Contents (TOC.) Use the heading and TOC functions in your word processor to create a clickable table of contents like the one you saw at the beginning of this document. (Visit Microsoft Office Help for how to create the TOC for MS Word.)

Cover Letter/Summary of Request

Follow your TOC with a cover letter/summary of your proposal. The summary should be no more than one page and include who you are, what's your problem, what's your solution, and how much money you are requesting.

To the Grant Resource,

XYZ School District and ABC University are responding to the current critical concerns about the growing demand for science, technology, engineering and mathematics (STEM) professionals in the United States. Through this partnership, we seek to develop, implement and evaluate a year-long afterschool robotics program in the XYZ public schools and in other racially diverse and economically disadvantaged STATE school districts. The project addresses the urgent need to enhance students' interest and performance in STEM courses while fostering skills that are important prerequisites for engineering and computer science careers. The project targets (N) STEM teachers, in grades seven

and eight, each of whom will receive 80 hours of summer professional development and 40 hours of follow-up support in leading the program. More than (N) students will participate with each having 40 to 80 hours of contact time during summer and after school.

In the near term, project leaders are helping students in STATE to meet statewide academic standards. Over the long term, the project will help to inspire and prepare a new generation of engineering and computer science professionals. The project's intellectual merits derive from its innovative delivery platform (i.e. hands-on robotics projects) and its professional development framework (i.e. after-school programs as an incubator for new classroom teaching methods). In terms of broader impacts, the robotics curriculum is aligned with both state and national technology education standards, and the project team is committed to promoting statewide adoption and national replication. Special emphasis is place on female and minority students. Pedagogical methods are tailored to these students' learning patterns, and strategies are provided to help middle school STEM teachers engage all students, regardless of gender or race.

Sincerely, etc.

Why do you need the funding?

1. What is your situation/problem?

It is important to immediately state the problem you are trying to solve with the requested funds. Focus on the need and your objectives.

Only N percent of high school seniors surveyed in District XYZ indicated that they have an interest in pursuing engineering or computer science degrees. This percentage was significantly smaller among minority and female students.

2. Why is this important?

Provide a context so that the funder can understand the gravity of the problem for your students and cite available research if appropriate.

Our nation has a critical shortage of STEM professionals especially in the fields of engineering and computer sciences. Minority and female students are especially underrepresented in these fields. Of the 68,000 bachelor's degrees in engineering awarded in the United States in 2006, only 8,500 were awarded to under-represented minorities. Of the 6,404 doctoral degrees in engineering awarded in 2006, 100 went to African American students; 98 went to Latinos and Latinas; and 9 went to Native Americans and Alaska Natives. Out of these total doctoral degree recipients, 55 were women. Some 1.5 million engineers with bachelor's degrees are employed in the United States, but only 9.5 percent of these are women (Frehill, DiFabio and Hill, 2008).

Research on career choice for adolescents and pre-adolescents generally recognizes that middle school is the optimum time for students to think about the future. During middle school they are poised to broaden their aspirations beyond the stereotypes of gender, ethnicity, and socioeconomic level; develop and maintain self-esteem; develop cognitive complexity (essential for STEM careers of the future); and recognize the broad scope of work available in the 21st century. (Kerka, S. 1994). Most adults begin to make enduring decisions and form attitudes about school and work when they are in the middle grades (Toepfer , 1994, p. 61).

We believe that a STEM-rich afterschool robotics program at middle school level will engage and inspire student motivation, self-efficacy, and encourage each to pursue a twenty-first century engineering or computer science degree in college. (Nugent, Barker, White and Grandgenett, 2011), (Talaiver, M., Bull, G., Moore, S. & Hayden, K.,2011).

3. What proof do you have?

The following chart shows percentage (N) of seniors participating in an end-of-the-year survey that indicated interest in pursuing a STEM Career after high school.

	All Seniors	Minority Seniors	Female Seniors
2010	N_1%	N_5%	N_9%
2009	N_2%	N_6%	N_{10}%
2008	N_3%	N_7%	N_{11}%
2007	N_4%	N_8%	N_{12}%

Total number of students surveyed each year was N. Minority seniors surveyed were African American, Hispanic, Asian American and Native American and composed N% of the total surveyed. Female students surveyed made up N% of the total surveyed.

4. What do you need to solve your problem?

Don't jump right in to the project; it is important to the funder that you have carefully thought out the details of the problem you are trying to address.

What: A successful afterschool robotics program must combine technology and engineering concepts while utilizing 21st Century workplace skills such as teamwork, problem-solving, and self-efficacy in performing the hands-on and programming tasks in the program. An innovative teaching approach geared to non-traditional students will enable the program to have sustainable success.

Who: The project must be able to serve all seventh and eighth grade students and teachers in the district. Teachers will receive a program of quality professional development in the summer and follow-up throughout the school year. Students will attend the afterschool program accumulating between 40 and 80 contact hours in the school year.

Constraints: Because the summer professional development workshop is so important to the program's success, stipends must be provided for those teachers taking time off from their summer vacation to attend. Room and board must be provided for the university training team and the attending teachers and administrators. A campus administrator from each participating campus is invited to attend.

What is your proposed project?

Draw a direct line between your needs and your project.

1. What is the project design?

This is a very short example, be sure that the reader will understand each of these sections in detail.

How you created the project: Through a collaborative partnership with XYZ School District and ABC University we have designed an afterschool robotics program for middle school students in grades seven and eight. University trainers and STEM teachers will engage in an intensive summer workshop to prepare them to deliver and facilitate the year-long program for students.

What you will do: The project will implement a humanoid robotics program called NAO with a middle school curriculum that integrates technology and engineering concepts into a grade-appropriate STEM program.

Who will be served: A total of N teachers, serving N_1 students, will benefit from the innovative program in the first phase. The second phase involves statewide adoption of the program.

Who is involved: The project will be managed by the district secondary STEM director and the STEM coach at each school who will serve as a resource to the regular science and mathematics teachers. The STEM coach is responsible for logistics, implementation, and ongoing tracking as well as interface with the district office. At the district level, the secondary STEM director is ultimately responsible for the project. Additionally, the university training team will be involved.

When: Depending on funding, our goal is to begin the project in early spring before the upcoming school year. The training will be developed and delivered in the summer. Each identified teacher will have full access to the Summer Workshop program before school begins.

2. What are the project's goals?

Goals are outcome statements that define what you are trying to accomplish. Define your goals and objectives. Be passionate about how your project goals will improve and enrich education for your students. We recommend between 1 and 5 goals to assure focus on the central problem.

We know that students today must be more prepared than ever for the needs of the 21st century marketplace in order for the U.S. to remain globally competitive. Middle school students frequently develop career interests and set goals that will guide their future decisions. Our students deserve the opportunity to build 21st Century workplace skills and participate in a STEM-rich robotics program that will steer them toward careers in technology and computer science. The goals of our project are:

To improve the science, technology and mathematics achievement of participating students so that they may move on to successful secondary, post-secondary and career paths in technology and computer sciences.

To engage, inspire and motivate students who are traditionally underrepresented in STEM and engineering careers.

To provide professional development for teachers and administrators designed to improve instructional strategies in keeping with non-traditional STEM students' learning styles and interests.

3. What are your objectives?

Objectives are specific, time-sensitive, and measurable actions that support the completion of your goals. Provide a narrative with a clear plan of action, and explain how you will carry it out dedicating approximately one paragraph to each objective. For example:

Needs Assessment and Planning was undertaken by the Project Partnership Committee which includes the district school superintendent, the district secondary STEM director and the middle school principals. University representatives include the Dean of the College of Engineering, Director of STEM Initiatives and key members of the training team. Using surveys and testing data, the Committee developed a report on the underrepresentation of minority and female students in engineering and computer science degree programs and recommendations for using middle school STEM afterschool programs to address the problem.

The following is an example of an objectives, personnel and timeline chart

Working collaboratively, the school district and university partners have established the following objectives and timeline for the project.

Objective	Personnel	Timeline/Status
1. Needs Assessment and Planning		Project Partnership Committee/Complete
2. Identification of professional development program		Training Team, STEM coaches and District STEM Director/Complete
3. Purchase of NAO Robotics Solution		District STEM Director/Aldebaran/Upon funding
4. Identification of the Curriculum, Strategies and Activities		District STEM Director/Training Team /Upon funding
5. Implementation Planning		STEM coaches/campus principals/3 weeks from funding
7. Progress monitoring		STEM coaches/every week/Principals/every two weeks District STEM Director/monthly
12. Project Evaluation	The project's impact will be evaluated using longitudinal tracking of student data and career interest surveys developed by the University.	District STEM Director, STEM Coaches/Prior to Student Implementation At mid-year Final evaluation at end of year

What is NAO?

NAO is the most widely-used humanoid robot for academic purposes worldwide. Fully interactive, fun and constantly evolving, NAO is a trusted platform for teaching students of different levels.

Robotics is one of the latest developments in technology and humanoid robots are an ideal learning tool for classes at all levels. Visionaries like Bill Gates have said they believe that robotics will be as important tomorrow as computers are today. With a robotics program, students are able to connect theory with practice and discover a wide range of fields linked to robotics, such as computer science, engineering or mathematics. They gain hands-on experience using NAO and when utilized in labs they will discover exciting topics such as locomotion, grasping, audio and video signal treatment, voice recognition and much more.

NAO enables teachers to integrate team work, project management, problem-solving and communication skills in a stimulating setting. These are 21st century workplace skills that are essential in STEM careers. In addition, NAO offers flexibility for developing interdisciplinary projects because it can be programmed by novice level students.

Using NAO Robots enable teachers to have a project-oriented approach that includes many hands-on experiments. These are proven, effective learning strategies for many students, especially those learning English as a second language. For students of all ages and levels, NAO makes classes more lively and fun and furthers their commitment and interest in STEM subjects.

Teachers that have used humanoid robots during their classes all agree that they have a great motivational impact on students and that it raises the bar for learning in the classroom. The management skills learned through team projects makes lessons with NAO even more motivating.

NAO Features and Benefits

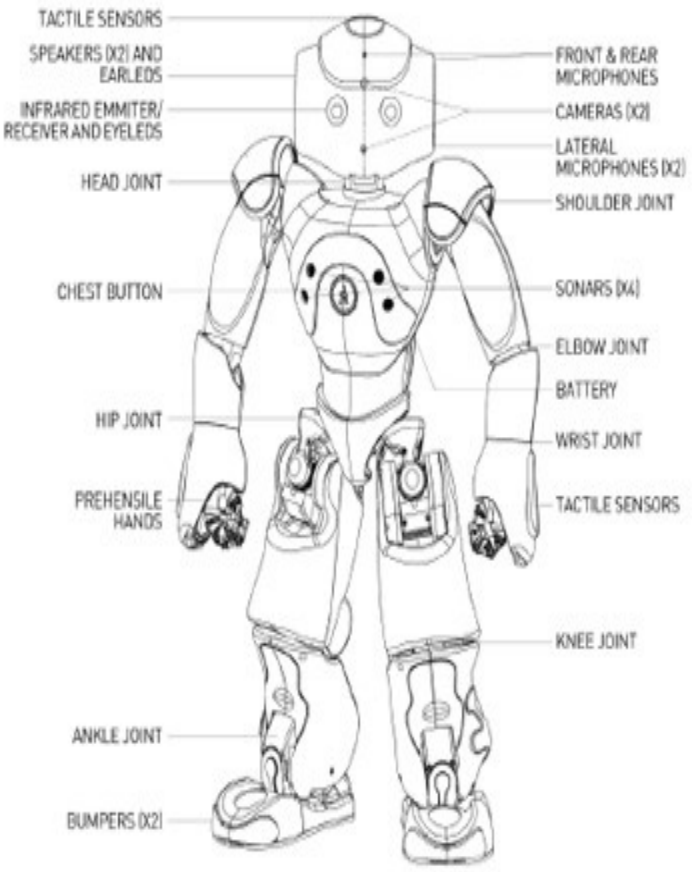
- NAO is a humanoid robot used by more than 350 prestigious universities and research labs around the world.
- NAO is a versatile platform used to explore a great variety of research topics in the robotics field as well as in computer science, man-machine interaction and social sciences.
- NAO is fully programmable and comes with a programming environment suitable even for those with no programming experience.
- NAO's many sensors and actuators, convenient size and attractive appearance combined with sophisticated embedded software makes it a unique humanoid robot ideal for many research fields.
- NAO has capacity for face and object recognition, automatic speech recognition, text to speech capacity in seven languages and whole body motion.

Hardware Platform

NAO is a programmable 57 cm tall humanoid robot with the following key components:

- A body with 25 degrees of freedom (DOF), whose key elements are electric motors and actuators.

- A series of sensors - 2 cameras, 4 microphones, a Sonar distance sensor, 2 IR emitters and receivers, 1 inertial board, 9 tactile sensors, 8 pressure sensors.
- Various devices to express itself - voice synthesizer, LED lights, 2 high quality speakers.
- A CPU (located in the head) which runs a Linux kernel and supports ALDEBARAN's own proprietary middleware (NAOqi).
- A second CPU (located in the torso).
- A 55 Watt-Hours battery, giving NAO 1.5 hours autonomy or more depending on the usage.



Software

Wholly designed and developed by Aldebaran Robotics, Choregraphe is the programming software that lets NAO users create and edit movements and interactive behaviors with complete simplicity. The intuitive graphic interface, the library of behaviors delivered as a standard feature and the advanced programming functions satisfy the needs of novices and experts. Everyone can compose their own behaviors by a simple drag/copy from the library or else create their own boxes and save them in their personal library. Students can explore event-based, sequential or parallel programming, the timeline lets users program with time scheduled logic. The pre-programmed behavior boxes are easily configurable,

but students can also create their own, using the Curve Editor to edit movements, or writing them in Python script.
Combining these approaches opens great possibilities to program on NAO, with or without entering the complexity of code. Choregraphe accepts Urbi and Python language, so it can directly call C++ modules developed separately. It comes with many detailed examples to simplify the learning process.
Choregraphe is multi-platform and can easily be integrated into your development environment; it is compatible with Windows, Mac OS and Linux.

Ethernet and Wifi

NAO currently supports both Wi-Fi (a, b, and g standards) and Ethernet, the most widespread standards for network connection. In addition infrared transmitter receivers in the eyes allows for connection to objects in the environment. NAO is compatible with the IEE 802.11g Wi-Fi standard, and can be used on both WPA and WEP networks so he can easily be connected to most home and office networks. Both Ethernet and Wi-Fi connections are supported natively by NAO's OS, and don't require any setup other than entering your password for Wi-Fi.
NAO's ability to connect to a network opens up a great scope of possibilities. You can connect to NAO from any computer on the network to pilot and program it.

How will you evaluate your project?

Document how you will determine the success of the project throughout its duration. Detail how you will determine if your goals and objectives have been met.

1. What data will be collected?

To evaluate this project, we will use benchmarking data for students at the beginning and middle of the school year and final achievement results from the STATE Mathematics and Science tests. Participating students will be tracked through high school and into college for information on their choice of major/career track. Career interest inventories will be administered at the beginning of the program, at the end of the program and when the student is a senior. Teacher participation will be tracked by the Principal and the District STEM Director.

2. What is the evaluation design?

Aldebaran Robotics encourages project evaluation to measure the success of the program and to define any additional support. The study is quasi experimental comparing growth over time within the student population served by this program. Surveys of student interest and self evaluation of skill improvement are also included at strategic times throughout the students' school career.

How much will the project cost?

Define project costs and expenses. Be sure to include everything from equipment to shipping to substitute teachers. Be realistic and accurate with budget information. List any other costs associated with the project (i.e. lunch for professional development, substitute teachers during training, etc.).

1. Budget Narrative

Prepare a budget narrative that describes your cost items, for example:

The full cost of this project is the purchase of NAO Robotics, software and face-to-face summer training for the N teachers teaching math/science in 7th and 8th grades. There is no cost for substitute teachers.

2. Budget Chart

Item	Unit Cost	Total
NAO Robots		$
NAO Choregraphe software		
Summer Training Workshop	$100 per day (14 days) x (N) teachers	$
	Total Requested	$

Resources for Grant Writers

Links:

1. ***Preparing the Next Generation of STEM Innovators: Identifying and Preparing Our Nation's Human Capital*** http://www.nsf.gov/nsb/publications/2010/nsb1033.pdf a 2010 report from the National Science Board.

*2.**The STEM Workforce Challenge: The Role of the Public Workforce System in a National Solution for a Competitive STEM Workforce*** a 2006 report from the U.S. Department of Labor.

3. ***National Action Plan for Addressing the Critical Needs of the U.S. STEM Education System:*** http://www.nsf.gov/nsb/documents/2007/stem_action.pdf -a 2007 action plan from the National Science Foundation

4. State STEM Initiatives Database: http://ecs.org/ecsmain.asp?page=/html/issuesK12.asp - from the Education Commission of the States.

5. Robotics Education Website for teachers interested in robotics, including classroom lesson plans, an image gallery, information about robotics careers, opportunities to participate in projects and workshops with robotics experts and links to NASA's robotics websites.

6. ***Science Sampler: Girls, Robots, and Science Education*** by J. Jill Rogers, Marylin Lisowski, and Amy A. Rogers http://learningcenter.nsta.org/product_detail.aspx?id=10.2505/4/ss06_029_06_62 a National Science Teachers Association journal article describing various robotics-related activities that can be presented in the classroom to foster positive attitudes toward careers in robotics among girls.

7. Partnership and Framework for 21st Century Skills http://www.p21.org/

8. Successful STEM Education: 2011 report from the National Research Council. http://www7.nationalacademies.org/dbasse/Successful_K12_STEM_Education_PDF.pdf

References Cited in Grant Proposal Example:

Frehill. S., DiFabio, A. and Hill L., (2008) Confronting the "New" American Dilemma: Underrepresented Minorities in Engineering, Commission on Professionals in Science and Technology, Washington, D.C.

Data on graduates from underrepresented minorities.

Kerka, S. (1994). Vocational education in the middle school. ERIC Digest. No. 155. ERIC Clearinghouse on Adult Career and Vocational Education Columbus OH

Many young adolescents have sex-stereotyped views of occupations and often have already limited their aspirations. They have difficulty seeing a connection between what they learn in school and future careers, and they often lack guidance in selecting courses.

Nugent, G., Barker, B., White, A. & Grandgenett, N. (2011). The Impact of Robotics Competitions on Youth STEM Learning, Attitudes and 21st Century workplace Skills. In T. Bastiaens & M. Ebner (Eds.), *Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications 2011* (pp. 3614-3619). Chesapeake, VA: AACE.

Results of this study support the effectiveness of an established robotics competition in increasing youth knowledge of technology and engineering concepts, 21st century workplace skills including teamwork, problem solving, and self-efficacy in performing robotics tasks.

Talaiver, M., Bull, G., Moore, S. & Hayden, K. (2011). Children's Engineering and Computational Thinking. In M. Koehler & P. Mishra (Eds.), *Proceedings of Society for Information Technology & Teacher Education International Conference 2011* (pp. 53-57). Chesapeake, VA: AACE.

Access to technology tools, scientists and engineers as mentors and opportunities to solve real world problems help youth develop self-efficacy as idea generators and innovators in our global innovation economy driven by technology. The integration of core knowledge and skills from both children's engineering and computer science can create a strong foundation for future STEM career success.

Toepfer, C. F. "Vocational/Career/Occupational Education at the Middle Level." MIDDLE SCHOOL JOURNAL 25, no. 3 (January 1994): p.61. (EJ 477 508)

Do young adolescents have a realistic view of the world of work and their potential place in it? What role should vocational education play in shaping this view and preparing middle school students for high school and for work in the 21st century? These questions are explored in this article.