

Chapter 7: Vocational Education

Overview

Vocational education is an integral and necessary part of the training that should be offered by a YouthBuild program. As the classroom side of the construction site, the vocational education class provides the format where the fundamentals of construction and theory of design are introduced and taught to the participants. Vocational education may take place on the work site, in a construction lab, or in other training space. It may even be delivered on site with training partners at community colleges, trade unions, and through other sources of learning.

The subject areas covered can include safety awareness and hazard analysis, tool use, measurement, material identification and application, introduction to green building, introduction to other trades, blueprint reading, drafting, and in some cases, historic restoration. While the basic goal of vocational education is to provide participants with the information and training they need in order to be safe, successful, and productive at the work site, a vocational education class can also serve as the bridge that connects and integrates the academic, classroom environment with the hands-on construction work site.

Vocational education is also a necessary part of career development and placement, including preparation for post-secondary education and apprenticeships.





Provision of Instruction

The manner in which vocational education will be provided is dependent on the resources available to the YouthBuild program. Usually it will be provided in one of following ways:

- A contracted training program from a vocational technical school
- A vocational education teacher as a member of the YouthBuild staff
- A construction trainer on the YouthBuild staff who will serve as a vocational education teacher

There are advantages and disadvantages to each of these arrangements that each YouthBuild program must weigh. The table on the following page outlines some of the major advantages and disadvantages of each means of instruction.

Regardless of which arrangement is selected, a skilled vocational instructor will be required (see Chapter Three: Hiring and Training Construction Staff). A job description for a vocational education instructor is included with other staff job descriptions in the Job Descriptions document in Appendix B. This job description can also be used to evaluate the skills of an instructor assigned by a vocational technical school.

Type of Construction Classroom Instruction	 Advantages	 Disadvantages
Vocational Technical School	<ul style="list-style-type: none"> Fully equipped classroom and woodshop space available and provided by others Certified instructors and pre-existing curriculum, does not have to be created YouthBuild participants should be able to receive “credits for classes taken 	<ul style="list-style-type: none"> Classroom not readily available Timing of classes may cause scheduling issues with the rest of the YouthBuild program “Outside” instructors may have difficulty responding to some of the participants’ issues
YouthBuild Vocational Education Instructor	<ul style="list-style-type: none"> Scheduling classes can be coordinated with other program activities Curriculum can directly address program requirements Content and methods of instruction can be integrated with and enforced by other program components 	<ul style="list-style-type: none"> May require additional classroom and woodshop space Requires an additional staff person with specific training
Construction Trainer/ Vocational Education Instructor	<ul style="list-style-type: none"> Understands what the participants need to know to be successful on the work site Established rapport with participants and program objectives Scheduling of classes can be coordinated with other program activities Content and methods of instruction can be integrated with and reinforced by other program components 	<ul style="list-style-type: none"> Requires skills to create and implement a curriculum that trainers may not have Time spent in vocational class may conflict with trainer’s time on work site May require additional classroom and woodshop space

Scheduling

Many YouthBuild programs have a weekly vocational education class as part of the regular classroom schedule, while others have a more concentrated approach at the beginning of the program year. While it is important for the participants to have enough information before they go to the work site, it is equally important that the lessons they are exposed to have a context base. When the vocational curriculum is coordinated with the work that the participants will be doing in the near future, the participants can apply and reinforce what they have just learned. This is easier to accomplish when the vocational education class is held on a regular basis throughout the program cycle.

Objectives

Regardless of the format or scheduling of instruction, some of the specific objectives that the YouthBuild participants should achieve in a vocational education class include:

- Recognizing potential work site hazards and appropriate responses to injuries in accordance with OSHA and Red Cross training standards
- Demonstrating competencies in two or more modules within two or more skill areas to meet the requirement for participants to have substantial hands-on experience
- Some examples well suited to the training space include:
 - Green building theory and practice
 - Drywall installation and painting
 - The use and maintenance of hand and power tools that are common to carpentry and light construction, in compliance with manufacturer's specifications
 - Selecting appropriate sizes and types of lumber, fastenings, and other materials necessary for typical house construction, as specified in local and national building codes
 - Identifying attributes of different door and window styles and sizes, in relation to operation, energy efficiency, egress, and other code requirements
 - Recognizing the requirements of electrical, plumbing, and heating/ventilation systems in their relation to carpentry and light construction
- Delivering instruction using an industry-recognized curriculum that prepares participants to obtain relevant employer-supported credentials such as those from the National Center for Construction Education and Research (NCCER), North America's Building Trades Unions (NABTU), the Home Builders Institute (HBI), and the Building Performance Institute (BPI)
- Identifying work habits and attitudes that will lead to successful employment in construction and other fields
- Reinforcing academic instruction in math, writing, public speaking, and research that will lead to successful post-secondary placements including apprenticeships
- Identifying career possibilities in construction and related fields



VOICES FROM THE FIELD

On Classroom Vocational Education

"You have to start from day one teaching construction terminology and construction math basics. We spend two hours every week in the classroom on it."

"To fit with the construction site, the vocational education classes must be well-structured and based on a routine."

"Offsite, we gear the vocational education toward theory, giving demonstrations and showing films of things the participants will be doing within the week."

"What has helped our vocational education a lot is having a great teacher who has a lot of teaching experience and can coordinate what's being taught with what needs to be applied on site."

"Make sure the skills the participants are learning are applied immediately. We teach in vocational education what will soon be done on the work site, whether it is that day or sometime that week."

Organizing the Vocational Education Program

Whether the YouthBuild organization provides vocational education or obtains such services from another organization, the program should have similar characteristics. These would include the following:

Assessment of Participant Skills

Many participants entering YouthBuild think they have a basic knowledge of construction work even if they have no experience. For example, most people think they know how to use a hammer or a saw, climb a ladder, or lift heavy objects. However, there are specific skills involved in each of these tasks that are essential to successful construction safety and employment. In order to examine this issue, it is useful to do an assessment of participants' construction skills before beginning the vocational education class. This can be accomplished in several ways:



- By discussion in class in which participants describe prior construction experience of any type
- By delivering a pre-test of construction knowledge that when given as a post-test can demonstrate knowledge and skill gain while in the program
- By written evaluation that asks participants to identify basic construction tools or describe construction procedures
- By observing participants' performance while they undertake simple construction tasks such as hammering a nail into a block of wood

Hands-on Vocational Education Experience

The vocational education program should provide the opportunity to teach skills through hands-on practice. While budget and space constraints may make it difficult to order all the materials needed for hands-on practice, as many in-class experiential activities should be organized as possible. In limited space and with limited materials, participants can:

- Frame and wire a dummy wall
- Demonstrate measuring and cutting skills
- Frame a portion of a stud wall and apply sheet rock and install a door and/or window
- Practice the use of power tools

Several YouthBuild programs have incorporated the construction of scale model houses in their construction program as a way to introduce the construction skills needed on a real construction site. For example, prior to beginning work on the construction site, one YouthBuild program's participants construct scale homes that are built to code and inspected just like real homes. The homes are four to five feet in height—the size of a small playhouse. Construction tasks include carpentry, electrical and plumbing work, roofing, floor covering, and insulation. YouthBuild construction staff teach the skills needed to complete the projects, which take about two months to finish, in the program's vocational education classroom. Each participant completes an entire house, giving participants a sense of accomplishment early in the program and a chance to practice construction skills before they are needed on the construction site. Once completed, scale homes can be sold or donated and can be used as garden sheds or playhouses.

The classroom setting allows for practice with tools and materials in an environment that is safe, comfortable and potentially more supportive than the work site. Hands-on practice in class allows for time to focus on accuracy rather than speed, for mistakes, and for more focused concentration. Hands-on experiences in the classroom also allow for the expression of a wide variety of learning strengths. Participants who have difficulty reading or understanding written directions may have well-developed visual ability and good eye-hand coordination.

Demonstration of Skills

Demonstration is a powerful teaching tool that ensures that participants see how to do a task, hear an explanation of how to do it, and practice what they've learned. In demonstrations, the instructor should follow these guidelines:

- Present participants with a problem. For example: "We have to nail this vertical stud to a horizontal stud that is already nailed to the floor. How do we do it?"
- Ask for suggestions on how to solve a problem. Participants may or may not succeed but should attempt some of these suggestions and discuss what worked, what didn't, and why.
- Demonstrate how to perform the task correctly, describing the task as it is being demonstrated. Draw a picture on the blackboard if it is helpful. Explain when to use a technique and in what situations it works best.
- Review what has been taught by asking participants to describe the skill demonstrated and when it would be used.
- Have participants practice the skill until they get it right. Work with individuals who are doing it incorrectly until they get it. Ask participants who have mastered the skill to help others.

Work in Small, Mixed-Ability Groups

Participants should work in small, mixed-ability groups or teams in the classroom just as they will work in teams on the work site, solving problems together and having team competitions. Small groups help participants learn to communicate and foster leadership and mutual responsibility. Mixing students of different abilities allows participants to learn from and teach one another.

The Vocational Education Curriculum

The vocational education program should be guided by an industry-recognized vocational education curriculum.

A vocational education curriculum should cover the following subjects in sequential order, following the general order in which participants are likely to encounter these tasks on the construction site:

- Safety (including first aid and OSHA training)
- Architectural design
- Construction math
- Tools and construction materials
- Demolition (including safety procedures)
- Rough and finish carpentry (including use of tools)
- Electrical systems
- Plumbing and heating
- Masonry
- Landscaping
- Painting & finishing
- Facilities maintenance
- Green building
- Weatherization

Some vocational education programs include components on architectural design and drafting to enable participants to understand how housing design and construction documents are produced and to introduce participants to architecture as a career interest.

The vocational education curriculum should include a series of well-organized units of instruction, covering specific topics within each of the areas above. For example, the curriculum subjects listed above include safety. This is an aspect of the construction project on which participants might spend a significant amount of time and one that includes a number of issues. Thus, this subject area might be taught in a series of instructional units extending over several weeks. Instructional units for safety might address:

- Staying safe - attitude, behavior, plan, and identification of risk
- Safety rules
- Reading instructions and warning signs
- Safety gear

- Using tools safely
- Safety role plays
- Checking for safety hazards at the site
- Dealing with emergencies—the first aid kit
- Reporting near misses and accidents

Each unit itself should clearly describe the purpose of the lesson, specific skills or knowledge participants will acquire, materials needed to carry out the lesson, a guide to activities for the lesson, and relevant handouts. The Vocational Education Curriculum Unit: Safety Rules is in Appendix B. This provides a model format that can be used to create other unit plans. The curriculum should also include a method of measuring and tracking the participants' progress.



The success of the vocational education program will be dependent on its integration with both the on-site construction work and the academic program. All three should be planned together so that vocational education provides instruction on construction techniques before they need to be used on the work site and incorporates and demonstrates the practical application of academic skills after they have been introduced in the classroom. Ensuring that skills are introduced and practiced in the right sequence will require good communication between the vocational education instructor, academic teachers, and construction staff. One way to coordinate this integration and make certain that planning, regular communication, and curriculum evaluation take place is to have one staff person serve as curriculum coordinator.

Reinforcing and Integrating Academic Instruction

The vocational education class can reinforce and provide a practical application for many of the social and academic disciplines that are also a part of the YouthBuild program. Math, reading, writing, history, sociology, public speaking, and research are a few of the areas that can be integrated into the vocational education class and presented in a way that is relevant to the participants. Each vocational instructor has the opportunity to present this information in a meaningful and dynamic way. Working with the program's teachers, trainers, and counselors, vocational instructors can use project-based or theme-based learning techniques to develop comprehensive, interdisciplinary lessons that connect classroom work with activity on the work site. The following examples are just a few of the ways that these principles can be applied.

Math

Math is fundamental to most construction tasks. For example, fractions need to be understood in order to read a tape measure and accurately mark stud length, drywall dimensions, and the sizes of other materials. Construction workers use math to accurately determine the areas of floors, walls, and roofs and the volume of foundations. Multiplication and division are used in estimating the total number of materials and supplies needed; diagonal measurements of walls and floors need to be compared and adjusted to be square; and the cost of the job in materials and labor needs to be monitored and compared to a budget.

Delivering math lessons that incorporate various methods of presentation (lecture, hands-on identification, videos, handouts) and visits to construction sites in progress can help the participants understand these concepts.

Reading and Writing

Reading comprehension and composition are critical skills that are not only necessary but also transferable. Selecting a “dream house” from various periodicals and describing why it was selected and what design principles it incorporates, following a lesson on the nature and function of design, can motivate and provide a realistic application of design principles in a particular climate zone. Vocational lessons that incorporate handouts can be used to generate vocabulary lists and additional questions that are based on real applications. Opportunities to read can be incorporated by:

- Having participants read diagrams, instructions, ingredients, and narrative descriptions
- Using participant writing as text for the class
- Having participants refer to wall charts, posters, or reference books to get information

Opportunities to write can be incorporated by having participants:

- Write instructions, ingredients, and narrative descriptions
- Create wall charts and posters to use for reference
- Use online resources to create crossword puzzles and other learning tools with construction themes
- Write quizzes and tests for other participants
- Interview construction workers about their jobs and write a report on their findings

Writing in personal journals can be an excellent way for participants to integrate and reflect on their learning. Many programs establish a time each day for participants to write entries in their personal journals about the day’s activities and events. Journals can assist participants in documenting the skills they are learning on the construction site and can also provide raw material to develop further in a classroom writing class. Teachers and counselors can work with participants to use journal entries as information for self-evaluation, and many programs use personal journals as a log of individual development, which gives participants a record of their achievements.

History and Sociology

Studying the history of a neighborhood or a building the participants are working on is an excellent way to use project-based learning techniques. For example, with effective planning, the entire staff can develop lesson plans that relate to the history of the construction site and integrate skills from many different disciplines. Participants can begin by conducting a historical “inventory” of the neighborhood, counting and categorizing buildings, businesses, inhabitants and systems, and reading about the history of the area. At the same time, the construction trainers can work with students on analyzing the architectural elements of the neighborhood’s buildings and how the occupants dealt with environmental elements without modern technology.

The program’s job developer can help participants to identify what types of industries and career pathways are available in the area. As the construction planning progresses, the participants can learn the elements of project management that involve budgeting, proposal writing, real estate financing, and negotiation. A local history professor can be brought into the program as a

guest speaker to discuss with the students how their rehabilitation of the building is playing a role in the history of the neighborhood. With project-based learning, individual participants and groups of participants can create multi-media exhibits using photos, writings, drawings, models of buildings, maps, performances, and videos that incorporate and document their learning across several disciplines.

Public Speaking

Visiting construction sites can provide a tremendous learning opportunity if the interests and views of the YouthBuild participants are focused. Dividing a large group into smaller groups of three or four participants and having them be responsible for finding the answers to questions that are specific to the site visit can provide clear direction. Having the groups present their findings to the larger group for verification can reinforce their findings and build oral presentation skills.

Learning Games

A less formal way of integrating the academic and vocational components is to use learning games such as trivia quizzes, riddles, math puzzles, ethical dilemmas, spelling competitions, physics demonstrations, guessing games, and stories. These games can become an important teaching tool because they convey different kinds of information simultaneously. Games teach participants that hard work can be fun while helping to keep the atmosphere in the program lighthearted. They also enable the staff to present information repeatedly and in different ways to reinforce the participants' learning. From a theoretical standpoint, games allow instructors to teach participants who have different learning styles. Most importantly, learning games teach that learning can be fun.

Excellent Game Resource for Hazard Identification: OSHA Hazard Identification Training Tool
<https://www.osha.gov/hazfinder/>

Research

Looking into deeds, obtaining permits, and getting zoning variances are all projects that are related to the construction site and the vocational education class. In some instances, if the project site is a historic building, there is an opportunity to present the basic principles of historic restoration. For projects, the participants can do timelines of the construction of the building, and different architectural elements of the structure can be identified, photographed, categorized, and compared to other buildings of that era.

Conclusion

Each YouthBuild program should evaluate what resources it has available and how the vocational education class fits into the overall program design. In doing so, the value and relevance of the class should be taken into consideration. It is clear that while vocational education was once thought of as simply job training or preparation, it is now recognized as a complex synthesis of hands-on skills training and cognitive problem solving. The vocational education class can successfully integrate academic training with applied learning principles in a relevant, dynamic, and interactive way.

Chapter 7 Resources in Appendix



APPENDIX B

- [Vocational Education Curriculum Unit: Safety Rule](#)