FRAMEWORKS
A Modular Guide to Youth Development and Bicycle Repair
# WHAT YOU WILL FIND IN THIS BOOK

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INTRODUCTION: Lessons from Bike Works

Bikes are becoming more and more popular as a form of transportation, but also as a means of empowering young people and adults to move themselves forward. Youth Earn-A-Bike (EAB) programs are popping up all over the country in response to the demand for quality out of school programming: sustainable, affordable transportation; the refocusing on Science, Technology, Engineering and Math (STEM) education; and the dearth of workforce development training in traditional educational settings. The thing is, we all seem to be designing programming independently—"recreating the wheel," if you will.

As part of the 2015 Youth Bike Summit, Bike Works decided to share our experience in the form of a modular youth development and bike mechanics curriculum. In the past 19 years Bike Works has taught over 250 individual programs and camps and served over 4,500 youth. We’ve increased the number of our youth from 60 the first year in 1998 to 778 in 2014. In addition, we have increased the depth of our program offerings over the years to provide more leadership opportunities that make real impact in our organization and our community. We have youth serving on our board of directors, on a Youth Advisory Council, and as bicycle leaders on our rides and in our classrooms. Our mission is not just to build bikes, but to build sustainable communities by educating youth and promoting bicycling. Our vision is to create a just world where young people are empowered and engaged in communities that foster understanding and participation and encourage the health of people and our planet. We provide opportunities for youth to learn, lead, explore and challenge themselves and each other.

THE 7 VALUES

BI CYCLING: We believe that bicycling is an accessible form of transportation that promotes public health, builds confidence, encourages environmental stewardship and strengthens community.

YO UTH: We are committed to youth empowerment. We provide youth opportunities to grow as leaders, give back to the community, work together and see themselves as owners and creators of our collective future.

CO MMUNITY: We work to build a strong, supportive, inclusive community. We welcome and respect diversity of experience, identity and opinion and believe that collaboration is a powerful tool for social change.

ED U CATION: We believe that we are all teachers and learners, and we strive to be a place where we can work, learn, and grow together. Through our work we foster creativity, critical thinking, curiosity and cooperation.

ACCESS: We are committed to making cycling accessible, affordable and welcoming to people of all backgrounds, abilities and incomes.

EN V IR ONMENT: We believe that respecting and connecting to the world around us leads to more livable communities. To that end, we practice and encourage waste reduction and reuse, prolong the life of bicycles, promote cycling and teach environmental stewardship.

SOCIAL JUSTICE: Inequalities of wealth and opportunity in our community privilege some and marginalize others. We see bicycles as vehicles of empowerment, and our work as contributing to creating a more just and equitable world.
All of our work is guided by 7 values. These values help challenge us to have a greater impact, deeper connections and increased responsibility. Because there is no “right” way to work with youth, and because we are constantly in conversation with, learning from, and building off of others, this work draws on the incredible work of our partners in the bike world: Bikes Not Bombs (Boston, MA), Community Cycling Center (Portland, OR), Neighborhood Bike Works (Philadelphia, PA), Recycle-A-Bicycle (New York, NY), WE Bike NYC (New York, NY); as well as leaders in the youth development field: The David P. Weikart Center for Youth Program Quality, Schools Out Washington, Passages Northwest/ Girls Outdoor Leadership Development (GOLD), Safe Routes to School, and The Caring Classroom.

Many of the activities in this book draw on the long oral history of youth programs. Activities have been passed down from camps, schools, retreats, etc. over many years. Thankfully, some books and resources have taken the time to write down these activities. Whenever we use materials from these written sources, we have attempted to cite them in the lesson. Thank you to all of the organizations that have allowed us to reprint their work here.

For us bikes are a literal and figurative vehicle—an opportunity for developing strong youth leaders, independent thinkers and motivated young adults. For that reason, this curriculum includes equally as many resources for running an effective youth development program as it does for how to fix bikes. We believe that these two parts are indivisible- there is no way to work with youth without being aware of youth development, team building, and leadership skills.

The point of this curriculum is to give groups a starting point. We encourage educators to share resources and ask questions. Contact us at Bike Works at programs@bikeworks.org.

**PROVEN IMPACT & EVALUATION**

As mentioned above, our programs are about creating spaces where youth can grow, learn and take risks. We invest time in youth and develop caring, long-lasting relationships they can depend on as they grow into adulthood. Our challenge is to prove that what we are doing is producing the desired outcomes beyond bicycle competency. In order to do this we have turned to outside organizations, such as the David P. Weikart Center for Youth Program Quality (YPQ) with their active–participatory approach to programming, and the Schools Out Washington Quality Standards for Afterschool and Youth Development Programs, to guide our approach.

The Youth Program Quality Assessment (YPQA) developed by David P. Weikart Center for Youth Program Quality has been a valuable tool in evaluating and improving our programs. We know we do amazing work, but no matter how hard we work on developing evaluations of our youth, much of the work we do gets lost in the numbers game. The YPQ Initiative (YPQ) offers an assessment of the quality of our program, not just our youth. It is shown that youth who participate in programs that score high on the YPQ assessment, also show improvements in self-perception, school bonding and positive social behavior, reduction in behavior problems and drug use, and increases in test scores, grades, and school attendance. Using the YPQ Assessment over the last three years has helped us measure our impact and shape our curriculum and the physical space in which we offer our programs.

Another tool we have used is the Washington State Quality Standards for Afterschool and Youth Development Programs. These quality standards are a collection of guidelines to help staff understand “what quality looks like in a program setting.” These standards are grounded in the principles that 1) program quality matters, 2) program quality is measurable, and 3) program quality can be improved. This helps us continually expand and evaluate our programs to better serve our youth. This resource has been particularly helpful in our evaluation of the cultural competency of our staff and programs. We feel this is one of the most important and most difficult to measure indicators of program quality.

We encourage organizations to think about the content of their programs by using curriculum guides like this one, but also to look at how that content is being delivered and evaluated. How are we shaping our physical spaces? How are we pushing youth to connect their classroom work with their everyday lives? How are we measuring these efforts and their efficacy or success? At Bike Works we have made two major changes since working with the YPQ Assessment: how we structure our classrooms physically, and how we use group activities to intentionally build community and depth in our programs.
**Physical Spaces**

One of the values in a YPQ approach is to allow for choice in the environment. This is particularly difficult when you have a set curriculum and need to teach about a specific topic—overhauling a hub, for example. For us, providing choice meant creating a workspace that youth could rearrange every day. In this way youth were able to make choices about their environment when there was not much choice in the curriculum. We did this by replacing traditional work benches and peg-board tool walls with movable stands, benches and tools. Everyday youth set up their work space in the area they choose, and pick tools from tool drawers that they then organize on their benches as they see fit. It also encourages youth to think about what they will need and how to create an environment that works for them. The only classroom that does not have this system is the Job Skills Training classroom where youth are encouraged to work in a traditional setting like they might see in a commercial bike shop.

**Asking Questions**

In addition to creating their own space, it is our goal to prioritize the collective knowledge of our youth over the right answers of our staff. One of the ways we prioritize this during drop-in hours is by providing youth with different colored aprons depending on which classes they have taken. Beginning youth wear blue aprons, intermediate students wear brown and advanced students wear black. Youth are instructed to ask questions to each other, especially someone with more experience, before asking staff for help. This helps set the expectation that adults are there to facilitate, not to dictate.

**Digging Deeper**

Asking youth to connect bike mechanics and riding to everyday life is one of the most difficult tasks we take on. This is one of the main reasons we’ve incorporated “group forming” and “reflection” activities into every class. These activities ground our physical work in social/emotional work and provide opportunities for youth to connect with the materials and with each other.

*All these things help us build our programs from the youth up, not from the adults down.*

**The Pyramid of Youth Program Quality**

The pyramid below visualizes the values of the YPQ approach that we have adopted at Bike Works. The pyramid expresses the idea that “Young people can thrive when they feel safe and supported to learn and lead.” Each level of the pyramid builds on the level below it. For example, without a physically safe environment, it is hard to create an emotionally supportive environment. As a supportive environment grows, youth interact more, and as interaction increases, so does engagement and higher level participation. In addition to these ideas, Bike Works values Schools Out Washington’s measure of Cultural Competency as an important element in working with people of all ages. The activities collected in this book are tools we have used at Bike Works to increase youth engagement and other positive youth outcomes through intentional community building and hands-on bike mechanic work. We hope they will be useful to other organizations, as well.
INTRODUCTION

The materials included in this book have been collected and refined over the years as Bike Works has developed and grown. These are the ones that have worked for us and the youth we work with. However, this is only a guide. We encourage you to attend workshops, ask questions and adapt your activities to your participants and your space, as well as add new activities about things like: social justice, body image, and mental health, to name a few. Look at this curriculum as a place to start and let your passions and participants guide you as you go.

Working with youth is much more than presenting a lesson plan and following it through. Young people notice everything. They notice what color shoes you have on, how you wear your hair, which hand you write with, how many times you look at them, whether you say hello, whether you check your cell phone, everything you say to them and how you say it. Youth will reflect your leadership example back to you, as well as out to other youth in the community.

With that in mind, Bike Works teaches within these guidelines:

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**Ask twice as many questions as you answer.**

In many cases, the most important thing you will be teaching is not how to fix a flat tire, but how to solve a problem. Give students the opportunity to try to figure out what to do next. Instead of answering the question “Am I done? Did I do it right?” You might respond, “Does it work?” In this way, it’s not about gaining your approval; it’s about solving the problem at hand.

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**Emphasize a hands-on approach to learning.**

Two-thirds of every class should be hands-on time for youth. As an instructor, resist the urge to just to do the work yourself (i.e. “show” the student how to do it) as this creates a passive learning environment. Instead, talk the student through the process (even though it may feel slower and more trying), as it will keep them actively involved and helps prevent the dreaded “Brain Shut-off.” One way to think of this is to put on your “Mentor Mittens.” These can be literal or figurative mittens. Think about being ‘hands off’ so the youth can be ‘hands on.’

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**Focus on “problem solving” and “trouble shooting.”**

Classes should focus on what can go wrong with a bike and why and how to fix it. These classes are about making things work, not about mechanics for mechanics sake. A good way to do this is by asking students what kinds of problems have they had with, say, their brakes? Explain the concept of trouble-shooting: look at the bike, listen to it, try out different things in order to find and fix issues. If the first thing doesn’t work, encourage youth to try something else. That is how professional bike mechanics work.

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**Safety is part of every lesson.**

Each week, try to discuss some aspects of bicycle safety within your lesson. For example, what types of problems could riding with loose handlebars cause? Or ineffective brakes?

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These four guidelines permeate our staff and our programs. We currently have 7 program staff, 3 on-site classrooms, 16 off-site partners and a variety of classes ranging from advanced certificate classes to one-time fix-a-flats. No matter who, where or what we are teaching, these four points ensure that all our programs have a consistent feel and energy.
One of the goals of this curriculum is to create something that can be adapted to a variety of settings. Instead of listing full lessons from start to finish, we have broken down each part of a lesson into its’ own module. In this guide a group of modules are combined to form a lesson, several lessons taught over a variety of days make up a class, and all of our different class offerings combine to make up our programs. We have included a “Lesson Plan Scaffold” (p. 211) to help you combine modules into lessons. In addition, we have included a list of what lessons our current Bike Works classes include (p. 17–20).

To help staff and organizations figure out what modules make sense for them we have included a variety of ratings in terms of ability level of staff, age of youth, youth skill level and required materials. These are guidelines and most activities can be adapted to any age group or ability level. With any group you’ll need to mold and change your style and programming based on the youth you are interested in recruiting and serving.

**Time**
The time guidelines are meant as that—guidelines. It is a joke here that our fix–a–flat class can take anywhere from 15 minutes to 2 hours depending on how we teach it and who we are teaching. For that reason, use these as rough estimates and feel free to stretch or compress lessons to meet your needs.

**Participant Age**
Bike repair isn’t an easy thing to learn. It takes a lot of time and a ton of patience. The age rankings on these classes take into account the tools being used, the number of steps involved in the repair, and most importantly, the amount of frustration tolerance needed to master the skill.

**Youth Skill Level**
These levels are based on what we teach in each of our classes—Beginner, Intermediate, and Advanced. For almost any mechanic skill it is possible to teach a basic, intermediate or advanced version of the skill. See our "Classes at Bike Works" section (p. 17–20) to see how we structure our classes.

**Staff Mechanics Skill Level**
The Staff Mechanics Skill Level is based on a 1-3 scale. 1 means this activity can absolutely be learned through some quick online research. 2 means this one is a little harder to grasp, but many will be able to teach confidently after some online research and a bit of practice. 3 means this is a very challenging activity to teach and staff should search out some professional instruction before trying to teach this one.

**Good for Groups**
We understand that qualified and motivated staff are a precious resource. For that reason, we’ve marked activities that work well with large groups where the staff to student ratio is more than 1:9. Many repairs require a lot of guidance, however, some lessons work just as well with larger groups.

**Tool Kit**
The tool kits for each level (Bare Minimum, A, B, and C) are listed in the appendix (p. 235–238) along with the approximate cost for each kit. Although a lot of bike mechanics can happen with a hammer and an allen key, using the right tool for the job teaches youth proper technique as well as improves the quality of their repairs.

Use the chart on the next two pages to help you identify, choose and implement modules that make sense for your organization!
The matrix below contains all the lesson modules in this book. Each module is between 5 and 45 minutes long and is intended to be combined with other modules to create an entire Lesson Plan using the Lesson Plan Scaffold (p. 211). By breaking our lessons into small parts, we hope that other organizations will be able to tailor classes to their youth as well as the staff, tools and time they have available. Individual lesson rankings reflect what we do at Bike Works, however, most activities can be adapted to any age range or skill level.

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Teamwork!

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Bikes!

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# Curriculum Matrix

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### CURRICULUM MATRIX

#### Youth Skill Level
- **Beg:** Beginner
- **Int:** Intermediate
- **Adv:** Advanced

#### Ways to Break Into Groups

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<td>Standing in the Shadow of Our Success</td>
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<td>Graduation Celebration</td>
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### ADDITIONAL ACTIVITIES

### SAFETY

### REFLECTION & REVIEW

### FRAMEWORKS

**Introduction**
The Lesson Plan Scaffold to the left is included to help combine modules into full lessons. Using the same scaffold for each lesson in a class also helps provide youth with structure. Uncertainty can make a young person anxious, which can lead to acting out. Consistent structure can help alleviate anxiety and decrease this behavior.

To the left is an example of a completed Lesson Plan Scaffold for a two-hour class.

In the sample scaffold to the left, we have plugged in the modules (and included page numbers) for one way to teach a two-hour lesson on ball bearings and hub overhauls. We have written the module in the top of the box, and included a few important notes below each module. The goal is after reading each module this scaffold can be used as a tool to help teach the lesson without flipping back and forth between modules in the curriculum binder.

There is a Blank Lesson Plan Scaffold included in the appendix (p. 211).

**IMPORTANT:** “Practice” units should never be taught without an “Explanation” unit first!
Beginning, Intermediate and Advanced curriculum can look different depending on the youth you are teaching, the time you have and the mechanics skill level of your instructor. Here’s how we do it at Bike Works!

We currently teach classes in 3 quarters of the year (fall, winter and spring) and run a variety of day camps and overnight bike touring camps in the summer. The first quarter we split classes by gender (Boys Beginning class, Girls Beginning class, etc.). The second quarter we split up classes by age (9–12 or 13–17). The third quarter we offer only one of each class, so all ages and all genders are together.

At Bike Works we offer different kinds of mechanics classes—some are community classes, some are school–based, some are organization–based, and some are Earn–a–Bike classes where youth earn hours that they can “spend” on a bicycle to take home after the class.

During our Earn–a–Bike classes, Bike Works’ students work on BMX bikes or mountain bikes depending on the level to be donated to other youth in the community who do not have access to our programs or sold in the shop. For every hour youth work in the class, they earn one community service hour. At the end of the class they are 2 hours short of the total hours needed to pick out an Earn–a–Bike bike: students earn 16 hours over the 8 week class, and a bicycle “costs” 18–24 hours at Bike Works. This means participants must come to open–shop drop–in hours (offered twice a week for two hours) to earn those last hours. After they have earned enough hours, they can “spend” them on a bike. They can work on this bike during drop in for up to a month to fix it up before they take it home. Youth also earn a helmet and lock with their bike.

Below are the bicycle mechanics modules included in each of our Earn–a–Bike classes—Beginning, Intermediate and Advanced. Each class also includes a “Group Forming” activity and a “Review/ Teach Back” activity not listed as these are left up to the individual instructors.
BEGINNING MECHANICS CLASS

8 weeks, one 2-hour lesson each week

Week 1: Rules, Tools and Bikes
- Introductions .................................................. 63
- Shop Rules .................................................... 172
- Bike Works Contract ........................................ 27
- Community Values Talk .................................... 33
- Name Games .................................................. 34
- Bike Break Down ............................................. 115

Week 2: Wheels Part I—Tires and Tubes
- Fix a Flat Explanation ....................................... 67
- Fix a Flat Practice ............................................ 118

Week 3: Wheels Part II—Front Hubs
- Ball Bearings Explanation ............................... 71
- Front Hub Explanation ..................................... 73
- Front Hub Practice .......................................... 120

Week 4: Threaded Headset Overhaul
- Threaded Headset Explanation .......................... 78
- Threaded Headset Practice ................................. 122

Week 5: 1-Piece Bottom Bracket
- 1-Piece Bottom Bracket Explanation .................. 82
- 1-Piece Bottom Bracket Practice ....................... 124

Week 6: BMX Brakes
- BMX Brakes Explanation ................................... 85
- BMX Brakes Practice ......................................... 128

Week 7: Bike Rodeo and Safety Class/ Review
- ABC Quick Check ............................................ 167
- Head to Toe .................................................... 168
- Helmet Fitting ............................................... 169
- Bike Rodeo ..................................................... 176

Week 8: Test and Graduation
- Beginning Test ............................................... 220
- Graduation Celebration .................................... 205

Graduation Certificate ........................................ 233
# Intermediate Mechanics Class

8 weeks, one 2-hour lesson each week

## Week 1: Re-introduction: Rules, Tools, Bikes, Tubes and Steps of the Overhaul Review
- Introductions .......................................................... 63
- Name Games ........................................................... 34
- Bike Works Contract ................................................ 27
- Community Values Talk .......................................... 32
- Parts of the Bicycle ................................................. 239
- Fix a Flat Explanation ............................................... 67
- Fix a Flat Practice .................................................... 118

## Week 2: Front Hubs with Dust caps
- Ball Bearings ........................................................ 71
- Front Hubs Explanation ........................................... 73
- Front Hubs Practice ................................................ 120

## Week 3: Threadless Headset
- Threadless Headset Explanation ............................... 96
- Threadless Headset Practice ................................. 132

## Week 4: 3-Piece Bottom Bracket
- 3-Piece Bottom Bracket Explanation ....................... 98
- 3-Piece Bottom Bracket Practice ............................ 134

## Week 5: MTB Brakes
- MTB Brakes Explanation ........................................ 85
- MTB Brakes Practice ................................................ 126

## Week 6: Derailleurs and Drivetrain
- Front Derailleur Explanation .................................. 94
- Rear Derailleur Explanation .................................... 89
- Front Derailleur Practice ......................................... 130
- Rear Derailleur Practice ......................................... 128

## Week 7: Review, Finish Bikes, Check-In
- Review for Test ...................................................... 224
- Finish work on bikes .............................................. 205
- Plenty of time for working and asking questions!

## Week 8: Test and Graduation
- Intermediate Test .................................................. 224
- Graduation Celebration .......................................... 205
- Graduation Certificate .......................................... 233
ADVANCED MECHANIC CLASS—PARK TOOL CERTIFICATE CLASS

The Advanced Mechanic class at Bike Works is meant to prepare youth to work in a shop. Students use the Park Tool Book, have weekly assigned readings, and quizzes every class. Not all of these materials are provided here; however, if you'd like more information, feel free to write us an email!

8 weeks, one 2-hour lesson each week

**Week 1: Introduction: Wheels, Tires and Tubes**
- Introductions ........................................................................................................ 63
- Name Games ........................................................................................................ 34
- Bike Works Contract ............................................................................................. 27
- Community Values Talk ....................................................................................... 32

Have students diagnose and fix as many problems as they see using Earn-a-Bike “Bike Check Tag” ........................................... 234

**Week 2: Rear Hub Overhaul**
- Rear Hub Overhaul Explanation ........................................................................ 105
- Rear Hub Overhaul Practice ............................................................................... 140

**Week 3: Headset Overhaul: All Types**
- Threadless Headset Explanation ...................................................................... 96
- Threaded Headset Explanation .......................................................................... 78
- Threadless Headset Practice ............................................................................. 132
- Threaded Headset Practice ............................................................................... 122

**Week 4: Bottom Brackets: All Types**
- 3-Piece Bottom Bracket Explanation ................................................................. 98
- 1-Piece Bottom Bracket Explanation ................................................................. 82
- 3-Piece Bottom Bracket Practice ....................................................................... 134
- 1-Piece Bottom Bracket Practice .................................................................... 124

**Week 5: Derailleurs and Drive Train**
- Advanced Drive Train Explanation .................................................................. 101
- Advanced Drive Train Practice ......................................................................... 138

**Week 6: Brakes: All Types**
- Advanced Brakes Explanation ........................................................................ 85
- Advanced Brakes Practice ................................................................................ 134

**Week 7: Wheel Truing**
- Wheel Truing Explanation ............................................................................... 108
- Wheel Truing Practice ....................................................................................... 142

**Week 8: Test and Graduation**
- Advanced Test .................................................................................................... 228
- Graduation Celebration ...................................................................................... 205

Graduation Certificate ......................................................................................... 233