

# Pathways To Shared Prosperity



A framework for forging next generation makers in SWPA

# Why a special look at Maker and Manufacturing

- Needed to categorize maker education as economic development
- Develop a better understanding of skills in maker education programs
- Communicate maker competencies that are valued by employers
- Clarify employment opportunities for parents and educators related to maker
- Develop a common framework or pathway for “credentials”

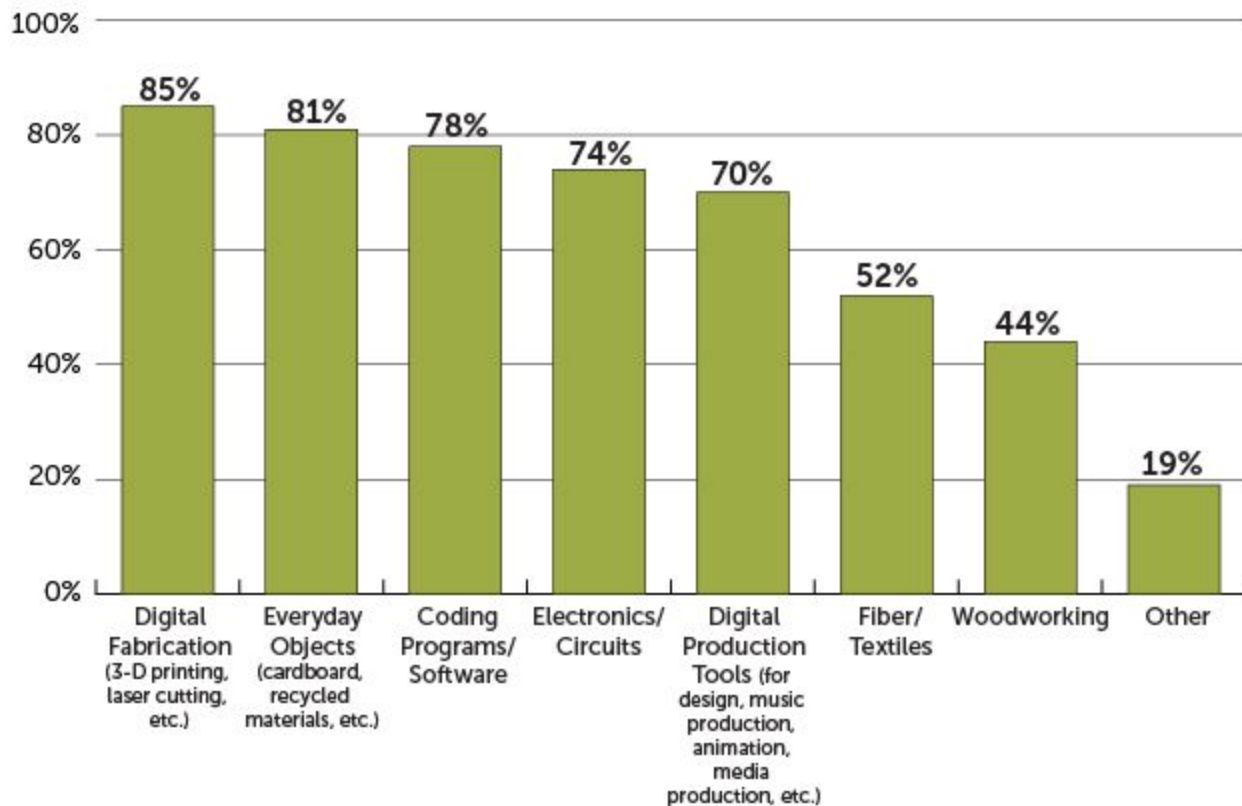
# Key Findings

1. Wide diversity of programs (type, location, tools, those served)
2. Programs connecting to other programs, but not to maker economy.
3. Competencies developed are valued by employers.
4. Gap in pedagogy with direct connections to employers.
5. Diverse opportunities within maker jobs and careers.

# Diversity and Connectivity of Programs

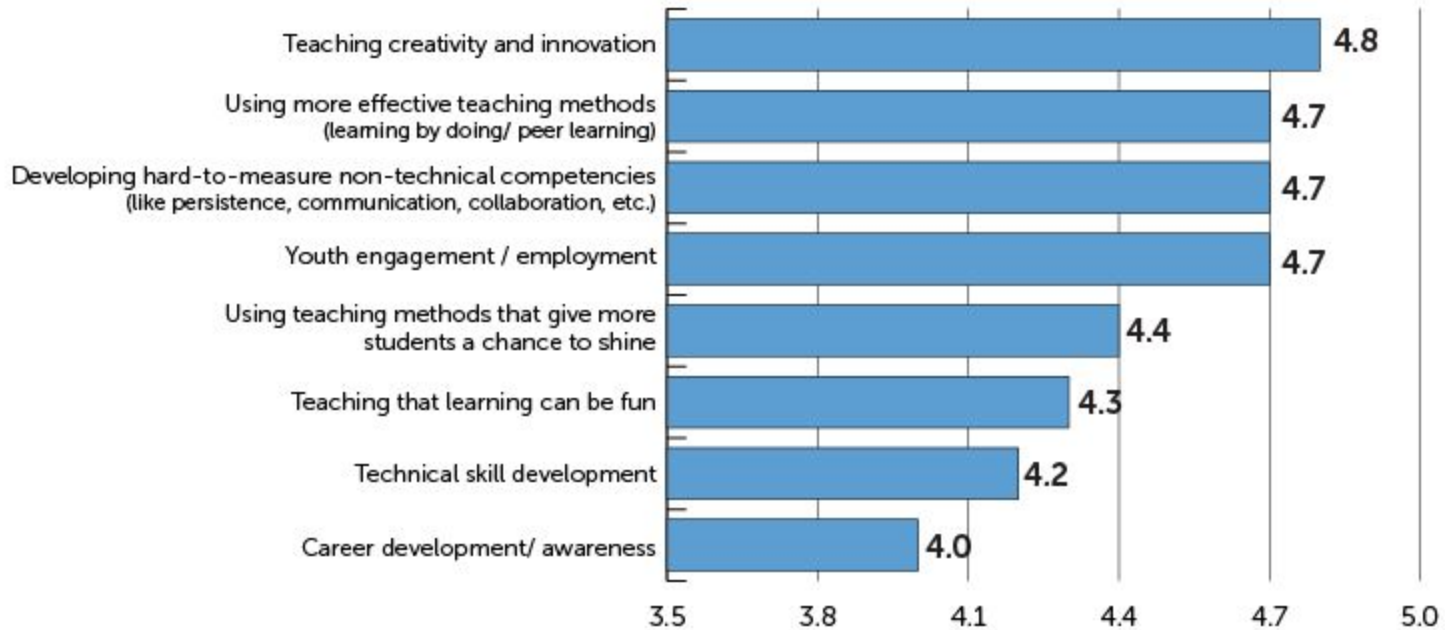
- **Ages:** 70% Serve high school age, 40% Young Adults.
- **Demographics:** 17% primarily minorities, 10% minorities and whites equally, 66% served girls and boys equally.
- **Locations:** 94% of spaces used for teaching; 63% in schools, 22% Other Spaces; 19% libraries.
- **Connections:** 69% work with at least one other program; 79% point graduates onto other programs. 41% work specifically with job training, employers or industry.

## Tools and Materials Used in Maker Programs



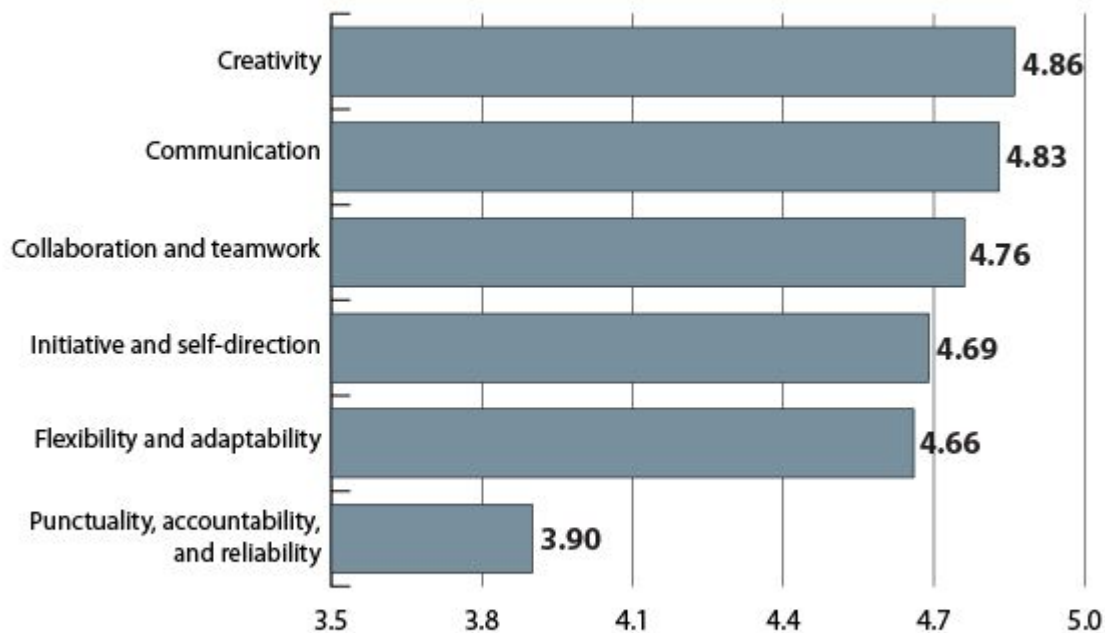
Source: Keystone Research Center maker survey analysis, April/ May 2017.

## Primary Goals of Maker Programs (5 = Very important; 1 = not important at all)



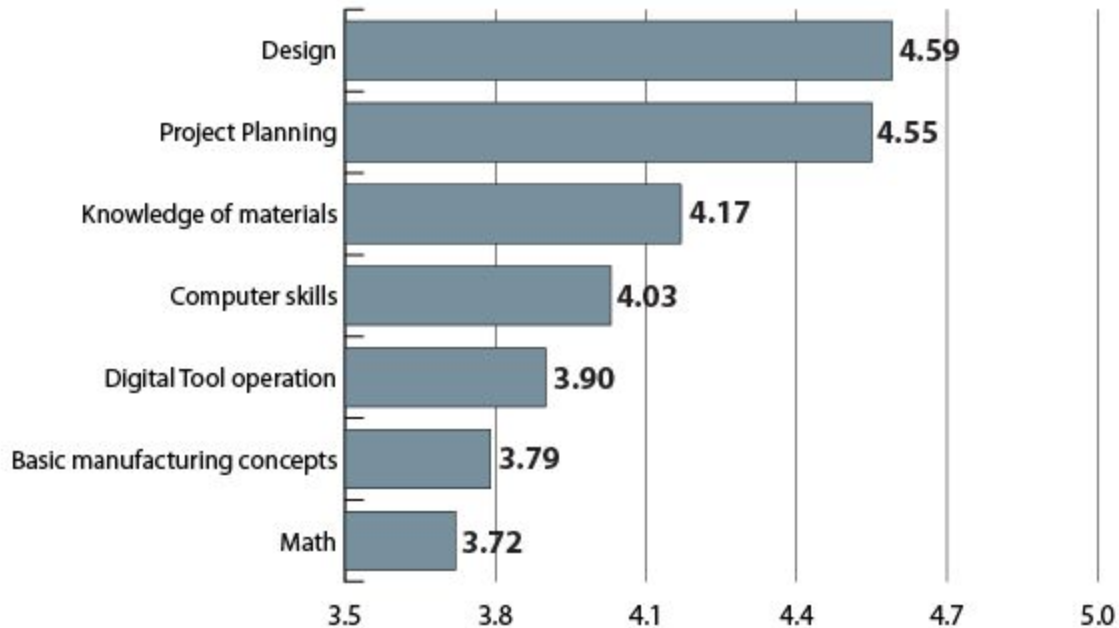
Source: Keystone Research Center maker survey analysis, April/ May 2017.

## Importance of Teaching Soft Skills to Maker Program (5 = Very important; 1 = not important at all)



Source: Keystone Research Center maker survey analysis, April/May 2017.

## Importance of Teaching Core Maker/ Technical Skills to Maker Program (5 = Very important; 1 = not important at all)



Source: Keystone Research Center maker survey analysis, April/May 2017.



# Maker Competencies

## Soft Skills

1. **Basic soft skills:** work ethic, reliability and social skills. These include: punctuality, accountability and reliability (showing up consistently and on time and being reliable)

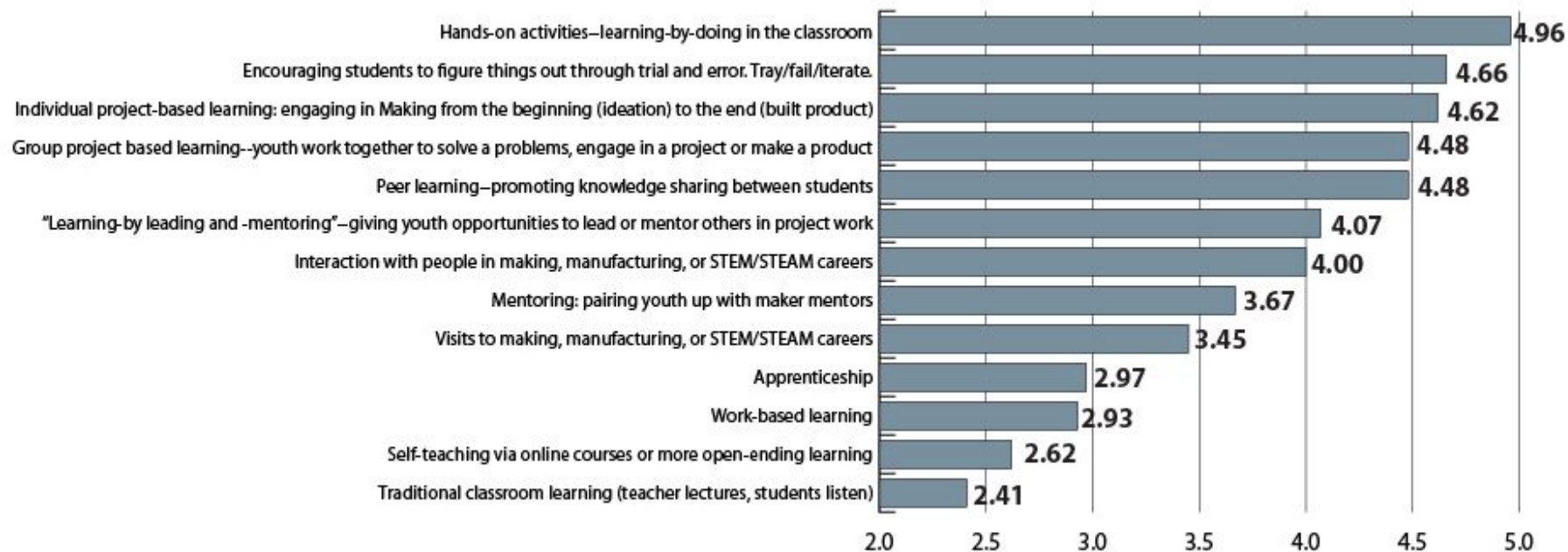
2. **Maker soft skills – critical thinking, innovation and collaboration skills:** critical thinking skills and the ability to problem solve; creativity and innovation skills; collaboration and teamwork; and communication skills.<sup>7</sup>

## Technical Skills

3. **Knowledge of the making process:** project planning; design; applied math and technological skills; understanding how to use tools in making; and knowledge of basic manufacturing concepts.

4. **Knowledge of digital tools and diverse materials:** design technology, additive technology, laser technology, other computer-controlled machine tools, and electronics; and ability to work with a range of materials (wood, plastics, metals)

## Importance of Teaching Approaches to Maker Program (5 = Very important; 1 = not important at all)



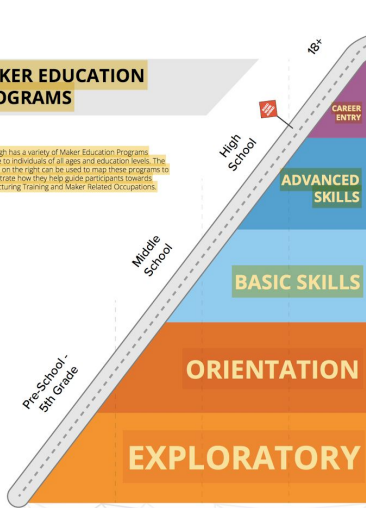
Source: Keystone Research Center maker survey analysis, April/May 2017.

# FRAMEWORK

This diagram gives structure to the broad network of maker education programs in the region and how they relate to the maker economy and job market. Whether you are a makerspace, program provider, educational service, individual, or business, this tool will allow you to visualize your place and potential in the maker ecosystem.

## MAKER EDUCATION PROGRAMS

Pittsburgh has a variety of Maker Education Programs available to individuals of all ages and education levels. The diagram on the right can be used to map these programs to demonstrate how they help guide participants towards Manufacturing, Training and Maker-Related Occupations.



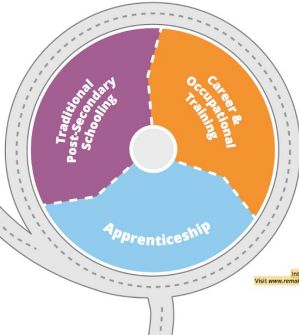
**CAREER ENTRY**  
Prepares individuals to enter a career and/or progress them toward work-related training.

**ADVANCED SKILLS**  
Teaching advanced maker skills, including digital tool proficiency, product design and other technical skills. Develops life and innovation skills through teamwork and project lead opportunities.

**BASIC SKILLS**  
Teaching beginner maker skills, including introduction to digital tool proficiency, product design and other technical skills. Key goals include learning and innovation skills, allowing participants to begin the process of making to discover their talents and something they want to pursue in the future.

**ORIENTATION**  
Engaging individuals in maker pedagogy and maker learning through activities on an introductory course.

**EXPLORATORY**  
Introducing individuals to the world of making and hands-on learning.



## MANUFACTURING TRAINING

### TRADITIONAL POST-SECONDARY SCHOOLING

Institutions offering associate, bachelors, masters, and doctoral degrees such as colleges, universities, and community colleges.

### CAREER AND OCCUPATIONAL TRAINING

Programs providing vocational training and certification in an occupation.

### APPRENTICESHIP

Government or employer sponsored, paid, on-the-job training in a specific occupation, resulting in a Department of Labor certification.

Interested in post-secondary training and education opportunities? Visit [www.remakelearning.org](http://www.remakelearning.org) for more information about local Maker resources.

## MAKER RELATED OCCUPATIONS

Values an occupational category known to have occupations with a growth rate of 10% or more

ESTABLISHED OCCUPATIONS	MEDIAN SALARY RANGES	COMMON EDUCATION LEVEL IN PK
Production (Assembler, Helper, Electronic Assembly, Supervisor)	\$29,020 - \$58,620	📍📍
Precision Machinist (Welders, CNC Machinist, Tool and Die)	\$35,860 - \$51,060	📍📍
Architects & Drafters	\$48,750 - \$78,020	📍📍📍
Engineer (Industrial, Mechanical, Electrical, Robotics, Technician)	\$49,100 - \$97,300	📍📍📍
Designer (Industrial, Product)	\$67,790 - \$76,881	📍

EMERGING OCCUPATIONS	COMMON SALARY RANGES	COMMON EDUCATION LEVEL IN PK
Robotics (Technician, Operator, Programmer, Maintenance, Installer)	\$24,960 - \$55,610	📍📍
Additive Manufacturing (Operator, Technician, Specialist)	\$32,864 - \$39,998	📍📍
Laser Production (Operators, Technician)	\$30,514 - \$34,028	📍📍

Please reference Remake Learning's Pathways to Shared Prosperity: A Framework for Forging Next Generation Makers in Southeastern Pennsylvania to learn more about Maker Related Occupations.

We are casting a broad net to ensure that all of Pittsburgh's neighborhoods and surrounding communities can be part of the Maker Movement.



### DID YOU KNOW?

Many people working as engineers don't have a formal engineering degree. Maker related occupations are growing, and many people have the opportunity to move up the chain and continue professional development once in a position.

## MAKER COMPETENCIES

There are many maker education programs in the Pittsburgh region whose goals are to teach new ways of thinking, introduce new skills, and promote the use of digital tools. Competencies gained from participating in maker programs are dependent on the program, but many of the skills learned can be seen to the right.



### Soft Skills

### Technical Skills

# Maker Pathway

## CAREER ENTRY

Prepares individuals to enter a career and/or provides them with work experience in making.

## ADVANCED SKILLS

Teaching advanced maker skills, including digital tool operation, product design and other technical skills. Deepens life and innovation skills through teamwork and project lead opportunities.

## BASIC SKILLS

Teaching beginner maker skills, including introduction to digital tool operation, product design and other technical skills. May also build learning and innovation skills. Allows participants to learn the process of making to assess whether making is something they want to pursue in the future.

## ORIENTATION

Engaging individuals in maker pedagogy and maker learning through activities or an introductory course.

## EXPLORATORY

Introducing individuals to the world of making and hands-on learning.

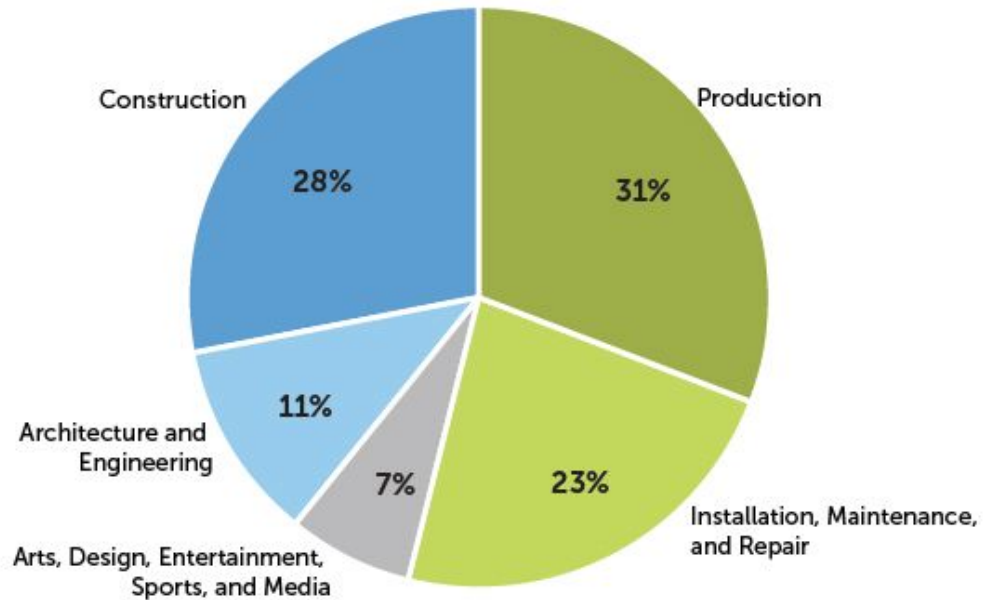
# Maker Economy

- **Manufacturers : 6,542 job openings**

annually in production jobs in the region, earning 9% more than comparable workers.

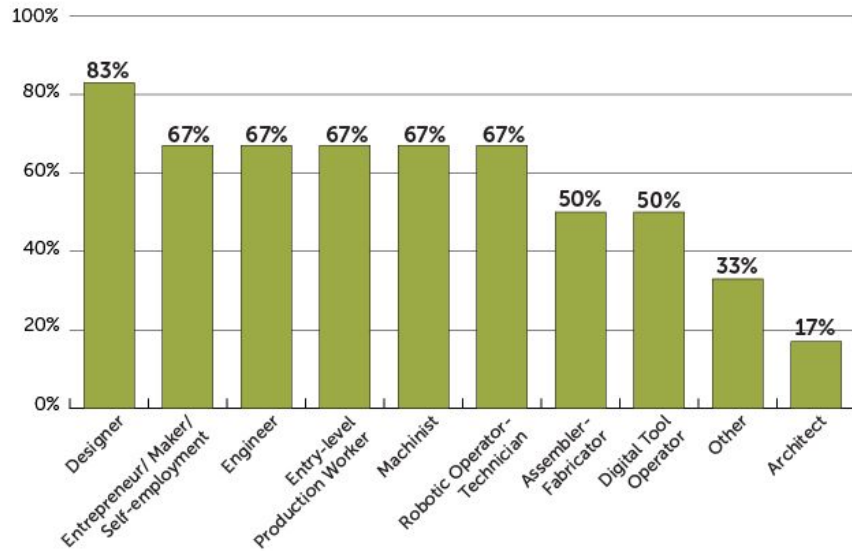
- Another **12,000-plus job openings** exist annually in maker “occupational families” such as construction (5,422), installation, maintenance, and repair (3,927), architecture and engineering (1,350), and arts and design (roughly 1,000 annually).

## Distribution of Employment by Maker Occupational Family, 2015



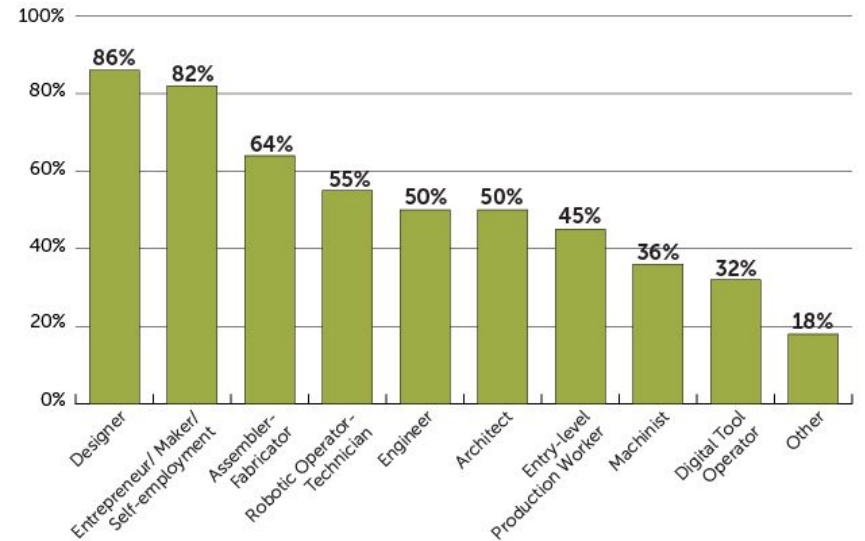
Source: Keystone Research Center based on Inflection Point Report, table 1, p. 8.

## Specific Occupations Trained for by Maker Programs\*



\*Only includes maker programs that train for specific occupations.  
Source: Keystone Research Center maker survey analysis, April/May 2017.

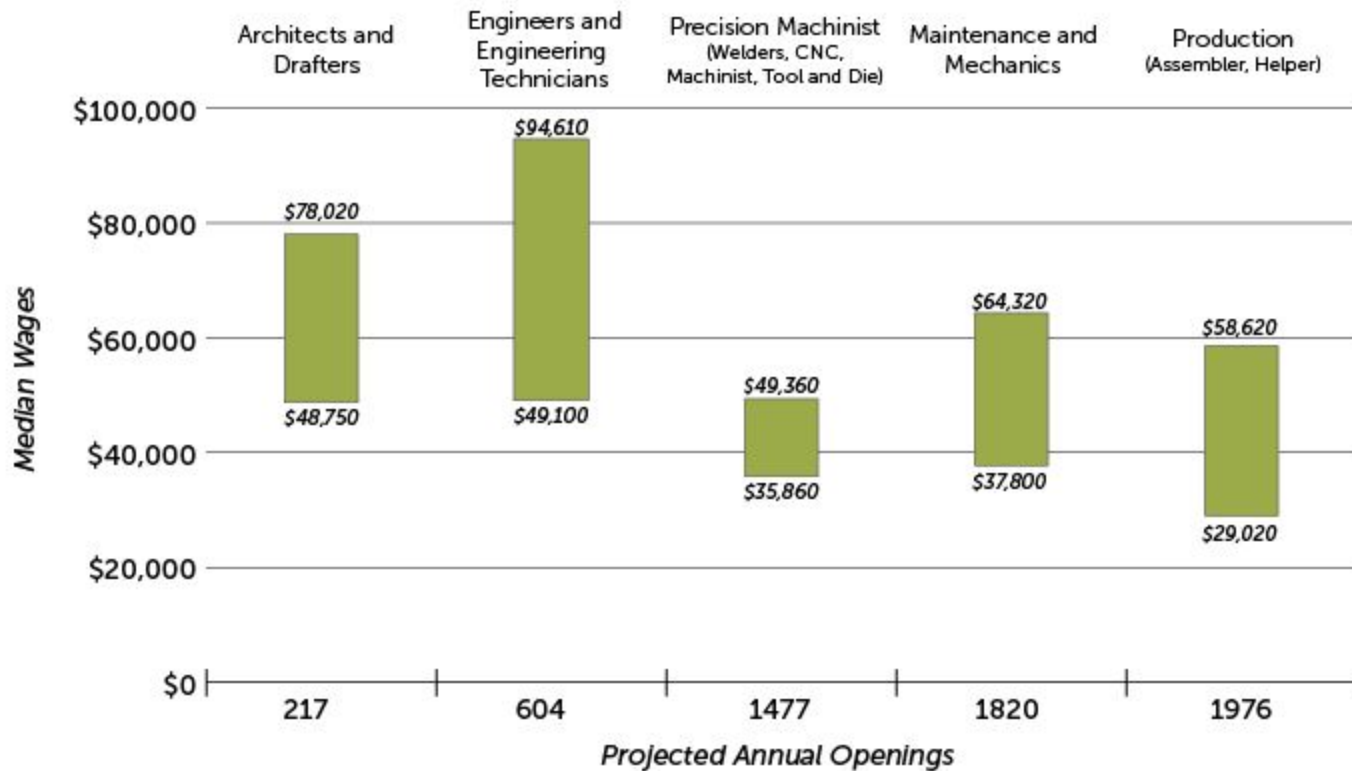
## Competences/Skills Taught by Maker Programs Useful in These Occupations\*



\*Includes maker programs that do not train for specific occupations.  
Source: Keystone Research Center maker survey analysis, April/May 2017.

## Projected Annual Openings and Median Wages in Five Groups of Specific Maker Occupations

Higher paid occupational groups have fewer annual openings than lower paid groups--but all groups have at least some jobs with a median wage of around \$50,000



Source: Table A1



# Recommendations for Action

- 1) Strengthen maker educator networks and peer learning (community of practice and collective performance improvement)
- 2) Strengthen the connections of regional maker education programs to employers and to makers in the economy
- 3) Make career pathways to - and among - rewarding maker careers more visible and credentialed