



**KENTUCKY FAME**  
FULFILLING THE PROMISE  
OF APPRENTICESHIP

OCTOBER 2020

Tamar Jacoby and Ron Haskins



BROOKINGS

# KENTUCKY FAME

FULFILLING THE PROMISE OF APPRENTICESHIP

Tamar Jacoby and Ron Haskins

OCTOBER 2020

## ABOUT THE AUTHORS

**Tamar Jacoby** is president of Opportunity America. A former journalist and author, she was a senior writer and justice editor at *Newsweek* and, before that, the deputy editor of the *New York Times* op-ed page. She is the author of *Someone Else's House: America's Unfinished Struggle for Integration* and editor of *This Way Up: New Thinking About Poverty and Economic Mobility*.

**Ron Haskins** is senior fellow emeritus in economic studies at the Brookings Institution, where he previously co-directed the Center on Children and Families and served as a senior consultant to the Annie E. Casey Foundation. He spent 14 years on the staff of the House Ways and Means Committee and served as President George W. Bush's senior advisor for welfare policy.

## ACKNOWLEDGMENTS

This paper would not have been possible without help from many Kentucky educators, employers, students and researchers. The authors thank the Kentucky Center for Statistics (KYSTATS) for its invaluable help accessing and analyzing data from the Kentucky Community and Technical College System (KCTCS), the Kentucky longitudinal student data system and the Kentucky office of unemployment insurance. We thank the Federation for Advanced Manufacturing Education (FAME) administrators at colleges across the state who reached out to their graduates and encouraged them to participate in our survey. We're grateful to the FAME employers who persuaded their employees to respond and also to the administrators from the KCTCS central office who smoothed our path at every step along the way. Special thanks to educators at Bluegrass Community and Technical College, Jefferson Community and Technical College, Southern Kentucky Community and Technical College and GE Appliances who recruited FAME students and graduates to participate in focus groups. We're deeply grateful to the apprentices who took part in those groups and to the 231 KY FAME graduates who responded to the survey. Special gratitude goes to the Annie E. Casey Foundation for its generous support of the project.

# TABLE OF CONTENTS

EXECUTIVE SUMMARY .....	1
INTRODUCTION.....	5
I. OUTCOMES FOR KY FAME APPRENTICES, 2010-2017 .....	15
<i>Ron Haskins</i>	
II. THE APPRENTICE VIEW: WHAT ACCOUNTS FOR FAME'S SUCCESS?.....	25
<i>Tamar Jacoby</i>	
Appendix I. Kentucky Center for Statistics methodology .....	43
Appendix II. Opportunity America KY FAME graduates survey .....	46
Endnotes .....	51



# FIGURES

- Figure 1. Completion rates for FAME and non-FAME students by year of enrollment, 2011-17 ..... 17
- Figure 2. Completion rates by gender..... 18
- Figure 3. Completion rates by race ..... 18
- Figure 4. Completion rates by ethnicity..... 19
- Figure 5. Median wages for FAME and non-FAME graduates, one, three and five years post-completion ..... 20
- Figure 6. Median wages for FAME and non-FAME (CTE and non-CTE) graduates, one, three and five years post-completion ..... 21
- Figure 7. Apprentice families’ reaction to decision to enroll in FAME ..... 29
- Figure 8. What makes FAME effective ..... 30
- Figure 9. How the FAME program could be improved ..... 33
- Figure 10. Value of on-the-job training by educational expectations of participant..... 36
- Figure 11. Assessment of FAME by age and manufacturing experience of participant .. 37









Photo credit: Omni Architects



# EXECUTIVE SUMMARY

**T**he economy is changing and, with it, America's need for postsecondary education and training.

Not long ago, in the early 1980s, only one-third of US jobs required more than a high school diploma. Today, two-thirds of jobs require some postsecondary education or training—not necessarily a four-year college degree, but some more specialized technical or nontechnical preparation for the world of work.

The last decade has been a time of burgeoning innovation as employers, educators, policy-makers and private philanthropy search for ways to address this new educational imperative. Among the most promising responses for learners and for the economy: job-focused postsecondary education and training offered in collaboration with employers, including European-style apprenticeship that combines classroom instruction with paid on-the-job experience, teaching skills in demand across an industry.

The Federation for Advanced Manufacturing Education (FAME) began as a small, local initiative: Toyota Motor North America and a handful of other firms in central Kentucky came together to build a talent pipeline. Yet already in its early days, FAME was at the forefront of most of the trends that now define the nation's response to the changing nature of work. A national model of employer-provided training—founded, funded and managed by manufacturing companies—FAME stands at the crossroads of the push to expand apprenticeship and the drive to align it more closely with the nation's goals for postsecondary credential attainment.

Now a national network of nearly 400 companies in 13 states, FAME has attracted considerable attention from other educators and

policy thinkers. But no researchers have quantified its benefits for students or explored what exactly makes the model successful. This study begins to address that gap with a two-part exploration of the oldest and most developed FAME state network, Kentucky FAME.

The first chapter of the study draws on administrative data from the state of Kentucky to assess outcomes for FAME graduates—college completion and employment outcomes, including earnings.

---

Only one-third of American jobs are open to workers with a high school diploma or less.

Data provided by the Kentucky Center for Statistics (KYSTATS) allow us to compare FAME graduates with other Kentucky Community and Technical College System (KCTCS) students from similar geographic and socioeconomic backgrounds who did not enroll in FAME.

Among students who entered KCTCS between 2010-11 and 2016-17, FAME participants were significantly more likely than non-FAME participants to complete their program of study—roughly 80 percent of FAME students graduated, compared with 29 percent of non-FAME students.

Comparisons by gender, race and ethnicity showed similar gaps. Among nonwhite students—Black or African American, Asian, American Indian and other races combined—roughly 64 percent of FAME participants completed their program, compared to 24 percent of non-FAME participants.



Earnings and employment gaps were if anything more pronounced. One year after completing a KCTCS program, FAME graduates' median earnings were \$59,164 a year, compared with \$36,379 for non-FAME participants. Three years after completion, FAME graduates were earning \$89,360, compared with \$41,085 for the non-FAME group. Five years after completion, FAME graduates were earning nearly \$98,000, compared to roughly \$52,783 for non-FAME participants—a difference of more than \$45,000 a year.

The second chapter of the study draws on a series of focus groups and an online survey to explore what dimensions of the FAME program are most important to graduates—what components do they believe contribute most to their performance on the job?

Graduates' reviews of the FAME experience were overwhelmingly positive. A total of 97 percent said they felt that enrolling in FAME was the right decision for them, and all but 3 percent said they would recommend it to a close friend or relative.

Asked about the most valuable features of the program—what makes it effective in preparing graduates to succeed in the workplace—94 percent singled out “what I learned on the job.” Respondents were also strongly supportive of the program's signature combination of classroom instruction and on-the-job training. But many saw room for improvement in the way the earn-and-learn experience was structured: they wanted more rigorous work-based learning, more intensive mentoring and more coordination between what they learned in class and what they did on the job.

We found some striking differences among groups of FAME graduates: excellent students and those who were less well prepared; those who had grown up expecting to attend college and those who had not; and, perhaps most notable, traditional college-age students versus those who enrolled after several years working in a manufacturing plant.

FAME is a rigorous, demanding program. Just over half of the graduates we surveyed reported that their academic skills placed them in the top third of their high school class, and the overwhelming majority of them felt it had equipped them well to succeed on the job. But students who were less well prepared for college, including older learners with manufacturing experience, were even more likely than their peers to feel they had benefited from the program. And our findings suggest that it made the most difference for them, reducing if not eliminating gaps in their prior experience and academic preparation.

The second chapter of the study concludes with a set of recommendations.

---

Graduates' reviews of the FAME experience were overwhelmingly positive.

Graduates' message for FAME: don't rest on your laurels. Much as they valued their FAME experience, apprentices were eager to see the program maintain its exacting standards, and they felt strongly that it should take additional steps to ensure that participating employers offer well-structured work-based learning and mentorship.

Our principal recommendation for policymakers and employers and educators seeking to launch career and technical education programs: earn-and-learn training works, and the nation should redouble its efforts to take the model to scale.

A decade's worth of encouragement—by Barack Obama, Donald Trump, Congress and state lawmakers from coast to coast—has doubled the number of US apprentices, but from a very low base. Much more remains to be

done. Potential tools include tax incentives for employers and technical assistance from third-party intermediaries equipped to help companies launch programs. Taking a leaf from European countries with successful apprenticeship sectors, there should be more government funding for the classroom portion of the earn-and-learn experience, and policymakers should leverage the reach of trade associations to recruit employers to sponsor programs.

The thrust among policymakers in recent years has been to focus on expanding apprenticeship to nontraditional sectors—in many cases, white-collar occupations that would otherwise recruit four-year college graduates. There’s no harm in this: as FAME’s top achievers show and our findings about KY FAME earnings underscore, all learners can benefit from apprenticeship.

But these better-prepared students would likely have done well in life with or without the earn-and-learn experience. Other learners—less well-prepared students, those who grow up with no expectation of attending college, older learners and those headed for jobs in blue-collar industries—face steeper odds. Our study suggests that earn-and-learn training may be particularly beneficial for them, and in many cases, it’s their only path to a postsecondary credential and well-paying career.

Our takeaway: policymakers should not lose sight of older, less advantaged, less likely students as they create incentives to expand apprenticeship. This is where the earn-and-learn model can potentially add the most value—the biggest payoff for learners and for economic mobility.



**WELCOME  
TO  
KENTUCKY**



**WHERE EDUCATION  
PAYS**



**ALLEN  
COUNTY**



# INTRODUCTION

**T**he economy is changing and, with it, America's need for postsecondary education and training.

Just a few decades ago, in the early 1980s, only one-third of US jobs required more than a high school education, and many Americans with no more than a high school diploma were able to leverage it to reach or stay in the middle class.<sup>1</sup>

By 2019, only one-third of American jobs were open to workers with a high school diploma or less. Today, two-thirds of jobs require some postsecondary education or training—not necessarily a four-year college degree, but some more specialized technical or nontechnical preparation for the world of work.<sup>2</sup>

## A CHANGING ECONOMY

Nowhere is the contrast between past and present more vivid than in manufacturing. Through most of the 20th century, starting in the early Detroit auto plants through the glory days of World War II and into the postwar era, manufacturing was a royal road to the middle class: low-skill, high-wage jobs that paid off for generations of Americans.

Assembly-line work could be tedious, but it required no education and minimal technical or communications skills. Union negotiations kept wages high and benefits flowing, allowing millions of workers, immigrant and native-born, to attain a lifestyle their parents could only dream of, often sending their own children to college.

---

Nowhere is the contrast between past and present more vivid than in manufacturing.

Then, in the 1970s, automation began to transform work in the plants. The next blow was the China shock: a surge of outsourcing after China was admitted to the World Trade Organization in 2001. Then came the coup de grace, the Great Recession.

Manufacturing shed 2 million jobs between 2007 and 2010, and when employers started hiring again, they were looking for a different kind of worker. “The people that are out of work don’t match the jobs that are open and growing,” one Midwesterner told a *New York Times* reporter in 2010.<sup>3</sup>

What we now call the “future of work” had hit manufacturing: digitization, automation, industrial robots and early forms of artificial intelligence. There were still jobs available—in some places, ample, well-paying jobs. But they required skills: technical skills, communication skills, critical thinking and problem solving. Now manufacturing workers needed to be able to follow complex blueprints and operate sophisticated computerized machinery, requiring at least high school math and a basic understanding of engineering.

So too across the economy. From the beginning of the Great Recession through early 2010, America lost 5.6 million jobs for workers with a high school education or less, and the economy that emerged from the downturn looked very different than the one that existed before the crash. Employers in virtually every sector had revamped and retooled to require fewer workers with more advanced skills.

In the first six years of recovery, companies created 8.4 million new jobs for workers with bachelor's degrees or higher but fewer than 100,000 jobs for those with a high school diploma or less.<sup>4</sup>



## MIDDLE-TIER WORKERS

Caught in the middle of these swirling trends are what some people call “middle-skill” workers—those with more than a high school diploma but less than a four-year college degree.

Midlevel workers, too, lost ground in the Great Recession, but jobs bounced back and then some in the recovery. Between 2010 and 2016, the US added 3.1 million jobs for workers with some college or an associate degree—often technical positions in fields like health care, information technology and advanced manufacturing.<sup>5</sup>

Today, middle-tier jobs still account for roughly half of US employment: electricians, dental hygienists, police officers, bookkeepers and information technology (IT) support staff, among others.<sup>6</sup> They are expected to drive between one-third and one-half of labor market demand in years ahead.<sup>7</sup> But midlevel occupations vary dramatically, with some offering significantly more opportunity than others.

The divide was apparent before the Covid-19 economic shock. An influential 2018 study found that roughly one-quarter of mid-tier positions were “good jobs,” paying at least \$35,000 and on average \$55,000 a year.<sup>8</sup> As the nation emerges from the pandemic and US companies take another quantum leap toward the future of work, the two segments of the middle tier—well-paying, higher-skill jobs and those offering less opportunity—are likely to diverge further still.<sup>9</sup>

Some midlevel occupations will shrink; others will grow. Many if not most will be transformed by automation and artificial intelligence, and many jobs are likely to disappear entirely as technology replaces routine labor. But other midlevel occupations will require increasingly sophisticated skills and offer expanding opportunity for qualified workers. Even as technology changes, workers with up-to-date skills can expect to face promising prospects in health

care, IT, some skilled trades and some services, including technical sales.<sup>10</sup>

In the manufacturing sector, some jobs will disappear. But others will require increasingly advanced skills—both technical skills and soft skills, including communication, critical thinking and problem solving.

## TWO IMPERATIVES

The last decade or so has been a time of burgeoning innovation as employers, educators, policymakers and private philanthropy search for ways to respond to the new economy and the new educational imperatives it creates.

Some reformers are focused on learners’ needs—education and training for upward mobility. Others are driven by an economic rationale: developing talent pipelines for business and industry. Still others start from an equity agenda: more opportunity for those ill-served in the past by traditional higher education.

This revolution has taken many forms—a thousand flowers blooming. But by and large, the responses fall under one of two umbrellas: the push for college completion and credential attainment or the reinvigoration—reimagining and renaming—of what was once called vocational education, now career and technical education.

**College access and completion.** Barack Obama led the charge for expanded college access and completion. Just weeks into his administration, his first major speech to Congress promised young Americans, “We will provide the support necessary for you to complete college and meet a new goal: by 2020, America will once again have the highest proportion of college graduates in the world.”<sup>11</sup>

The next eight years brought a raft of reforms, including vastly increased financial aid for low-income students; a historic revamping of the federal student loan program; generous

---

Even as technology changes,  
workers with up-to-date skills can  
expect to face promising prospects.

federal grants for community colleges; and the creation of a consumer website, the College Scorecard, to help students and parents make better choices about higher education. Meanwhile, the shape of the economic recovery—the dramatic skew in favor of jobs for workers with bachelor’s degrees or higher—lent ever more urgency to the push for college completion and credential attainment.

In 2009, a leading education funder, Lumina Foundation, announced an ambitious goal: that by 2025, 60 percent of Americans, up from just 38 percent in 2008, should hold postsecondary credentials with value in the labor market.<sup>12</sup> The idea struck a chord across the political spectrum. State after state embraced the objective and enacted it as law. Over the next decade, 44 out of 50 states set higher education attainment goals that met Lumina’s standards. And the share of Americans with qualifying credentials—bachelor’s degrees, but also an array of other, shorter awards—rose steadily through the years.

By 2020, according to Lumina, 33.9 percent of Americans held bachelor’s degrees or higher, and 53.1 percent held a credential that qualified toward the foundation’s target.<sup>13</sup>

**In-demand skills.** Meanwhile, even as reformers nationwide intensified the push for college-going, a second, largely parallel reform movement emerged, focused less on academic credentials than on in-demand workforce skills.

This movement, too, had national champions: a cadre of influential researchers, national employer groups, education associations and

philanthropic funders. But the most exciting experimentation and innovation took place in the field: high schools, community colleges, community-based organizations, for-profit entities, disruptive online education providers, employers and others pushing to expand options for learners who might or might not complete a four-year college degree but needed workforce skills to compete in the 21st century economy.

This innovation came in all shapes and sizes. But among the most celebrated, seen by many as the gold standard of workforce training, was apprenticeship—training that combines classroom learning with paid on-the-job experience, teaching skills in demand across an industry.

Apprenticeship, too, comes in many forms. One important distinction sets formal programs registered and monitored by a state or federal agency apart from others, unregistered and unregulated, with standards set by individual employers or employer groups. But perhaps even more significant is the divide created by the changing relationship between apprenticeship and higher education.

Until recently, most American apprentices trained for traditional blue-collar industries like construction and manufacturing. Advocates now focus increasingly on white-collar occupations traditionally filled by college graduates: jobs in finance, insurance, IT and health care, among other fields. The classical apprenticeship programs of decades past were often managed by labor unions. Today, many advocates are seeking to expand from that base, engaging academic institutions—high schools, community colleges, even four-year colleges—to sponsor programs and offer classroom instruction.

Former US labor secretary Tom Perez, who spearheaded the Obama-era push for earn-and-learn training, all but equated it with other forms of higher education. Apprenticeship is “the other college,” he famously remarked, “without the debt.”<sup>14</sup>

As the labor market tightened through the end of the Obama era and into the Trump years, a growing number of elected officials in Washington and beyond put expanding apprenticeship at the top of their workforce agendas. In 2019, according to the National Council of State Legislatures, lawmakers across the US considered “thousands of bills” to make it easier to launch programs in their states.<sup>15</sup> All told, the Obama administration spent some \$260 million to advance apprenticeship.<sup>16</sup> Donald Trump upped the ante. From early 2017 through 2020, the administration and Congress spent just over \$1 billion to expand earn-and-learn training and put informal programs designed by third-party groups, including employers, on a par with registered apprenticeship.<sup>17</sup>

But it hasn’t been easy to expand apprenticeship in the US. Despite its popularity among policy thinkers and a growing body of research that demonstrates the value for employers and employees, in 2019, just three-tenths of one percent of American workers were enrolled in civilian apprenticeship programs—520,000 apprentices, compared to nearly 20 million students in degree-granting postsecondary institutions.<sup>18</sup>

## EMPLOYER ENGAGEMENT

It’s a cardinal rule of the new job-focused education and training emerging nationwide: there can be no effective career preparation without employers.

Only employers know what skills are in demand at their companies. Few know better than employers how technology is transforming their industries or what skills will be needed in the workplace of tomorrow. And engagement by employers, helping to ensure that educators are teaching in-demand skills—this year’s trending coding language, not last year’s, or the more sophisticated skills needed for new manufacturing jobs—is what makes today’s job-focused education and training different

from the old, often ineffective vocational education of the past.

Researchers differ sharply about the breadth and depth of employer engagement in job training. Critics argue that employer-provided upskilling has declined sharply in recent decades. Employers want workers they don’t have to train, this argument goes, and private-sector investment in training has shrunk dramatically since the 1970s.<sup>19</sup>

In fact, data are scarce: apart from surveys

---

There can be no effective career preparation without employers.

of employers and employees—self-reported answers—very little is known about the extent of employer-provided upskilling.<sup>20</sup> And some scholars argue that in-house company programs remain robust, albeit focused disproportionately on more educated workers and those who already have a job rather than the unemployed. One analysis by the Georgetown University Center on Education and the Workforce estimated that in 2013, employers spent some \$590 billion on formal and informal training, compared to \$467 billion spent by students enrolled in two- and four-year colleges.<sup>21</sup>

In today’s changing economy, it’s not entirely irrational for companies to back away from in-house training. Job tenure is declining, especially for men and younger workers.<sup>22</sup> The skills needed for many positions are more specialized and complex than in the past. And employers focused increasingly on their firms’ core missions have outsourced a range of services—janitorial services, IT support, job training and many others—to specialized providers better positioned to supply customized inputs.

These broader shifts have not stopped some employers from finding ways to engage, if not by offering training in-house, then by

---

## The Federation for Advanced Manufacturing Education (FAME) began as a small, local initiative.

partnering with training providers. This collaboration varies widely in quality and intensity—from occasional advice for an educational institution to partnering closely with a public or private training entity to craft curriculum and offer instruction, then committing to hire qualified trainees.

The historically tight labor markets that emerged in the decade after the Great Recession spurred many companies to invest more heavily in worker training and talent pipelines. A surge of interest in apprenticeship helped fuel the trend, but earn-and-learn programs were only one tool among many. From Walmart and AT&T to employer associations like the Associated Builders and Contractors and the National Restaurant Association, private-sector initiatives abounded—a mix of cutting-edge innovation and time-tested, older approaches.<sup>23</sup>

The new consensus about the importance of collaboration between educators and employers has been reflected in more than two decades of public policy. Federal spending on job training and career education is increasingly tied to employer involvement.<sup>24</sup> State and federal policymakers search for ways to incentivize the private sector to engage.

But even as some companies, large and small, step up to take on the challenge, many have not. And few observers quarrel with the skeptics' broader charge: whatever companies are doing, it's not enough.<sup>25</sup> Employers need to shoulder more responsibility for workers' skills.

## FAME

The Federation for Advanced Manufacturing Education (FAME) began as a small, local initiative: Toyota Motor North America and a handful of other manufacturing firms in central Kentucky, one with fewer than 50 employees, came together to build a better talent pipeline. A decade later, FAME is a national network of nearly 400 companies in 13 states managed by the National Association of Manufacturers' education and research arm, the Manufacturing Institute.<sup>26</sup>

Yet already in its early days, FAME was at the forefront of most of the trends that now define the nation's response to the changing nature of work and the need it creates for a different kind of postsecondary education and training. A national model of employer-provided training—founded, funded and managed by manufacturing companies—FAME stands at the crossroads of the push to expand apprenticeship and the drive to align it more closely with the nation's goals for postsecondary credential attainment.

**Bottom-up experimentation.** In the 1990s, long before the China shock or the Great Recession, managers at the giant Toyota plant in Georgetown, Kentucky—the largest Toyota facility in the world, with 8,000 full-time employees—began to worry about the quality of the workers they were hiring.<sup>27</sup>

Automation was changing production protocols. US plants were having trouble keeping up with company norms. FAME founder Dennis Dio Parker describes the challenge bluntly: the entry-level technical workers applying for jobs in Georgetown were “underskilled and not work-ready”—not competitive with entry-level workers in Europe and Asia.<sup>28</sup> Recruiting front-line production workers—the backbone of the workforce in the plant—was challenging enough. Finding industrial maintenance technicians—the better-paid, more highly skilled



employees responsible for the troubleshooting and repairs that keep a manufacturing facility operating smoothly—was harder still.

Toyota spent nearly two decades experimenting with a variety of training options—some in house, others at a local community college, some alone, others organized in concert with few other local companies—before settling on FAME’s distinctive approach.

**A classic apprenticeship.** Few early FAME employers or educators used the word apprenticeship. Until recently, few FAME employers registered with state or federal apprenticeship agencies. The program leaves the choice to individual companies, and most have preferred not to register. But the FAME model incorporates the best features of a classic earn-and-learn program.

Learners preparing to be industrial maintenance technicians divide their weeks into time spent in class and time on the job, learning by doing and earning competitive wages. Classroom learning is coordinated with what happens in the plant so that academic instruction and on-the-job experience reinforce each other. And the program is designed to prepare learners to work anywhere in the manufacturing industry—nothing about the instruction is specific to Toyota or any other FAME employer.

**Company and college.** Yet unlike many apprenticeship programs and other employer-provided workforce training, FAME puts a premium on college completion and attainment of academic credentials.

The hallmark of the FAME model, what distinguishes it from many other earn-and-learn programs: participating companies are organized in regional employer collectives that come together to sponsor programs housed at local community colleges.

Most regional chapters have 10 to 15 active members, often a diverse mix of companies, yet all with similar workforce needs. There are 33 collectives nationwide organized under

---

The FAME model incorporates the best features of a classic earn-and-learn program.

loose statewide leadership: Kentucky FAME, Alabama FAME and Indiana FAME are the most extensive networks. And, by and large, chapters adhere to a set of protocols established by the original collective in central Kentucky.

All have the same organizational structure. All have similar expectations for active engagement by employer members. All structure the student experience in the same way, combining time in class with time spent in the workplace. And all follow a similar process in choosing and collaborating with a community college.

Unlike much collaboration between companies and colleges, often initiated and managed by the educational institution, FAME employer collectives are the driving force in these partnerships.

The employer group chooses the community college partner, often through a selective process. The collective dictates curriculum and often oversees recruitment of instructors, usually hiring out industry rather than academia. College partners are required to convert classroom space into a factory-floor-like “advanced manufacturing center”—no seats, no desks, no lecturing teacher—filled with industrial machinery. The employers select students to participate in the program and meet monthly to confer with educators about instruction and other issues.

“We’re the customer, they’re the vendors,” explains a senior trainer at GE Appliances, a leading employer in the Greater Louisville FAME chapter. “But ultimately the relationship is a two-way street. The company lays out the vision, and we rely on the college to deliver it.”<sup>29</sup>

What happens at each company is left largely to the individual employer, although it

is expected that work assignments will align with college curriculum. The federation's one hard-and-fast rule for employer members: they must pay apprentices enough to cover college costs, and most FAME students graduate debt-free.

The model's payoff for students: the classroom portion of their experience goes well beyond technical instruction and includes a basic foundation in academic skills. It's an intensive two-year experience, and unlike many community college students, who take three or six or more years to graduate, FAME apprentices must finish on time or they are dropped from the program.

Most graduates get permanent jobs at the companies that sponsored them during their apprenticeship. But they also earn a variety of technical credentials—credit-bearing academic certificates in subjects like electrical maintenance and robotics. All completers earn two-year associate degrees, and some later choose to continue their studies—FAME curriculum is designed to prepare the way—obtaining bachelor's degrees in engineering or business management.

**A three-part curriculum.** A last distinguishing feature of FAME, for many employers, the principal appeal of the program: technical training accounts for only one-third of the curriculum. As important and intertwined with everything students do are soft skills—both basic work habits like timeliness and attendance and higher-order soft skills like critical thinking and problem solving. “The emphasis is on the person,” FAME leadership explains, “the technician, not the technology.”<sup>30</sup>

The technical third of the curriculum is designed to be as broad as possible, preparing learners to work in any industrial setting. Content is based on a factory task analysis and updated periodically to reflect industry standards. Units include electrical, fluid power, mechanical and fabrication.

FAME's term for threshold work habits is “professional behaviors,” and instructors are encouraged to hold students to the highest expectations. Trainees are taught that “on time” means 30 minutes early. In many chapters, more than one or two absences is cause for being dropped from the program. Most chapters maintain dress codes and drill trainees in everything from posture to eye contact and techniques for getting along with their classmates.

---

## Technical training accounts for only one-third of the curriculum.

The program's approach to higher-order soft skills starts with basic manufacturing practices like safety, but the broader goal is to teach critical thinking and problem solving. The curriculum borrows heavily from the lean manufacturing practices Toyota pioneered in the US and elsewhere. Students learn to break down problems and address root causes. The principle behind all work practices and processes is continuous improvement.

The upshot for learners and employers: FAME graduates come to work equipped with the full spectrum of competencies required by the new manufacturing that has emerged in recent decades—initiative, communication and teamwork, plus the skills to operate sophisticated machinery and adapt to changing technology.

The next step for FAME, still a work in progress, is a push to scale the program nationwide. In September 2019, Toyota handed the reins of FAME USA—until then, a loose, informal federation—over to the Manufacturing Institute. Its goals for the program: nationwide growth, greater standardization and diversifying curricular options to include a broader range of manufacturing occupations.

### THIS STUDY

FAME has attracted a fair amount of attention over the years from press and policymakers. National employer groups tout it. FAME employers have testified in Congress. Several recent books and think tank studies describe how it works and attest to its value.<sup>31</sup> But no researchers have quantified its benefits for students or explored what exactly makes the model successful.

This study begins to address that gap with a two-part exploration of the oldest and most developed FAME state network, Kentucky FAME.

The first chapter of the study draws on administrative data from the state of Kentucky to assess outcomes for FAME graduates—college completion and employment outcomes, including earnings.

The second chapter draws on a series of focus groups and an online survey to explore what dimensions of the program are most important to graduates—what components do they believe contribute most to their performance on the job?

The second chapter also includes a set of recommendations—for FAME, for other employers and educators launching earn-and-learn training programs and for policymakers, state and federal, seeking to expand apprenticeship.





Photo credit: Toyota





Photo credit: Omni Architects

## CHAPTER ONE

# OUTCOMES FOR KY FAME APPRENTICES, 2010-2017

By Ron Haskins

**E**uropean-style apprenticeship that combines classroom instruction with paid on-the-job experience, teaching skills in demand across an industry, is increasingly recognized as one of the most effective forms of career preparation.

Earn-and-learn training comes in many forms: programs registered with state or federal authorities; independent programs that go unregistered despite the government benefits that confers; and programs sponsored by different kinds of backers, including employers, unions, colleges and workforce intermediaries.

The earn-and-learn model fell into some disuse in the US in the later decades of the 20th century. But recent years have brought a strong revival of interest and robust efforts—by two US presidents and a broad array of companies, community colleges, philanthropic funders and workforce education advocates—to expand the number of apprenticeships available.<sup>32</sup>

Still, despite this revival of interest and attention, relatively few research studies have explored employment outcomes and earnings for workers who complete earn-and-learn training, particularly for young adults.

To close this gap, we take a closer, data-driven look at FAME, a robust and growing earn-and-learn program sponsored by a consortium of employers. Our goal: to better understand FAME students' performance in the program and graduates' employment outcomes—job placements and earnings over time.

## METHODOLOGY

In conducting our analysis, we focused on the state of Kentucky, where the FAME program has been running longest and state data are most robust. Working with administrative data provided by the Kentucky Center for Statistics (KYSTATS), we analyzed student records from the Kentucky Community and Technical College System (KCTCS) and the state's longitudinal student data system (KLDS). We also had access to aggregated student records matched with information about employment outcomes provided to KYSTATS by the state agency that oversees the unemployment insurance program in Kentucky. (See Appendix I for an explanation of KYSTATS' methodology.)

The primary goal of our analysis was to compare FAME graduates with other young people from similar geographic and socioeconomic backgrounds who had chosen similar career paths but did not self-select into the FAME earn-and-learn program.

---

Relatively few research studies have explored employment outcomes and earnings for workers who complete earn-and-learn training.

It's not easy to build an appropriate comparison group that avoids any selection bias. But KYSTATS pair-matched FAME graduates with other individuals with an array of similar characteristics:

- Full-time students entering KCTCS associate degree programs of study in the same semester or earning associate degrees in the same year.
- Identically enrolled or not enrolled during their first year in a program or developmental course designed to compensate for an academic shortcoming. (As a general rule, no student who is enrolled in a developmental course can be admitted to FAME, so few matched students were either.)
- Enrolled in institutions of higher education in the same local workforce area.

In addition, the following three characteristics were prioritized when matching:

- Approximately the same age.
- Awarded approximately the same Pell Grant amount in the first year of enrollment.
- In the same academic class—freshman or sophomore.

Besides the FAME versus non-FAME comparison, we wanted to explore how women and students of color fare in the FAME program, and how this compares to their counterparts in other, non-FAME community college programs.

KYSTATS broke down its comparisons by gender, race and ethnicity, matching FAME and non-FAME students according to their status as “underrepresented minorities.” A student who is not an underrepresented student is a white, non-Hispanic male. A student who is underrepresented is a female of any race or ethnicity or a nonwhite male.

McNemar's chi-squared tests were performed on FAME and non-FAME associate degree seekers, testing their completion rates.

The tests showed a statistically significant difference in attainment of associate degrees at the  $p < 0.001$  level.

Paired t-tests were performed on the differences between mean wages of FAME versus non-FAME associate degree earners for wages one, three and five years after graduation. The t-test showed the differences in degrees earned to be statistically significant at the 0.001 level for all years and for wages at one and three years post-graduation. The mean wage differences were statistically significant at the 0.01 level for wages five years post-graduation.

## FINDINGS

KYSTATS provided us with data from 11 community colleges comprised of 552 students who enrolled in FAME between 2010-11 and 2017-18. KLDS data for 2017-18 were unavailable at the time KYSTATS completed its analysis, leaving 389 out of 552 students who enrolled between 2010-11 and 2016-17. Our findings are based on that group of 389 students.

In comparing these students with non-FAME students, we focus on seven major outcomes: rates of completing a two-year program of study at KCTCS; employment at one, three and five years post-completion; and wages at one, three and five years post-completion.

## Completion

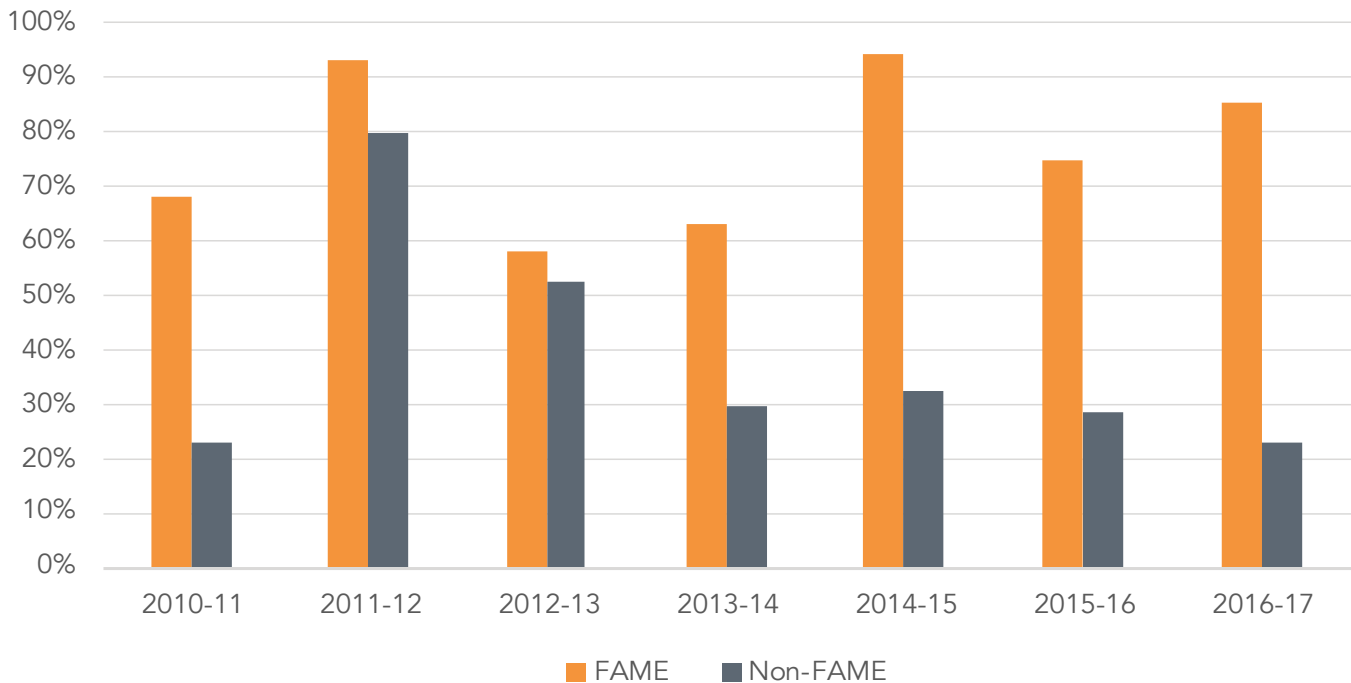
Figure 1 presents completion rates for FAME students and non-FAME students who entered a KCTCS program of study in each of the academic years between 2010-11 and 2016-17. Non-FAME students could be enrolled in any two-year KCTCS program, career-focused or transfer-oriented.

In every year over the seven-year period, FAME participants were more likely than non-FAME participants to complete their program of study.



Figure 1. FAME students are more likely to graduate

Completion rates for FAME and non-FAME students by year of enrollment, 2011-17



Note: This figure compares 389 matched pairs of FAME and non-FAME KCTCS enrollees. There were 22 matched pairs for the class of 2010-11, 15 matched pairs for 2011-12, 19 matched pairs for 2012-13, 27 matched pairs for 2013-14, 34 matched pairs for 2014-15, 88 matched pairs for 2015-16 and 184 matched pairs for 2016-17.

Source: Kentucky Center for Statistics.

Over the entire period, 312 of 389 pair-matched FAME students finished their coursework, for a completion rate of slightly more than 80 percent, as compared with only 113 out of 389 non-FAME students, for a completion rate of slightly more than 29 percent.

As important as overall completion rates are completion rates broken down by gender and race (Figures 2 and 3). In FAME, as in many apprenticeship programs, there are many more men than women, and it's possible that their experiences and completion rates would differ.

Figure 2 shows the completion rates of FAME and non-FAME males and females. These data show that more than 70 percent of females completed the FAME program, while only about 24 percent of females completed a non-FAME KCTCS associate degree.

Figure 3 presents completion rates for white students and "other" students—Black or African American, Asian, American Indian and other races combined.

There were many more white participants than participants from other racial backgrounds in both male and female KY FAME groups. But as in our overall comparison of FAME and non-FAME graduates, three outcomes are notable.

First, participants in both the male and female FAME groups were more likely to complete a program of study than those in the comparable non-FAME groups. For example, the completion rate among female FAME students was nearly 72 percent, compared with 24 percent for non-FAME female students.

## KENTUCKY FAME

Figure 2. FAME boosts completion for men and women

### Completion rates by gender

	GENDER	NUMBER	COMPLETERS	COMPLETION RATE
FAME	Female	32	23	71.9%
FAME	Male	357	289	81.0%
Non-FAME	Female	54	13	24.1%
Non-FAME	Male	335	100	29.9%

Source: Kentucky Center for Statistics.

Figure 3. FAME boosts completion for all racial groups

### Completion rates by race

	RACE	NUMBER	COMPLETERS	COMPLETION RATE
FAME	Other	28	18	64.3%
FAME	White	361	294	81.4%
Non-FAME	Other	41	10	24.4%
Non-FAME	White	348	103	29.6%

Source: Kentucky Center for Statistics.

Within both the FAME and non-FAME groups, white students were more likely than nonwhite students to complete a program of study in two years.

But as Figure 3 shows, “other,” nonwhite FAME students were much more likely to complete their program of study than non-FAME nonwhite students (64.3 percent vs. 24.4 percent).

In Figure 4, we look at completion rates for Hispanic students compared with non-Hispanic students. Similar to our previous comparisons, Hispanics in the FAME group outperformed Hispanics in the non-FAME group. Specifically, 76.5 percent of FAME Hispanics completed their programs of study, compared with 22.2 percent of non-FAME Hispanics.



Figure 4. FAME boosts completion for Hispanics

**Completion rates by ethnicity**

	ETHNICITY	NUMBER	COMPLETERS	COMPLETION RATE
FAME	Hispanic	17	13	76.5%
FAME	Non-Hispanic	372	299	80.4%
Non-FAME	Hispanic	9	2	22.2%
Non-FAME	Non-Hispanic	380	111	29.2%

Source: Kentucky Center for Statistics.

### Employment and earnings

Even more than college completion, arguably the most telling metrics for the FAME program are post-completion employment and earnings. Among the main goals of the program are to increase employment rates and income among young people who may be less likely to attend or to graduate from four-year colleges.

In exploring employment outcomes, KYSTATS used a slightly different comparison group—one made up of students enrolled in any two-year KCTCS career and technical education program.

Some of FAME's first graduating classes were too small to meet Kentucky requirements for publication of employment outcomes data, so it was necessary to combine data across years.

Figure 5 presents data on employment and earnings for FAME and non-FAME participants one, three and five years post-completion.

These earnings data show that FAME participants earned more than non-FAME participants in every year for which data are available:

- For the 134 pair-matched FAME participants with data available from their first post-completion year, median earnings

were \$59,164, as compared with \$36,379 for non-FAME participants.

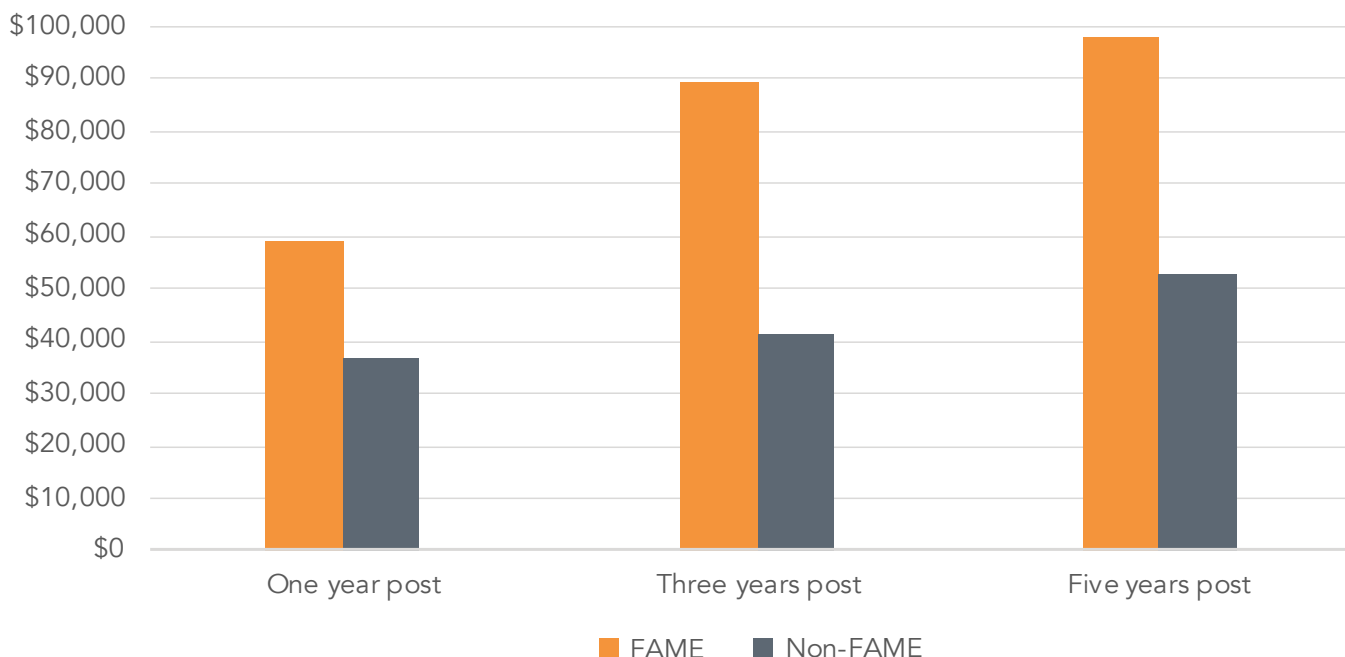
- For the 44 FAME students with earnings data for the third-year post-completion, median earnings were \$89,360, as compared with median earnings of \$41,085 for 38 participants from the non-FAME group.
- Because the earliest FAME cohorts were relatively small, few graduates in the KYSTATS sample had been in the labor force for five years since completing a program of study—just 24 FAME participants and 20 non-FAME participants. But earnings data show that FAME participants' median earnings were nearly \$98,000 while non-FAME participants had earnings of about \$52,783 at five years post-completion.

Figure 6 shows yet a third set of comparisons—all FAME and non-FAME students who earned associate degrees at KCTCS colleges in academic year 2016-17.

Non-FAME students are further divided into two subgroups: those who were enrolled in career and technical education (CTE) programs and those who were not (non-CTE). Career and technical education majors and concentrations include allied health, criminal justice, computer

Figure 5. FAME graduates earn more than other KCTCS graduates

**Median wages for FAME and non-FAME graduates, one, three and five years post-completion**



*Note: This figure presents median wages for 134 matched pairs of graduates. At one year post-completion, we compared earnings for all 134 FAME completers and 134 non-FAME completers. By three years post-completion, we were able to compare only 44 FAME completers and 38 non-FAME completers. At five years post-completion, we compared 24 FAME completers and 20 non-FAME completers.*

Source: Kentucky Center for Statistics.

science and IT, among many other fields. Non-CTE majors include liberal arts, general studies, sociology, psychology, and political science and government, among others.

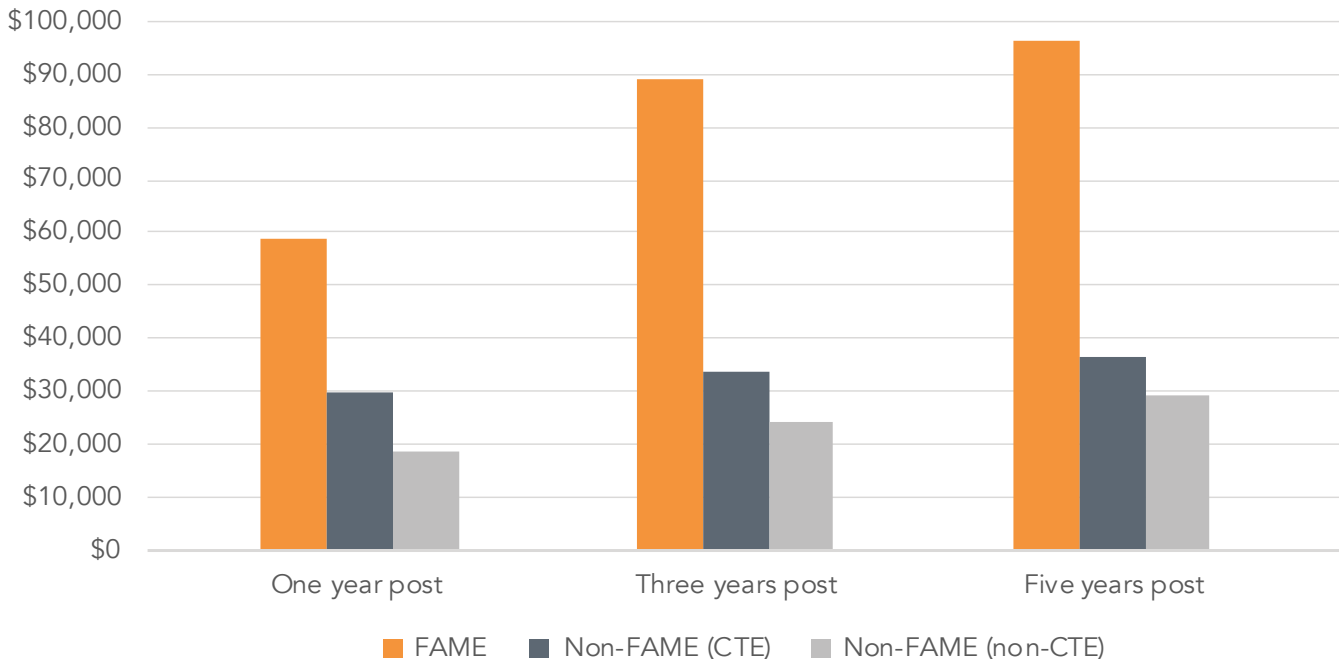
These two additional comparison groups were not pair-matched with FAME students, and no tests were run to assess the statistical validity of the differences among the three cohorts.

Figure 6 compares median wages for these three groups of KCTCS graduates one, three and five years after graduation. FAME graduates earned significantly more than both other groups at each point in time, and the difference between FAME earnings and the other groups'

wages grew significantly over the five-year period—the wage premium associated with completing the FAME program grew more pronounced over time.

Five years after completing a program of study at KCTCS, FAME students' median earnings were \$96,098 a year. Graduates from non-FAME KCTCS CTE programs were earning \$36,437 a year—less than 40 percent of the median wage for FAME graduates. And students who had pursued an academic, non-CTE program of study were earning \$29,022—less than one-third of what their peers who had completed FAME were earning.

Figure 6. FAME graduates earn more than other CTE students and academic majors  
**Median wages for FAME and non-FAME (CTE and non-CTE) graduates, one, three and five years post-completion**



Note: The three comparison groups highlighted in this figure were not pair-matched on like characteristics. The FAME group consists of 136 completers who did not reenroll in a postsecondary education program their first year after graduating from a KCTCS college, 27,315 non-FAME CTE completers who did not reenroll and 11,014 non-FAME non-CTE completers who did not reenroll.

Source: Kentucky Center for Statistics.

## DISCUSSION

The goals of the FAME program are to provide young people with skills and associate degrees they can leverage to land good jobs at wages high enough to support their families. A secondary purpose of FAME is to provide these valuable outcomes, which many young people have trouble achieving in today’s economy, without burdening graduates with student loan debt that could handicap their finances for years to come. The results of this study demonstrate that FAME has achieved these goals.

To determine FAME’s ability to accomplish these ends, our study featured a group of FAME students enrolled in one of 11 KCTCS

colleges and a group of comparison students enrolled across the same 11 institutions.

The students were matched on their geographic location, when they enrolled in KCTCS and whether they were simultaneously enrolled in developmental education. In addition, the two groups were approximately the same age, in the same academic class and receiving similar amounts of federal Pell Grant funding. They were also matched by race, ethnicity and gender.

One characteristic we were unable to match for: unlike most of KCTCS, FAME is a selective program. Students seeking admission must meet a variety of criteria, academic and non-academic, including selection by an employer.



The first outcome we examined was the probability that these two matched groups completed their KCTCS two-year programs at different rates. As shown in Figure 1, completion rates were much higher for FAME students in every academic year from 2010-11 through 2016-17. Figure 1 shows that FAME helped students complete the two-year program every year during that period.

Similarly, the data in Figures 2 and 3 suggest that both female and male FAME students and white and nonwhite or “other” (Black, Asian and American Indian) FAME students were more likely to complete a program of study than non-FAME students.

As important as completion rates, if not more so, is our comparison of earnings for FAME and other KCTCS graduates. The data on median wages at one, three and five years after completing community college favored FAME students by wide margins, around \$23,000 at the end of one year post-completion, \$48,000 at the end of three years post-completion and about \$45,000 at the end of five years post-completion.

What makes these comparisons particularly striking: the groups we juxtaposed were so closely matched—graduates of other career and technical education programs in the same statewide community college system, if not at the same colleges. FAME is a well-designed initiative, effective on many

---

Five years later, FAME graduates' median earnings were \$96,098 a year.

dimensions. But stripped to the core, the main differences between FAME and other KCTCS CTE majors are the work-based learning experience and the intensive involvement by employers—the role they play at every stage, designing the program, identifying what students need to know and overseeing their progress until they complete successfully.

The differences between FAME students and non-FAME students are at least as great as and usually much greater than the differences in income for those who complete other apprenticeship programs.<sup>33</sup> And it seems implausible that a difference of this magnitude could be attributed solely to the one variable we could not control for: employers' selection of students to enroll in the program.

Based on completion rates, income and ability to help disadvantaged groups, KY FAME is an unusually successful education and training program, even by the high standards set by other apprenticeship programs.





ELECTRICITY & ELECTRONICS II

ELECTRICITY & ELECTRONICS I



Photo credit: Omni Architects



## CHAPTER TWO

# THE APPRENTICE VIEW: WHAT ACCOUNTS FOR FAME'S SUCCESS?

By Tamar Jacoby

**T**he data leave little doubt: FAME is a superlative program. If what we—employers, educators, students, policymakers—ask of subbaccalaureate post-secondary education and training programs is that they prepare learners for jobs, FAME delivers, and then some.

What the Kentucky state data we examined for this study don't tell us: *why* FAME is as effective as it is. What exactly is it about the experience that drives these remarkable results for graduates? Which elements of the program design make the biggest difference? Many apprenticeship programs in the US and abroad produce good employment outcomes for learners and employers, but our data suggest that FAME rises above even that high standard. To what can we attribute this superior quality?

There are many ways to explore this question: direct observation, interviews with educators or employers, by asking apprentices who have been through the program or some combination of these approaches. We chose to go directly to those likely to have experienced KY FAME most intensively and with the most at stake: the roughly 585 apprentices who have graduated from the program since it was launched in 2010.\*

Which features of KY FAME do they believe are most valuable? Which components do they think best prepared them for the workforce? To what do they attribute their success in their current jobs? And what, if anything, about

---

We asked the 585 apprentices who have graduated from the program since 2010.

the FAME approach do they think could be improved?

The former apprentices we queried had strong opinions, and they were not shy about expressing them. Excellent students and those who were less well prepared, recent FAME graduates and those who had been on the job for many years, those who had passed through the program as traditional college-age students and those who experienced it as working adults: together, their responses provide a rich lode of information that we believe holds important lessons for FAME and for educators and employers in other industries seeking to launch apprenticeship programs.

More broadly, we believe our findings can shed new light on the place of job-focused earn-and-learn training in American higher education. Just who are these programs most likely to help? Who needs them most? And where does apprenticeship fit into the nation's effort to provide postsecondary education and training for a broader swath of Americans, enhancing the nation's competitiveness and expanding economic mobility?

---

\* Chapter 1 looked at results for 389 students who graduated between 2012 and 2017. The Opportunity America KY FAME graduates survey was open to all graduates from the launch of the program through August 2020.

## METHODOLOGY

We used three tools to explore KY FAME graduates' opinions: interviews, focus groups and an online survey.

The first step was a handful of informal interviews conducted intermittently over a period of a year or so as we prepared to launch the study. Subjects were current students and graduates we encountered on visits to Jefferson Community and Technical College in Louisville and the Bluegrass Community and Technical College campus adjacent to the Toyota assembly plant in Georgetown, Kentucky. The goal of these casual conversations: to explore apprentices' willingness to talk about their experience and establish a set of topics to be probed more deeply in the next phases of the study.

Next came a series of three focus groups, each convening current apprentices, graduates or both from a single FAME chapter: the original Bluegrass chapter in central Kentucky; the Greater Louisville chapter; and SKY FAME, based at Southcentral Community and Technical College, near the Tennessee border in the western third of the state. FAME employers and administrators recruited workers and apprentices to participate in the focus groups, centering in some cases on younger graduates and in others on older men who had gone through the program as incumbent workers already employed by a FAME member company.

The 90-minute sessions were held in fall 2019 and early spring 2020, two on campus and one in the training center at the iconic Louisville assembly plant, GE Appliance Park. The goal of the groups: to refine a survey instrument, but also to explore opinions in more depth than would be possible with a multiple-choice questionnaire. All told, 41 graduates and apprentices participated in the focus groups.

The third and culminating step of the project: an online survey. Twenty-four questions probed apprentices' opinions on why they chose FAME; what education or training, if any, they would have pursued if they had not

enrolled in FAME; what they valued most about the experience; and their plans for the future. (See Appendix II for the questionnaire.)

---

In the end, 217 graduates completed the survey.

College administrators and employers from all but one of the 11 KY FAME chapters helped get the word out about the survey and encourage graduates to respond—it was sent by phone and email to every former student for whom educators had contact information. The survey remained open for seven weeks even as Covid-19, just then emerging in Kentucky, required the closure of many plants. In the end, 231 graduates answered some questions, and 217 completed the survey.

## A variety of perspectives

Outreach by FAME administrators and employers netted a wide variety of graduates, yielding multiple perspectives on the program and its strengths.

**Age and education.** Respondents spanned two distinct age cohorts. The group included some 170 graduates who had gone through KY FAME as traditional college-age students just a year or two out of high school, but also a robust contingent who enrolled in the program after several years working in a manufacturing plant. Generally in their late 20s and early to mid-30s, these older learners had often been selected to participate and sponsored by employers who viewed them as candidates for promotion—ready to make the leap from production line worker to industrial maintenance technician. Not surprisingly, incumbent workers brought a sharply different perspective on the program.



A second critical divide traced back to respondents' varied school experience and their expectations for higher education.

The majority—nearly 70 percent—reported that they had grown up expecting to attend college. The rest never imagined they would or weren't sure. Just over one-third of respondents—36 percent—had had some experience of college before attending FAME. Just over half reported that their academic performance placed them in the top third of their high school class. Almost none reported being in the bottom third, but 45 percent were, by their own account, somewhat less well prepared for the academic component of the apprenticeship experience.

These distinctions, too, yielded important differences in graduates' perspectives on the FAME program—its strengths, its weaknesses and its value in preparing them for the workforce.

**Strong positives and strong negatives.** Participation in the survey was voluntary. Some alumni ignored repeated requests to participate. But those who responded spanned a wide range of opinions: strong supporters of the program and some detractors who made their feelings known, sometimes in pungent language, in the open-ended comment section at the end of the survey.

**A potential proxy for skill attainment.** In contrast to the state-data-driven arm of the study, the territory we explored with the survey and focus groups was entirely subjective. We had no objective measures of skill attainment, job placement, job tenure or promotion. So we had no sure way to distinguish graduates who were successful on the job from those who were less successful. What we did collect: workers' self-reported feelings of job satisfaction, which we believe may align loosely with their prowess in the workplace.

Success as an industrial maintenance technician is highly dependent on performance: can

---

## Older workers brought a sharply different perspective on the program.

a tech troubleshoot quickly and effectively to get machinery up and running smoothly? Some skilled, successful workers may nevertheless be dissatisfied with their circumstances—may not like the boss or the company culture or some other aspect of their employment. But by and large, we doubt that many less successful technicians would report high levels of job satisfaction, so we have used satisfaction as a rough proxy for performance on the job.

**Diversity.** The 231 graduates who participated in the survey fell short in one important respect: racial diversity. Recruiting a diverse workforce is a persistent challenge for US manufacturing and for the FAME program.<sup>34</sup> Concerted efforts in Kentucky have yielded a proportionate mix: the 16 percent of KY FAME graduates who report that they are underrepresented minorities matches the 16 percent of the state population that the US Census identifies as people of color. (FAME is less successful in recruiting women: just 8 percent of KY FAME graduates have been female.)

Yet, for reasons unknown to us, the group that responded to our survey was not representative. Educators and employers reaching out to graduates made no racial distinctions we were aware of. Nothing about the focus groups or the questionnaire appeared to discourage participation by underrepresented minorities. Our sample split proportionally by gender—the 8 percent of respondents who were women matched the 8 percent of KY FAME graduates. But 93 percent of our respondents told us they were white, and nearly 4 percent refused to specify their race or ethnicity, leaving us with just seven respondents who identified as people of color.

## FINDINGS

Our survey was designed to answer five core questions about KY FAME.

- Seen from a broad perspective, is FAME successful in preparing graduates for the workplace?
- What aspects of the program do apprentices find most compelling?
- How significant is the combination of on-the-job experience and classroom instruction, and what exactly accounts for its success?
- How important and effective are the parts of the FAME curriculum that look beyond technical competency, focusing either on basic work habits or higher-order soft skills like problem solving?
- Who appears to benefit most from the FAME program, and why?

### A stellar report card

Is KY FAME successful in preparing learners for the workplace? A small number of graduates seemed to regret choosing the program, and many more found shortcomings they would like to see addressed. But overall, the report card was overwhelmingly positive—a subjective assessment that matched KYSTATS’ objective findings.

All told, 79 percent of graduates “strongly agreed” that enrolling in FAME was the right decision for them, and another 18 percent “agreed somewhat,” for a total of 97 percent. A similar 81 percent said they would “recommend the program strongly to a close friend or relative,” and only 3 percent said they would not recommend it. Asked about satisfaction with their current job, 72 percent said they were “very satisfied”—a result we took to mean that they felt well-prepared and were performing at a high level.

All of these findings—right decision, would recommend, high job satisfaction—were

roughly consistent across the board. Although their evaluations differed somewhat in degree, all categories of FAME graduates—incumbent workers, recent high school graduates, the academically well-prepared and those who found schoolwork more of a challenge—gave the program favorable reviews.

---

*'If it wasn't for FAME, I'm not sure what I'd be doing.'*

The focus groups and an open-ended last question of the survey yielded similar glowing reports. A handful of graduates were disgruntled, with one saying flatly that his apprenticeship did not prepare him for the workforce and a few others lodging more focused complaints about various aspects of the program—teacher quality, advising, the equipment at the college. Others—the overwhelming majority—were generally positive, with some 40 percent of those who took the time to leave additional comments offering unstinting praise.

A sampling:

*I wouldn't be where I am today if it wasn't for this program.*

*[It] was the best thing I possibly could have done for myself, and it set me up for a highly promising future.*

*If it wasn't for FAME, I'm not sure what I'd be doing. It changed my life.*

*I honestly believe it was the best decision I've ever made.*

Combine these subjective reports with our study’s quantitative findings about outcomes—an 80 percent completion rate and wage premiums between 60 and more than 100 percent,

Figure 7. No stigma attached to a job-focused college program

Q. How did your parents or spouse feel about your decision to enroll in FAME?

**Percentage responding 'very supportive' friends or family by type of participant**

Older, with manufacturing experience

92%

Traditional college-age

90%

Expected to attend college growing up

89%

Top third of high school graduating class

85%

Source: Opportunity America KY FAME graduates survey.

depending on the cohort—and it's hard to dispute that FAME is an unusually effective job-focused postsecondary program.

## A long list of high-value components

At the heart of our survey instrument, two batteries of questions probed why graduates chose to enroll in FAME and what they felt they got out of it—which aspects they valued most and felt contributed most to their success on the job.

**Expectations.** Exploring why learners chose FAME, we asked about a range of possible motives: the promise of a job, a promotion, a college degree, some other type of credential or the possibility of graduating from college with little or no student loan debt.

It turned out that all these reasons were appealing, but one stood out far above the others. More than 92 percent of graduates chose the program because they believed it would lead to a well-paying job. Nearly 93 percent hoped it would improve their job prospects—in effect, their employability. And these

motivations were consistent across the board: college-age learners, incumbents, students from the top of their high school class and less prepared learners all expressed more or less the same preferences.

When asked about credentials, FAME graduates found some significantly more appealing than others. Overall, 83 percent of respondents said they were drawn by the promise of a college degree, while just 33 percent were attracted by an apprentice's journeyman certificate. Asked in the focus groups why a college degree was important to them, participants talked primarily about employment—for them, the value of a degree is as a ticket to a job, including potentially a job in a different city or state where the FAME program is unknown. Neither academic certificates nor journeymen's certificates held the same cachet in their eyes.

Among our most striking findings about why learners chose FAME was the absence of what we expected might be a major obstacle: as Figure 7 shows, there appeared to be virtually no stigma attached to choosing a job-focused postsecondary program rather than a traditional academic track.

A full 90 percent of traditional college-age students, 92 percent of incumbents, 89 percent



of those who had grown up expecting to go to college and 85 percent of those who said they placed in the top third of their high school class reported that their parents or spouses were “very supportive” of their decision to enroll in an apprenticeship program. We have no way of knowing if this would be true in a different setting or a different social milieu.

**Most valuable feature.** The battery of questions about what FAME delivers—what makes it effective in preparing learners to succeed on the job—explored an array of features: the classroom learning, on-the-job experience, instruction, advising, cohort model and several other aspects of FAME program design. (See Figure 8.)

At first blush, it was hard to assess the answers—all the components were so highly prized. Asked about “the most valuable aspects of your experience in the FAME program,” more than 85 percent of respondents indicated that all 15 of the program features we asked about were “somewhat” or “very important” to them.

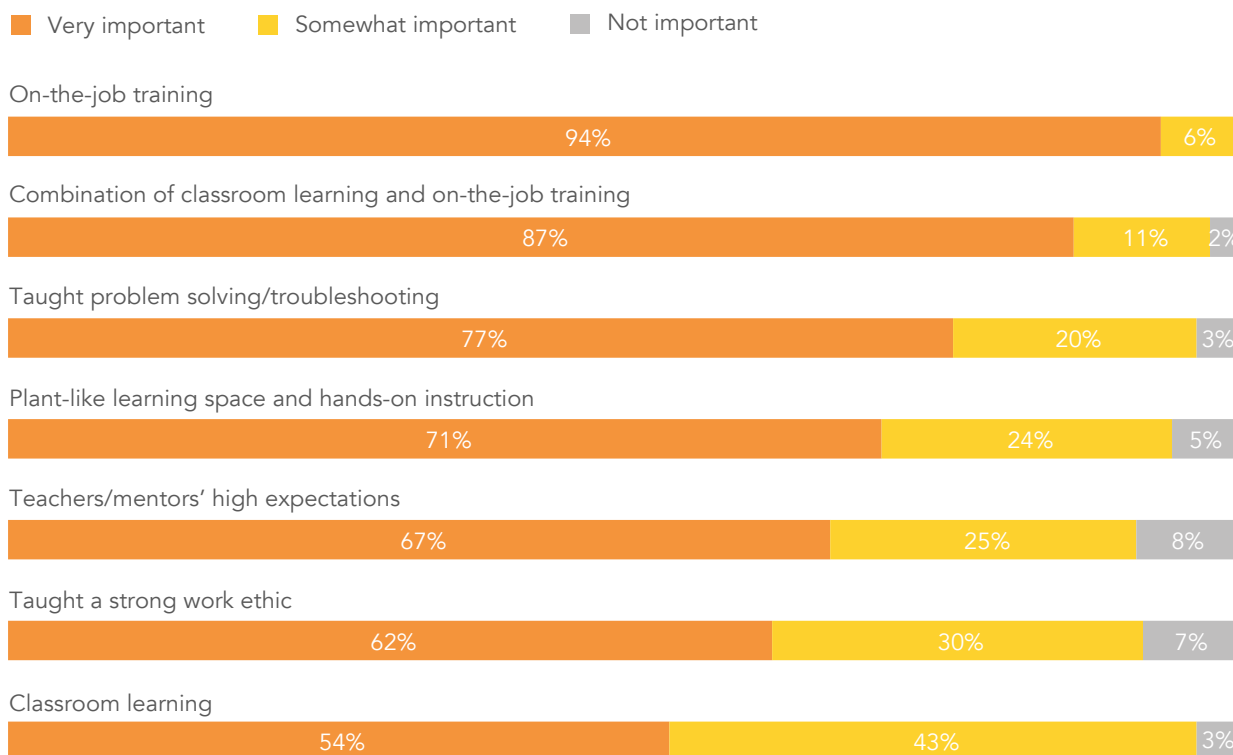
On closer inspection, three tiers of value emerged. In the top tier, once again, a single answer stood out, with 94 percent of respondents identifying it as “very important”: “what I learned on the job.”

“What I learned in class” came in far behind: overall, just 54 percent said it was “very important.” But an additional 43 percent said class was “somewhat important,” making it a top item in a second tier of high-value inputs.

Figure 8. What makes FAME effective

Q. What would you say were the most valuable aspects of your experience in the FAME program? What has helped you to be successful on the job since graduating from FAME?

Percentage rating program attribute as 'somewhat' or 'very' important



Source: Opportunity America KY FAME graduates survey.

Discussion in the focus groups clarified these rankings somewhat, confirming that graduates sorted what they valued about the program into two categories—what one described as “must-have and nice-to-have.”

For most apprentices, job experience was a must-have, classroom learning a highly ranked nice-to-have. Other highly ranked nice-to-haves, in the survey and the focus groups: “what the program taught me about a strong work ethic,” “what the program taught me about public speaking and communicating with others” and “the instruction and experience that prepared me for leadership.”

Learners’ evaluations of the two features of the program most important to FAME administrators—the combination of classroom instruction and work experience and the two-thirds of the curriculum devoted to nontechnical skills—were more complex.

Both were in the top tier of high-value features. But what emerged was more nuanced than a simple thumbs-up or thumbs-down. On both topics, FAME graduates had strong views about what did and didn’t work and what could be improved.

## Work and learn

The essence of apprenticeship—its distinguishing hallmark—is the way it combines classroom work and on-the-job training so that each reinforces the other and together the two experiences add up to more than the sum of the parts.

In theory, students who spend time in the workplace have an opportunity to apply what they learn in class, reinforcing abstract, academic instruction with practical experience. They learn how to handle themselves on a job, absorbing the norms and habits of more mature workers. Some find a mentor who challenges and inspires them in a way no teacher has been able to. For others, the most important takeaway is motivational: their experience on the job

---

Time in the workplace ‘helped me understand what questions to ask in class.’

helps them understand why what they’re learning in class matters and gives them a reason to apply themselves.

FAME graduates were strongly supportive of the work-and-learn model. Overall, 98 percent reported that the combination of classroom learning and on-the-job experience was a “somewhat” or “very important” component of FAME. As one student put it in a focus group, “It’s *the secret sauce*.”

But different types of learners found value in different dimensions of their experience, and across the board, FAME graduates had strong suggestions about how they thought academics and on-the-job training could be better balanced and coordinated.

**Something for everyone.** Perhaps not surprisingly, different types of learners took different things from the earn-and-learn experience.

Those who never expected to go to college or weren’t sure were significantly more likely to see the combination as a core component of the program. Its primary payoff in their eyes: the way work reinforced what they learned in class and helped them navigate the academic portion of the program—as one learner put it, it “helped me understand what questions to ask in class.”

Younger students, in contrast, were far more likely to value the mentoring. They were nearly 20 percentage points more likely than incumbents to appreciate the way “someone took me under their wing” and what the experience taught them about “adult responsibility.”

Perhaps most interestingly, the graduates who reported the highest job satisfaction—those we took to be the top performers—were





Photo credit: Toyota



noticeably more likely than others to see value in the work-and-learn experience.

They placed greater importance than other graduates on every potential aspect of the experience and were significantly more likely—by 15 to 20 percentage points—to appreciate the way time on the job exposed them to more mature workers, helping them develop a sense of adult responsibility.

**Room for improvement.** Even so, much as they valued the work-and-learn experience, graduates saw lots of room for improvement in the way it was structured and coordinated.

The subject came up unbidden at the start of every focus group and reemerged, usually several times, as the conversation continued. More respondents commented on it than any other topic in the open-ended question at the end of the survey, many of them offering sharp suggestions about what they saw as needed reforms. And when queried about what, if anything, they would change about the FAME program, more than 40 percent of graduates recommended a different balance of work-and-learn elements or better synchronization.

Their list of concerns fell into two broad categories: complaints about school and complaints about work, including the coordination of school and work.

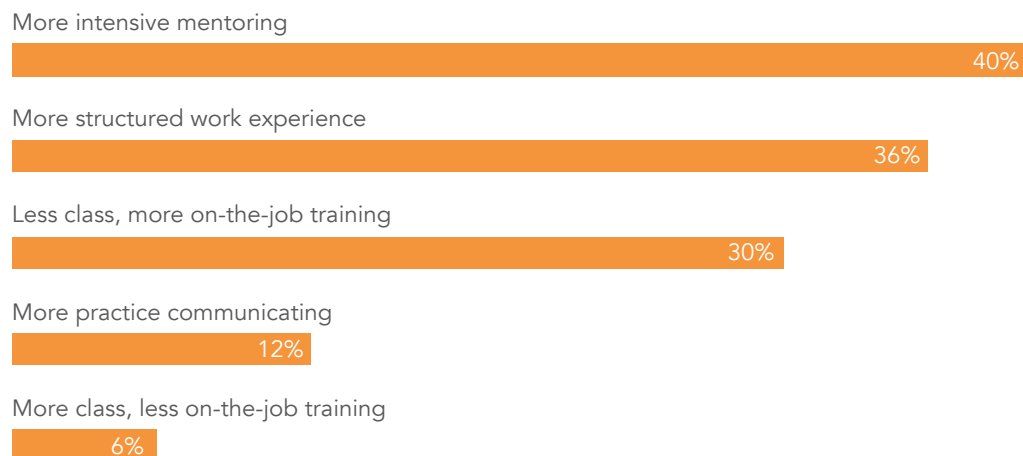
Nearly one-third wanted less time in class and more on the job. A number of respondents felt that the technical content of what they learned in class fell short of what they needed in the workplace. The college's equipment was not sophisticated enough. There were holes in the curriculum. Several learners wanted more emphasis on electrical work, others more computer programming and robotics.

But these quibbles about school paled in comparison to graduates' criticism of what they experienced in the workplace. Some found the two or three days a week they spent on the job well-structured and closely coordinated with what they learned in class. But they were outnumbered by those who said their on-the-job experience was disorganized, that the work they were assigned taught them little or nothing and that what passed as mentoring was sorely lacking—hardly worthy of the name. (See Figure 9.)

**Figure 9. Apprentices want more structured work-based learning**

*Q. If you could change any aspect of the FAME program, what would it be? (Choose up to three.)*

**Percentage identifying program attribute as needing improvement**



Source: Opportunity America KY FAME graduates survey.

“A lot of us were left to do the scut work,” one apprentice complained in the open-ended comment box at the end of the survey, “stuff the older maintenance guys were tired of doing.” “Sometimes you’re just observing or doing manual work,” reported another in a focus group. “My employer had no interest in training me,” said a third. “To him, I was just another employee—and one that he could get away with paying a much lower wage.”

When asked on the survey about how to improve the FAME program, 40 percent expressed a desire for more intensive mentoring, and 36 percent sought a more structured work experience.

Graduates had many suggestions about how to achieve these reforms. They proposed training for mentors and incentive pay. They wanted an opportunity to rate their mentors the way many students are able to rate their professors. They thought it might help if instructors spent more time on the shop floor. They suggested that FAME administrators take more responsibility for coordinating what’s taught in the classroom and what happens on the job, and they wanted the program to have higher standards in choosing employers to sponsor apprentices.

Some graduates grew heated, both in their free-form comments and in the focus groups, and they rarely pulled their punches. But others in the groups were quick to put their remarks in context. “Let’s be clear,” one said, “this is all constructive criticism. The combination of class and work is still the best thing about the program.”

### Soft skills and student supports

One area where apprentices seemed in strong agreement with FAME administrators: technical training is only part of what learners need to be successful in the workplace. As important if not more so: soft skills. And along with instruction, technical and nontechnical, students need an array of supports to survive in a challenging college program.

Both soft skills and student supports were highly valued by all different types of FAME graduates—and both appeared to play a significant part in determining who succeeded in the program.

**Nontechnical skills.** There’s no unit in the FAME curriculum called “soft skills,” but the program design puts heavy emphasis on two kinds of nontechnical abilities: “professional behaviors” like attendance, diligence and teamwork, but also what administrators call “competitive competencies”—higher-order workplace skills

---

Overall, 92 percent saw 'what the program taught me about a strong work ethic' as 'somewhat' or 'very important.'

like problem solving and the critical thinking at the heart of lean manufacturing protocols.

Graduates ranked both types of soft skills as highly valuable. Overall, 92 percent saw “what the program taught me about a strong work ethic” as “somewhat” or “very important.” A total of 93 percent said the same about “communicating with others,” and 97 percent put problem solving and troubleshooting in the “important” column.

Graduates ranked FAME’s discipline and no-excuses approach lowest on their list of valued attributes—perhaps because those who succeeded in the program didn’t feel they needed help in that department.

But when asked why other trainees dropped out before completing the program, nearly half of successful graduates singled out those students’ inability to comply with FAME’s strict requirements for attendance and timeliness. Interestingly, several participants in the focus groups said they thought the requirements

should be stricter. Many older graduates had noticed that the program was relaxing its attendance requirements, and they strongly opposed any easing of that kind.

**Guidance and mentoring.** FAME graduates, especially the older incumbents, came across as resilient men and women, independent and self-sufficient. But that didn't stop them from singling out student supports as an essential component of the program.

Counseling, mentoring and administrators' "high expectations" all ranked near the top of what graduates valued about the apprenticeship. A significant number mentioned more supports on their list of needed reforms. And nearly eight in 10 pointed to the highly structured sequence of courses that leaves learners little leeway or choice—what many educators and education reformers call a "guided pathways" model—as a "very important" component of the FAME experience.

Perhaps most strikingly, those who reported the highest job satisfaction—those we surmised might be the top performers—put especially high value on the guidance they received from teachers and mentors. They were 10 percentage points more likely to think counseling was "very important," 10 points more likely to put a high value on the program's guided pathways approach, 14 points more likely to say that administrators' high expectations made a difference and nearly 20 points more likely to underscore the benefits of mentoring.

## Who benefits

Conventional wisdom holds that job-focused education and training, including apprenticeship, is something for less able students—those less likely to succeed in a more rigorous, academic college program. FAME puts the lie to that demeaning notion.

All told, 51 percent of FAME graduates reported that their academic skills placed them

---

Where FAME makes the biggest difference—the learners it helps most—are the less well-prepared.

in the top third of their high school class, and just 4 percent recalled placing in the lowest third. A visit to any FAME classroom bears this out: it's not uncommon to encounter students who say they chose the program over an academic degree in engineering.

But some FAME students, these potential engineers among them, would likely succeed with or without the program. One way or another, their academic ability and disciplined work habits put them on a course to a postsecondary credential and, eventually, a well-paying job. For them, there are many paths to success—many ways to reach and stay in the middle class.

Where FAME makes the biggest difference—the learners it helps most—are the less well-prepared. Those less well-positioned academically, those who did not expect to go to college and those whose first job was as a production line worker with few expectations of promotion: they start out behind, but when they complete FAME, their prospects are as bright as those of any of their peers.

This difference was reflected in graduates' feelings about FAME: less well-prepared learners saw significantly greater value in the experience. Middling students were 10 percentage points more likely than top-tier students to "agree strongly" that it was the right decision for them, and those who weren't sure about attending college were more likely than their peers to "strongly recommend" it to a friend or family member.

The questions this posed for us as researchers: What are the elements of the program that matter most for this less likely group of



students? Does their experience differ? And should policy incentives be structured in a way to ensure that apprenticeship is available to both types of learners—those likely to succeed in any case and those with poorer chances?

**A different way of learning.** Less well-prepared students appear to value different aspects of the FAME program than other apprentices.

Survey respondents who did not expect to attend college were 10 percentage points more likely than those who did expect it to value the classroom portion of the program. Those who weren't sure about college were even more appreciative—23 percentage points more likely. The academically less well-prepared were 18 points more likely than those who excelled in high school to find value in classwork. And incumbent workers—those whose classroom experience was furthest in the past—were 14 points more likely than college-age students to feel they had benefited from the program's formal instruction.

What makes the difference for these learners, the reason they find FAME classes valuable in a way they didn't value prior schooling: the

The program's signature combination of school and work gives them an entry point.

program's signature combination of school and work gives them an entry point—a reason to pursue book learning and a way to make sense of it. (See Figure 10.)

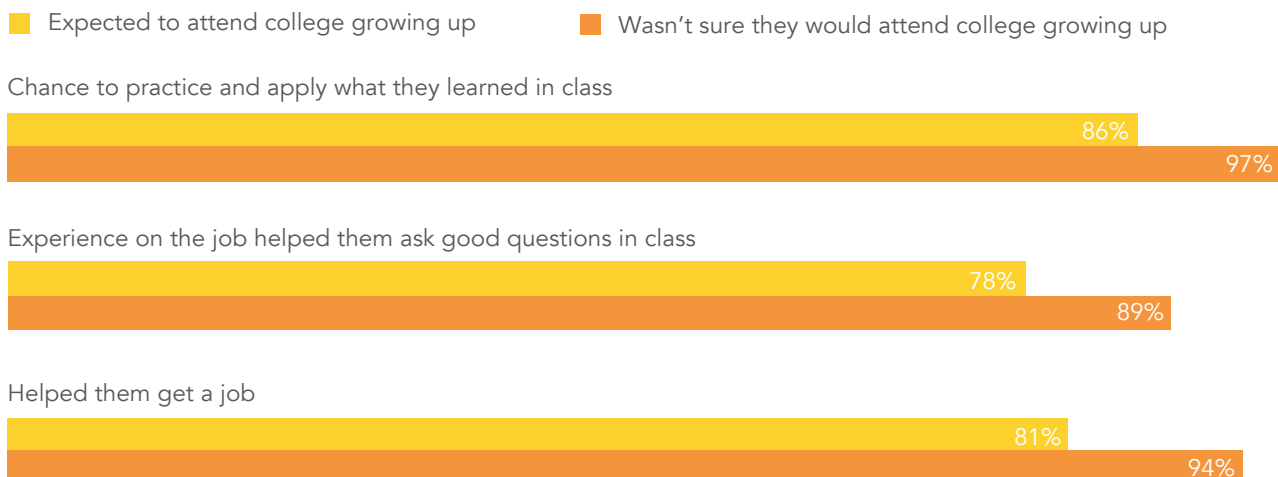
Those who weren't sure about attending college were 11 percentage points more likely than their college-bound peers to say that what they learned on the job helped them ask the right questions in class. Incumbents were 14 points more likely than younger students to find that work experience helped them make sense of classroom instruction.

The same pattern applies, although not always as starkly, to guidance from instructors and counselors and the aspects of the FAME program that resemble the guided pathways model. Less well-prepared learners were significantly more likely—a 10 to 15 percentage

Figure 10. On-the-job experience gives meaning to classroom instruction

Q. What do you think was most valuable about the on-the-job component of FAME?

Percentage rating program attribute 'very important' by whether respondent expected to attend college



Source: Opportunity America KY FAME graduates survey.

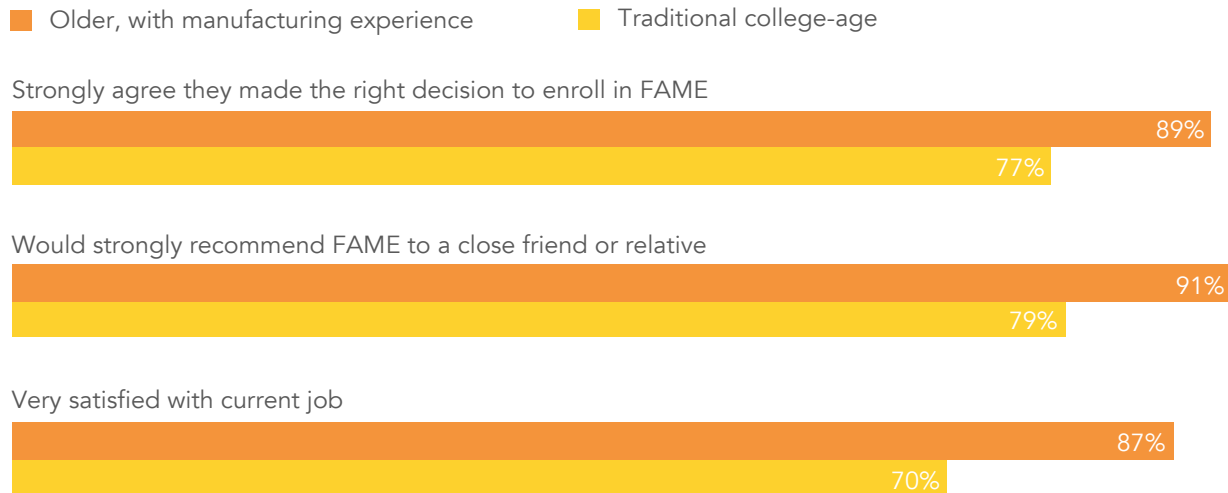
Figure 11. Experienced workers are more likely to value the FAME program

Q. Looking back, do you feel you made the right decision to enroll in FAME?

Q. Would you recommend FAME to a close friend or relative?

Q. Are you satisfied in your current job?

Percentage responding 'strongly agree' by age and manufacturing experience of participant



Source: Opportunity America KY FAME graduates survey.

point gap—to say that educators' high expectations were essential to their success.

**Incumbent workers.** Among the most interesting groups of less likely FAME students are incumbent workers—midcareer adults, mostly men, thrust back in school after years in the workplace, often in an entry-level manufacturing job.

The incumbents who participated in the focus groups were not shy about admitting that the program is often harder for them. Many were married with children, adding a third peg to juggle along with a full course load and a demanding job. Most hadn't been in a classroom in many years. Many didn't like school in the first place. And they tended to find FAME's stringent math requirements particularly challenging. "Calculus is a witch," one man complained, using a different word and provoking a burst of laughter from his peers.

But incumbents also come to FAME with some inherent advantages, and those too came out in the focus groups. "We're more disciplined," one worker said. "We see the value of education," explained another. "We know what we're getting into," said a third, "and that helps as we wrestle with it."

Perhaps it's not surprising then that incumbents are among those who feel they benefit most from the FAME program. As Figure 11 shows, older students with manufacturing experience are 12 percentage points more likely than younger students to "strongly agree" that they made the right decision in enrolling in FAME, 12 percentage points more likely to say they would "strongly recommend" it to a friend or family member and 17 points more likely to report they are "very satisfied" in their current job.

## RECOMMENDATIONS

We believe our study of FAME and what makes it most valuable to learners holds lessons for employers, educators and policymakers.

### For FAME

Graduates' message for FAME: don't rest on your laurels.

The Kentucky state data we examined, the graduates' evaluations we culled from our survey and focus groups, the enthusiastic employer uptake spurring FAME's rapid growth across the US: all indicators point in the same direction. FAME is an exceptional program, perhaps one of the best US job-focused education and training initiatives. But there is still work to be done—improvements needed and challenges that could be addressed or exacerbated depending on how the program grows.

---

### Companies need help structuring what apprentices do in the workplace.

Two issues stand out: recruiting for diversity and ensuring the quality and consistency of the on-the-job experience at the heart of any earn-and-learn training.

Recruiting for racial and gender diversity is not easy in a field that many still view, albeit often mistakenly, as dirty, dangerous, low-skill work. But KY FAME shows it can be done. After years of concerted effort, the share of graduates who are underrepresented minorities now matches the share in the state. The next frontier: women—a challenge FAME works hard to address but needs to make more of a priority.

Equally challenging and just as important, the complaints we surfaced about the quality and consistency of apprentices' on-the-job experience are a cry for help that must not be ignored.

Companies need help structuring what apprentices do in the workplace. Mentors need training and incentives. Educators and employers need to communicate more frequently and in a more granular way. And FAME administrators need to take more responsibility for ensuring a quality on-the-job experience—including, if necessary, taking steps to bring errant member companies in line.

In this realm, too, FAME shows it can be done: there are few better models of exemplary educator-employer collaboration than the best FAME partnerships. But quality needs to be more consistent.

### For other employers and educators

With policymakers across the US working to scale the apprenticeship model, employers and educators in a broad range of industries can learn from FAME and its successes.

The first and most important lesson: earn-and-learn training works. When structured properly and managed in the right way, it's a boost for students, a boon for employers and an unparalleled strategy for addressing economic inequality.

The KY FAME graduates whose opinions we explored identified the critical features of the model, essential for any program's success: a robust, well-structured on-the-job experience, closely coordinated classroom learning, attention to both hard and soft skills, high expectations and ample student supports.

Kentucky graduates' complaints about the inconsistency of their on-the-job experiences also hold lessons.

Hand-in-glove employer-educator collaboration is a central pillar of the FAME model. Regional employer collectives, employer-driven



student recruitment, co-crafted curriculum and a strong employer voice in the hiring of instructors all pay off in spades for the FAME program. What KY graduates are saying: take this a step further. It's the right model, but the collaboration should be closer and more intensive.

## For policymakers

The message from Kentucky for policymakers, state and federal: redouble your efforts to take earn-and-learn training to scale.

Our findings about Kentucky employment outcomes leave little doubt, and the good reviews we heard from FAME graduates reinforce the point. Few approaches are more effective than apprenticeship in preparing learners for the workforce. Structured properly and offered in cooperation with a community college, earn-and-learn training can boost post-secondary credential attainment. And at a time of growing concern about economic inequality, KY FAME shows what earn-and-learn programs can do to propel learners into the middle class.

---

The message for policymakers:  
redouble your efforts to take  
earn-and-learn training to scale.

What's needed from policymakers: more incentives for employers to launch earn-and-learn initiatives. A decade's worth of encouragement—by Obama, Trump, Congress and state lawmakers—has doubled the annual count of new apprentices, but from a very low base, and much more remains to be done.<sup>35</sup>

Among proven tools that can and should be used more widely: technical assistance from third-party intermediaries equipped to help companies launch programs. Lawmakers

should experiment with tax incentives and if they prove effective, expand their use.

Taking a leaf from European countries with highly successful apprenticeship sectors, there should be more government funding for the classroom portion of the earn-and-learn experience. Employers should cover the cost of apprentices' wages and mentors' time. But government should contribute toward—or shoulder—the cost of related classroom instruction offered at community colleges.

Federal and state officials should leverage the reach of trade associations to recruit employers, as FAME has done by aligning with the National Association of Manufacturers.

Also essential: flexibility and easy access for employers. Our study found little evidence that KY FAME graduates working for employers who registered their training with the state office of apprenticeship had better outcomes than those sponsored by employers with unregistered programs.

Quality control is essential. Any training that receives state or federal subsidies should be required to report outcomes, and registration is not without benefits for sponsoring companies, including, in some states, grant funding.

But many employers resist registering—they're wary of red tape and what they often see as overly rigid requirements for how their proprietary upskilling should be structured.<sup>36</sup> Nationwide, unregistered earn-and-learn initiatives may account for as many trainees as registered programs.<sup>37</sup> And if the nation's goal is to continue expanding earn-and-learn training, it's hard to see the logic of restricting it to companies willing to submit to a process many find off-putting or onerous.

The Kentucky example also holds two additional, nuanced suggestions about using apprenticeship to boost equity and economic mobility.

A first set of lessons grows from our findings about incumbent workers—the program's extraordinary payoff for older learners with job experience and a hard-earned understanding of why education is important.

Their superior outcomes don't argue for restricting who is admitted to apprenticeship programs. Younger KY FAME graduates also experienced extraordinary wage gains. Youth apprenticeship has its own distinct advantages, and it too should be scaled wherever possible.

What the FAME incumbent experience teaches: more students of all ages need real-world experience to help them grasp the value of classroom learning. All students need opportunities for work-based learning in middle school and high school. There's a strong argument for encouraging learners to take a gap year before committing to an intensive postsecondary program. And more work—much more work—is needed to make it easier for learners to come back to the classroom after they have spent time in the workplace.

Among the reforms that should be encouraged: more widespread use of prior learning assessments, more readily available credit for prior learning and college programs redesigned for midcareer adults—with different formats, different schedules and a different kind of advising.

Bottom line: midcareer students should not be seen as less likely college material. If anything, they're more likely to benefit from a well-designed postsecondary program.

A second set of lessons grows from our findings about less well-prepared students. The thrust among policymakers in recent years has been to focus on expanding apprenticeship to nontraditional sectors—in many cases, white-collar occupations that would otherwise recruit four-year college graduates. There's no harm in this: as FAME's top achievers show and our findings about KY FAME earnings underscore, all learners can benefit from apprenticeship.

---

More students of all ages  
need real-world experience to  
help them grasp the value of  
classroom learning.

But these better-prepared students would likely have done well in life with or without the earn-and-learn experience. Other learners—less well-prepared students, those who grow up with no expectation of attending college, older learners and those headed for jobs in blue-collar industries—face steeper challenges. Our study suggests that earn-and-learn training may be particularly beneficial for them, and in many cases, it's their only path to a postsecondary credential and well-paying career.

The takeaway: policymakers should not lose sight of older, less advantaged, less likely students as they create incentives to expand apprenticeship. This is where the earn-and-learn model can potentially add the most value—the biggest payoff for learners and for economic mobility.

One of the KY FAME graduates who took the time to add a free-form comment at the end of our survey left an eloquent reminder of the difference an apprenticeship can make. "Before the FAME program," he wrote, "I wasn't going to go to college. FAME taught me that I could succeed in life."









# APPENDIX I

## KENTUCKY CENTER FOR STATISTICS METHODOLOGY

### FAME PAIR-MATCHING AND SIGNIFICANCE TESTS

KY FAME provided records for 576 students who enrolled in the program between the 2010-11 and 2017-18 academic years. Of those 576 records, the Kentucky Center for Statistics (KYSTATS) was able to match 552 into the Kentucky Longitudinal Data System (KLDS).

FAME provided additional records for 203 enrollees for the 2018-19 academic year of enrollment that could not be matched into the KLDS because 2018-19 academic and graduation data were not yet available from KLDS at the time of our analysis.

Completers were defined as FAME enrollees who earned associate degrees within two years of enrolling in the program. Although FAME requires enrollees to complete degrees in specified career and technical education majors in two years, we included in our analysis four enrollees who earned degrees in requisite majors in 2.5 years. We did not include a FAME enrollee who obtained an associate degree in a liberal arts major.

No FAME graduate took more than 2.5 years to earn an associate degree from the Kentucky Community and Technical College System (KCTCS).

KYSTATS analyzed these data by comparing FAME enrollees to two similar groups of students who did not participate in FAME. The comparison groups were developed by two iterations of pair-matching.

Pair-matching is a process by which each individual in a treatment group is matched to an individual who has not experienced the treatment being analyzed—in this case, participation in the FAME program—but is otherwise as similar as possible. This methodology

allows for comparison of two like groups and also for performing statistical tests to analyze the significance of any differences discovered between the two groups.

### MATCHED PAIR 1: FAME ENROLLEES

KYSTATS imported records for 132,285 KCTCS students who enrolled for the first time as full-time students seeking associate degrees between the academic years of 2010-11 and 2016-17. Of that 132,285, 389 students were FAME enrollees.

In order for a FAME participant to be matched to a non-FAME participant, both must have met the following criteria:

- Enrolled seeking an associate degree in the exact same semester (semester of FAME enrollment or first semester of full-time status at KCTCS)
- Identically enrolled or not enrolled in a developmental course during their first year of enrollment at KCTCS
- Enrolled in institutions in the same local workforce area\*

In addition, the following four characteristics were prioritized when matching:

- Approximately the same age
- Awarded approximately the same Pell Grant amount in the first year of enrollment
- In the same academic class—freshman or sophomore
- Same status of underrepresentation—same race, ethnicity or gender

---

\* Kentucky's 10 local workforce areas were established by the Workforce Investment Act of 1998 and are responsible for overseeing the implementation of America's public workforce investment system in their local communities.

A student who is not underrepresented is a white, non-Hispanic male.

No attempt was made to match majors because of the wide array of majors chosen by KCTCS students—including FAME students—at the time of enrollment.

Among the pairs identified, all had the exact same classification upon enrollment and the exact same race, ethnicity or gender. They were also in the same age “bucket” (i.e., under 28 or 28 or older). All but 39 students were awarded the exact same Pell amount. There were only 19 pairs with a Pell award difference of more than \$100, with a maximum difference of \$933.

A McNemar’s chi-squared test was performed on FAME versus non-FAME associate degree seekers, testing students’ degree completion rates. It showed a statistically significant difference in attainment of associate degrees between FAME participants and nonparticipants at the  $p < 0.001$  level.

The contingency table below shows the matched pairs we considered—in each core cell, one bolded group in each row is matched with one bolded group in each column—and the number of students in each matched group.

## MATCHED PAIR 2: FAME COMPLETERS

We began a second pair-match by importing records for 13,285 KCTCS students. To be included in this set, students must have met the following criteria:

- Must have earned an associate degree between the academic years of 2011-12 and 2016-17
- Associate degree must be in an area coded by KCTCS as career and technical education
- If a FAME enrollee, must have completed the FAME program
- Must have a record of employment one year after completion

This group of students included 134 FAME completers and 13,151 associate degree earners who were never enrolled in FAME.

For a FAME participant to be matched to a non-FAME participant, both must have met the following criteria:

- Earned an associate degree in the same year
- Identically enrolled or not enrolled in a developmental course during their first year of enrollment at KCTCS
- Enrolled in institutions in the same local workforce area

In addition, the following four characteristics were prioritized when matching:

- Approximately the same age
- Awarded approximately the same Pell amount in the first year of enrollment
- In the same academic class—freshman or sophomore
- Same race, ethnicity or gender

Appendix figure 1. Matched pair contingency table

ASSOCIATE DEGREE ATTAINMENT	<b>Non-FAME student, Non-degree earner</b>	<b>Non-FAME student, degree earner</b>	TOTAL
<b>FAME enrollee, Non-degree earner</b>	14.7% (57)	5.1% (20)	19.8% (77)
<b>FAME enrollee, degree earner</b>	56.3% (219)	23.9% (93)	80.2% (312)
TOTAL	71.0% (276)	29.0% (113)	100% (389)



For this comparison, we were able to pair-match all 134 FAME completers to non-FAME completers.

Paired *t*-tests were performed on the differences between mean wages of FAME versus non-FAME associate degree earners one, three and five years after graduation. Due to redaction issues, the paired students were divided

into groups earning degrees over a span of two years.

The *t*-test showed the differences to be statistically significant at the 0.001 level for all years and wages one and three years post-graduation. The mean wage differences were statistically significant at the 0.01 level for wages five years post-graduation.

## Appendix figure 2. Statistical analysis of differences in mean wages

ONE YEAR POST-GRADUATION	Number of pairs	Difference in mean wages (\$)	<i>p</i> -value	Standard deviation of differences
2011-12 / 2012-13	26	24,835***	< 0.001	4,570
2013-14 / 2014-15	23	22,384***	< 0.001	4,450
2015-16 / 2016-17	85	21,146***	< 0.001	3,179
Total	134	22,075***	< 0.001	2,321

THREE YEARS POST-GRADUATION	Number of pairs	Difference in mean wages (\$)	<i>p</i> -value	Standard deviation of differences
2011-12 / 2012-13	17	39,667***	< 0.001	6,345
2013-14 / 2014-15	17	36,343***	< 0.001	8,260
2015-16 / 2016-17	—	—	—	—
Total	34	38,005***	< 0.001	5,137

FIVE YEARS POST-GRADUATION	Number of pairs	Difference in mean wages (\$)	<i>p</i> -value	Standard deviation of differences
2011-12 / 2012-13	18	33,802**	0.003	9,954
2013-14 / 2014-15	—	—	—	—
2015-16 / 2016-17	—	—	—	—
Total	18	33,802**	0.003	9,954

Note: \*\**p* < 0.01, \*\*\* *p* < 0.001

## APPENDIX II

# OPPORTUNITY AMERICA KY FAME GRADUATES SURVEY

### YOUR BACKGROUND

*Thank you for participating in the Opportunity America survey of KY FAME graduates. We appreciate your time and input. The survey is anonymous and off the record. We will not quote you.*

*But we do need to know a few things about you in order to understand your FAME experience, and if you choose, once you complete the survey, you may give us your name to be entered in a raffle.*

*First prize is a \$75 Amazon gift card. Second prize is a \$50 gift card. Third prize is a \$25 card.*

1/ What year did you graduate from FAME?

2/ What KCTCS campus did you attend while in the FAME program?

3/ How long after graduating from high school did you enter the FAME program?

- One to two years
- Three to four years
- Five to 10 years
- More than 10 years

4/ Did you spend any time in college before entering the FAME program?

- Yes
- No

5/ Were you working in manufacturing before entering the FAME program?

- Yes
- No

6/ Did you enroll in FAME as an incumbent worker sponsored by your employer?

- Yes
- No

### CHOOSING FAME

7/ How did you first hear about FAME?

- From a teacher
- From a guidance counselor
- From an employer
- From a peer
- Other (please specify) \_\_\_\_\_

8/ Growing up, did you expect to attend college—either two-year or four-year college?

- Yes
- No
- Wasn't sure

9/ How would you assess your place in your high school graduating class?

- Academically, in the top third of the class
- Academically, in the middle of the class
- Academically, in the bottom third of the class

10/ What did most of your friends do after high school?

- Dropped out of high school & went to work
- Finished high school & went to work
- Enrolled in community college
- Enrolled in a four-year college
- Joined the military
- Other (please specify) \_\_\_\_\_

11/ What were the most important factors in your choice to try out for FAME?

FAME ATTRIBUTE	VERY IMPORTANT	SOMEWHAT IMPORTANT	NOT IMPORTANT
I like working with my hands			
I wanted to move from production to maintenance work			
The combination of class time & hands-on learning			
The promise of a well-paying job at the end of the program			
The promise of a promotion if I finished the program			
Financial considerations relating to college costs—being paid to go to college			
Financial considerations relating to student loan debt			
The promise of earning a degree			
The promise of earning one or more technical certificates			
The promise of earning a journeyman's card			
Completing the program would improve my chances in the job market			

12/ How did your parents or spouse feel about your decision to enroll in FAME?

- Very supportive
- Somewhat supportive
- Somewhat concerned about the added work & stress
- Very concerned about the added work & stress

13/ What do you think you would have done if you had not enrolled in FAME?

- No further education
- A different community college program
- A four-year college program
- Other (please specify) \_\_\_\_\_

14/ Looking back, do you feel you made the right decision to enroll in FAME?

- Strongly agree
- Agree somewhat
- Disagree somewhat
- Strongly disagree



## YOUR EXPERIENCE IN THE FAME PROGRAM

15/ What would you say were the most valuable aspects of your experience in the FAME program? What has helped you to be successful on the job since graduating from FAME?

FAME ATTRIBUTE	VERY IMPORTANT	SOMEWHAT IMPORTANT	NOT IMPORTANT
What I learned in class—technical content			
What I learned on the job			
The combination of classroom learning & on-the-job experience			
What the program taught me about a strong work ethic			
What the program taught me about problem solving/troubleshooting			
What the program taught me about teamwork			
What the program taught me about public speaking & communicating with others			
The college’s plant-like learning space & hands-on instruction			
The instructor had worked in manufacturing			
The discipline & no-excuses approach			
The high expectations of instructors and/or mentors			
I rarely had to think about what to take next—the course schedule was planned for us			
The cohort I studied with & how we helped each other			
Guidance & day-to-day help from an instructor or career coach			
The instruction & experience that prepared me for a leadership position			
Other (please specify)			

16/ What do you think was most valuable about the on-the-job component of FAME?

FAME ATTRIBUTE	VERY IMPORTANT	SOMEWHAT IMPORTANT	NOT IMPORTANT
The chance to practice & apply what I learned in class			
Working at the company & understanding what the job entailed gave me a reason to pay attention in class			
My experience on the job helped me ask good questions in class			
Working at the company & applying what I learned in class helped me remember what I learned			
Working at the company taught me about adult responsibility			
Someone at the company took me under their wing & encouraged me			
The experience working at a company helped me get a job after graduating from FAME			
Other (please specify)			

17/ Not everyone who enrolls in FAME completes the program. What do you think were the main reasons some of your classmates dropped out? (Please choose up to two.)

- Difficulty keeping up with the college coursework
- Difficulty holding down a job
- Difficulty combining school & work—keeping up in class & holding down a job
- They learned they did not want to work in manufacturing
- They were unable to comply with requirements for attendance & timeliness
- The discipline & no-excuses approach
- Personal reasons unrelated to the program
- Other (please specify) \_\_\_\_\_

18/ If you could change any aspect of the FAME program, what would it be? (Please choose up to three.)

- Less time in class, more time on the job
- More time in class, less time on the job
- More emphasis on how to handle yourself on the job
- More practice communicating
- More guidance from teachers & others at the college
- A more structured work experience
- More intensive mentoring on the job
- Other (please specify) \_\_\_\_\_

19/ Are you satisfied in your current job?

- Very satisfied
- Somewhat satisfied
- Somewhat dissatisfied
- Very dissatisfied

20/ Do you plan to go back to school in the future?

- Yes, to get a bachelor's degree
- Yes, to get a graduate or professional degree
- Yes, to get more specialized training
- No, I don't expect to go back to school

21/ Would you recommend FAME to a close friend or relative?

- Recommend strongly
- Recommend somewhat
- Discourage somewhat
- Discourage strongly

## KENTUCKY FAME

---

22/ Please tell us about your background.

- White
- African-American
- Hispanic
- Asian-American
- Other (please specify)

23/ Please tell us your gender.

- Male
- Female
- Other (please specify)

24/ Is there anything you would like to add—additional feedback or suggestions for improvement in the FAME program?

*Thank you for your time and input!*



# Endnotes

1. Data provided by the Georgetown University Center on Education and the Workforce for Opportunity America Working Group on Community College Workforce Education, *The Indispensable Institution: Reimagining Community College*, June 2020, [https://opportunityamericaonline.org/wp-content/uploads/2020/06/Indispensable\\_Inst\\_FullReport.pdf](https://opportunityamericaonline.org/wp-content/uploads/2020/06/Indispensable_Inst_FullReport.pdf).
2. Ibid.
3. Motoko Rich, "Factory Jobs Return, but Employers Find Skills Shortage," *New York Times*, July 1, 2010, <https://www.nytimes.com/2010/07/02/business/economy/02manufacturing.html>.
4. Anthony P. Carnevale, Tamara Jayasundera and Artem Gulish, *America's Divided Recovery: College Haves and Have-Nots*, Georgetown University Center on Education and the Workforce, 2016, <https://cew.georgetown.edu/wp-content/uploads/Americas-Divided-Recovery-web.pdf>.
5. Ibid.
6. Anthony P. Carnevale, Nicole Smith and Jeff Strohl, *Recovery: Job Growth and Education Requirements Through 2020*, Georgetown University Center on Education and the Workforce, June 2013, [https://cew.georgetown.edu/wp-content/uploads/2014/11/Recovery2020.FR\\_Web\\_.pdf](https://cew.georgetown.edu/wp-content/uploads/2014/11/Recovery2020.FR_Web_.pdf).
7. Ibid.
8. Anthony P. Carnevale et al., *Three Educational Pathways to Good Jobs: High School, Middle Skills, and Bachelor's Degree*, Georgetown University Center on Education and the Workforce, 2018, <https://cew.georgetown.edu/wp-content/uploads/3ways-FR.pdf>.
9. Career Vision, "Opportunities Abound in Middle-Skill Jobs," 2018, <https://careervision.org/opportunities-abound-middle-skill-jobs/>; and Harry J. Holzer, *Job Market Polarization and US Worker Skills: A Tale of Two Middles*, Brookings Institution, April 2015, [https://www.brookings.edu/wp-content/uploads/2016/06/polarization\\_jobs\\_policy\\_holzer.pdf](https://www.brookings.edu/wp-content/uploads/2016/06/polarization_jobs_policy_holzer.pdf).
10. Harry J. Holzer, "The Robots Are Coming: Let's Help the Middle Class Get Ready," Up Front Blog, Brookings Institution, December 13, 2018, <https://www.brookings.edu/blog/up-front/2018/12/13/the-robots-are-coming-lets-help-the-middle-class-get-ready/>; Holzer, *Job Market Polarization and US Worker Skills*; Joseph B. Fuller et al., *Bridge the Gap: Rebuilding America's Middle Skills*, Accenture, Burning Glass and Harvard Business School, November 2014, <https://www.hbs.edu/competitiveness/Documents/bridge-the-gap.pdf>; and Anthony P. Carnevale et al., *Good Jobs That Pay Without a BA*, Georgetown University Center on Education and the Workforce, 2017, <https://goodjobsdata.org/wp-content/uploads/Good-Jobs-wo-BA-final.pdf>.
11. Doug Lederman and Paul Fain, "The Higher Education President," Inside Higher Ed, January 19, 2017, <https://www.insidehighered.com/news/2017/01/19/assessing-president-obamas-far-reaching-impact-higher-education>.
12. Lumina Foundation, *A Stronger Nation Through Higher Education: National Report 2020*, February 2020, <http://strongernation.luminafoundation.org/report/2020/#nation>.
13. Ibid.
14. J.B. Wogan, "States Increasingly Look to Apprentices to Bolster Their Workforce," *Government Technology*, March 14, 2018, <https://www.govtech.com/workforce/States-Increasingly-Look-to-Apprentices-to-Bolster-Their-Workforce.html>.
15. Iris Hentze and Saige Draeger, "State Apprenticeship Legislation in 2019," NCSL Blog, National Conference of State Legislatures, November 18, 2019, <https://www.ncsl.org/blog/2019/11/18/state-apprenticeship-legislation-in-2019.aspx>.
16. US Department of Labor, "Fact Sheet: Investing \$90 Million Through ApprenticeshipUSA to Expand Proven Pathways into the Middle Class," April 21, 2016, <https://www.dol.gov/newsroom/releases/osec/osec20160421>.
17. There are two potential sources for apprenticeship funding: congressional appropriations and H-1B visa fees. Between 2017 and 2020, H-1B visa-funded grant programs accounted for \$433,081,216, and Congress appropriated \$586.4 million for apprenticeship, for a total of \$1,019,481,216.

Between 2017 and 2020, H-1B fees were used to cover the cost of three US Department of Labor competitive grant programs. See US Department of Labor, Employment and Training Administration, "US Department of Labor Announces Funding Opportunity for Apprenticeship Expansion in Key Industry Sectors," July 18, 2018, <https://www.dol.gov/newsroom/releases/eta/eta20180718>; US Department of Labor, Employment and Training Administration, "US Department of Labor Makes Major Announcements on Apprenticeship Expansion," June 24, 2019, <https://www.dol.gov/newsroom/releases/eta/eta20190624>; and US Department of Labor, Employment and Training Administration, "US Department of Labor Announces Nearly \$100 Million in Apprenticeship Grants to Close the Skills Gap," February 18, 2020, <https://www.dol.gov/newsroom/releases/eta/eta20200218>.

Between 2017 and 2020, there were nine congressional appropriations for apprenticeship. See US Department of Labor, Employment and Training Administration, "Notice of Availability of Funds and Funding Opportunity Announcement for: Women in Apprenticeship and Nontraditional Occupations (WANTO) Technical Assistance Grant Program," 2017, <https://opportunityamericaonline.org/wp-content/uploads/2020/08/FOA-WB-17-01-3.pdf>; Department of Education, Office of Career, Technical and Adult Education, "Applications for New Awards: Pathways to STEM Apprenticeship for High School Career and Technical Education Students," May 18, 2018, <https://www.federalregister.gov/documents/2018/05/18/2018-10671/applications-for-new-awards-pathways-to-stem-apprenticeship-for-high-school-career-and-technical#p-16>; "Further Consolidated Appropriations, 2020," P.L. 116-94, 116th Cong. (2019), <https://www.congress.gov/116/plaws/publ94/>

- PLAW-116publ94.pdf; US Department of Labor, “FY 2020 Department of Labor Budget in Brief,” <https://www.dol.gov/sites/dolgov/files/general/budget/2020/FY2020BIB.pdf>; and US Department of Labor, Women’s Bureau, “WANTO Grants,” <https://www.dol.gov/agencies/wb/grants/wanto>.
18. US Department of Labor, Employment and Training Administration, “Registered Apprenticeship National Results Fiscal Year 2019 (10/01/2018 to 9/30/2019),” 2020, <https://www.dol.gov/agencies/eta/apprenticeship/about/statistics>; and National Center for Education Statistics, “Fast Facts: Back To School Statistics,” 2020, [https://nces.ed.gov/fastfacts/display.asp?id=372#College\\_enrollment](https://nces.ed.gov/fastfacts/display.asp?id=372#College_enrollment).
  19. Peter Cappelli, “Skills Gaps, Skills Shortages and Skills Mismatches: Evidence for the US” (working paper 20382, National Bureau of Economic Research, August 2014), <https://www.nber.org/papers/w20382>.
  20. Robert I. Lerman, “Are Employers Providing Enough Training? Theory, Evidence and Policy Implications,” Urban Institute and American University and IZA, 2015, [https://sites.nationalacademies.org/cs/groups/pgasite/documents/webpage/pga\\_168146.pdf](https://sites.nationalacademies.org/cs/groups/pgasite/documents/webpage/pga_168146.pdf).
  21. Anthony P. Carnevale, Jeff Strohl and Artem Gulish, *College Is Just the Beginning: Employers’ Role in the \$1.1 Trillion Post-secondary Education and Training System*, Georgetown University Center on Education and the Workforce, February 2015, <https://files.eric.ed.gov/fulltext/ED558166.pdf>.
  22. Craig Copeland, “Trends in Employee Tenure, 1983-2018,” *EBRI Issue Brief* no. 474, Employee Benefit Research Institute, February 28, 2019, [https://www.ebri.org/docs/default-source/ebri-issue-brief/ebri\\_ib\\_474\\_tenure-28feb19.pdf](https://www.ebri.org/docs/default-source/ebri-issue-brief/ebri_ib_474_tenure-28feb19.pdf).
  23. Manufacturing Institute, “The Manufacturing Institute Training Survey 2020,” January 17, 2020, <https://www.themanufacturinginstitute.org/research/the-manufacturing-institute-training-survey-2020/>; Business Roundtable, *Work in Progress: How CEOs Are Helping Close America’s Skills Gap*, June 2017, [https://s3.amazonaws.com/brt.org/archive/immigration\\_reports/BRT%20Work%20in%20Progress\\_0.pdf](https://s3.amazonaws.com/brt.org/archive/immigration_reports/BRT%20Work%20in%20Progress_0.pdf); Fuller et al., *Bridge the Gap*; The White House, “Pledge to America’s Workers,” 2020, <https://www.whitehouse.gov/pledge-to-americas-workers/>; Obama White House, *White House Report: President Obama’s Upskilling Initiative*, April 2015, [https://obamawhitehouse.archives.gov/sites/default/files/docs/150423\\_upskill\\_report\\_final\\_3.pdf](https://obamawhitehouse.archives.gov/sites/default/files/docs/150423_upskill_report_final_3.pdf); and Tamar Jacoby, *Employer Engagement in Career Education*, testimony before the House Committee on Education and the Workforce, Subcommittee on Higher Education and Workforce Development, 115th Cong., 2nd sess., May 9, 2018, <http://opportunityamericaonline.org/wp-content/uploads/2018/05/OA-EW-testimony-5-18.pdf>.
  24. *Workforce Investment Act of 1998*, Public Law 105-220, *US Statutes at Large* 112 (1998): 936–1247, <https://www.govinfo.gov/content/pkg/PLAW-105publ220/pdf/PLAW-105publ220.pdf>; *Workforce Innovation and Opportunity Act*, Public Law 113-128, *US Statutes at Large* 128 (2014): 1425–722, <https://www.govinfo.gov/content/pkg/PLAW-113publ128/pdf/PLAW-113publ128.pdf>; and *Strengthening Career and Technical Education for the 21st Century Act*, Public Law 115-224, *US Statutes at Large* 132 (2018): 1563–623, <https://www.congress.gov/115/plaws/publ224/PLAW-115publ224.pdf>.
  25. Deloitte and Aspen Institute, *A Guide to Upskilling America’s Frontline Workers*, March 2018, [https://assets.aspeninstitute.org/content/uploads/2018/03/Upskilling\\_Employer\\_Handbook\\_042015.pdf](https://assets.aspeninstitute.org/content/uploads/2018/03/Upskilling_Employer_Handbook_042015.pdf); Jason A. Tyszko, Robert G. Sheets and Joseph B. Fuller, *Managing the Talent Pipeline: A New Approach to Closing the Skills Gap*, US Chamber of Commerce Foundation Center for Education and Workforce, 2014, <https://www.uschamberfoundation.org/sites/default/files/Managing%20the%20Talent%20Pipeline.pdf>; and Opportunity America-AEI-Brookings Working Class Study Group, *Work, Skills, Community: Restoring Opportunity for the Working Class*, Opportunity America, American Enterprise Institute and Brookings Institution, November 2018, [http://opportunityamericaonline.org/wp-content/uploads/2018/10/WCG-final\\_web.pdf](http://opportunityamericaonline.org/wp-content/uploads/2018/10/WCG-final_web.pdf).
  26. “FAME: Federation for Advanced Manufacturing Education,” Manufacturing Institute, <https://www.themanufacturinginstitute.org/workers/fame/>.
  27. Toyota Motor Manufacturing, Kentucky, “About TMMK,” <http://toyotaky.com/boutdex.asp>.
  28. Tamar Jacoby and Robert I. Lerman, *Industry-Driven Apprenticeship: What Works, What’s Needed*, Opportunity America, February 2019, [https://opportunityamericaonline.org/wp-content/uploads/2019/02/OA\\_ApprenticeshipReport\\_2019.pdf](https://opportunityamericaonline.org/wp-content/uploads/2019/02/OA_ApprenticeshipReport_2019.pdf).
  29. Opportunity America Working Group on Community College Workforce Education, *The Indispensable Institution*.
  30. Jacoby and Lerman, *Industry-Driven Apprenticeship*.
  31. Oren Cass, *The Once and Future Worker: A Vision for the Renewal of Work in America* (New York: Encounter Books, 2018); *Quality Pathways: Employer Leadership in Earn and Learn Opportunities*, US Chamber of Commerce Foundation and Manufacturing Institute, March 2018, [https://www.uschamberfoundation.org/sites/default/files/Quality%20Pathways\\_March%202018.pdf](https://www.uschamberfoundation.org/sites/default/files/Quality%20Pathways_March%202018.pdf); *Work-and-Learn in Action: Successful Strategies for Employers*, National Network, November 2015, <https://s3.amazonaws.com/brt.org/archive/BRT%20Work%20and%20Learn%20Nov12.pdf>; and Jacoby and Lerman, *Industry-Driven Apprenticeship*.
  32. Opportunity America Working Group on Community College Workforce Education, *The Indispensable Institution*; and Rachel Rosen, Mary Visser and Katie Beal, *Career and Technical Education: Current Policy, Prominent Programs, and Evidence*, MDRC, September 2018, <https://www.mdrc.org/sites/default/files/CTE%20Paper-Final.pdf>.
  33. Jorge Klor de Alva and Mark Schneider, *Apprenticeships and Community Colleges: Do They Have a Future Together?*, American Enterprise Institute, May 2018, <https://files.eric.ed.gov/fulltext/ED585878.pdf>; US Department of Labor, “Apprenticeship Toolkit: Frequently Asked Questions,” 2020, <https://www.dol.gov/apprenticeship/toolkit/toolkitfaq.htm#>; Elka Torpey (updated by Ryan Farrell), “Apprenticeships: Outlook and Wages in Selected Occupations,” *Career Outlook*, US Bureau of

---

Labor Statistics, November 2019, <https://www.bls.gov/careeroutlook/2019/article/apprenticeships-outlook-wages-update.htm>; and Debbie Reed et al., *An Effectiveness Assessment and Cost-Benefit Analysis of Registered Apprenticeship in 10 States*, Mathematica Policy Research, July 2012, <https://www.mathematica.org/our-publications-and-findings/publications/an-effectiveness-assessment-and-costbenefit-analysis-of-registered-apprenticeship-in-10-states>.

34. *All In: Shaping Tomorrow's Manufacturing Workforce Through Diversity and Inclusion*, Manufacturing Institute and PwC, 2018, <https://www.themanufacturinginstitute.org/wp-content/uploads/2020/03/MI-PwC-Diversity-and-Inclusion-Report.pdf>.
35. US Department of Labor, Employment and Training Administration, "Registered Apprenticeship National Results Fiscal Year 2019 (10/01/2018 to 9/30/2019)."
36. Jacoby and Lerman, *Industry-Driven Apprenticeship*.
37. *Ibid.*



