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An Evaluation of the Labor Market Impact of AO-K

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Executive Summary

At the request of the Kansas Board of Regents, the Center for Science, Technology, & Economic Policy at the University of Kansas evaluated the labor market impact of the Accelerating Opportunity program in Kansas (AO-K). The Accelerating Opportunity (AO) program is designed fill some of the gap between the skills employers seek and the skills of the available labor force. A main feature of AO programs is the inclusion of adult basic education instructors in technical education courses. We matched students participating in AO-K with a "control group" student in a program with the same major and award level, but at a school where that track was not designated for AO-K supports. To the extent possible, the control group students were also matched on characteristics such as gender, ethnicity, and college readiness. The matching process is designed to even out the effects of these measurable characteristics so that we can single out the effect of AO-K.

We found that the AO-K had the following impact on labor market outcomes:

- AO-K students were significantly more likely to complete the certificate levels of SAPP (<16 credits) and CERTC (45-59hrs) than the comparison group.
- AO-K students were more persistent—they were significantly less likely to drop out and more likely to continue through their second year than the comparison group.
- AO-K students earned significantly more technical credits than the comparison group.
- AO-K students were less likely to fail their courses than the comparison group.
- AO-K students earned more industry credits than the comparison group.
- AO-K students were less likely to be employed before starting their programs and during the program years than the comparison group. Students from both groups who complete one more certificates or degrees are substantially more likely to be employed than drop out.
- AO-K students earned the same median wages as those from the comparison group after completing the program.

Completing certificate programs increases wages and employment. Thus, to the extent that AO-K increases certificate completions relative to the comparison group, it has a significant impact on the workforce outcomes of participants.

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Introduction: Wage, Education, and Skill Gaps

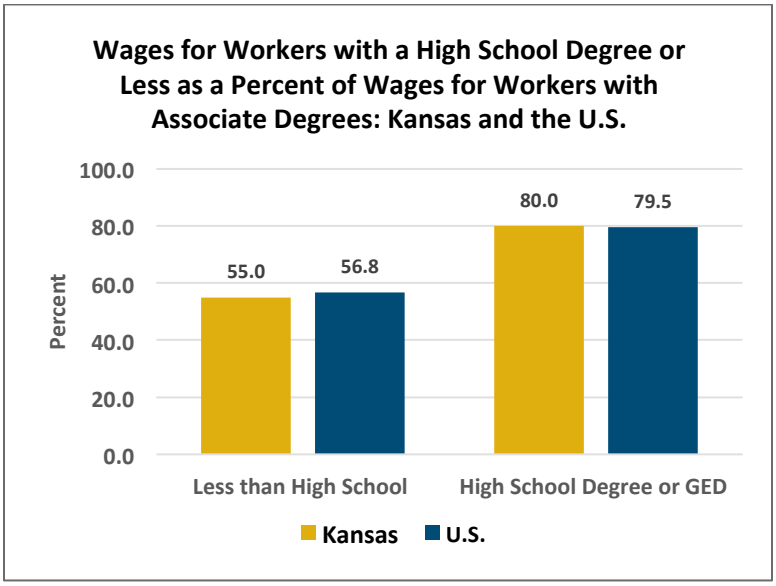
Adults with low skills or low education levels face many workforce challenges. According to a recent Georgetown University study (Carnevale, Smith, and Stohl, 2013), about 64 percent of jobs will require postsecondary education by 2020. Along these same lines, increasingly fewer jobs will be open to those with a high school education or less, 24 percent of jobs for those with a high school education, and 12 percent for those who have not completed high school.

Not only will the jobs available become scarcer for workers without postsecondary education, the wages paid by the jobs for which they are qualified will fall far short of those for jobs that typically require an associate's or bachelor's degree. In the U.S., median wages of a full-time worker with a high school degree currently are about 80 percent of wages of an associate degree holder and 54 percent of wages of a person with a bachelor's degree or higher. The situation is worse for those without a high school degree: 57 percent and 39 percent respectively. The same wage pattern holds for Kansas employees (Table 1, Figures 1 and 2).

Table 1: Median Wage and Salary Earnings, 2015
Full-time Full-year Workers Ages 25-64

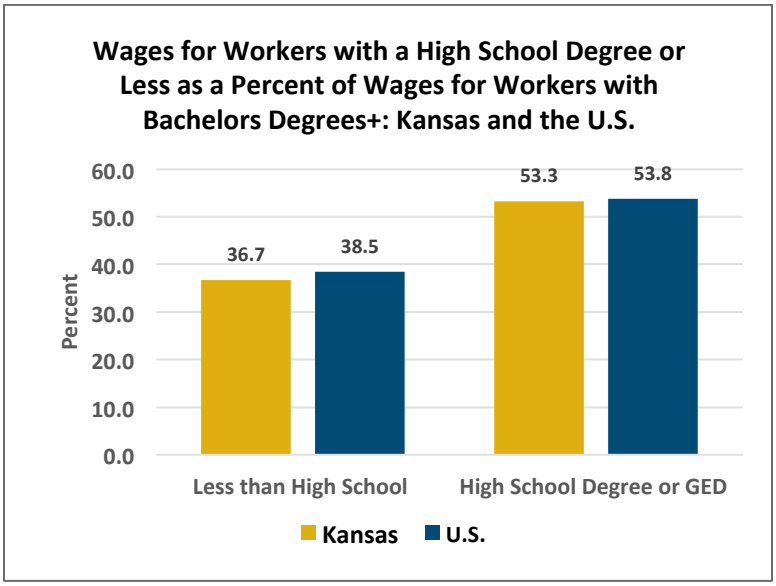
	U.S.		Kansas	
Education Level	**Median Wage**	**Wage %**	**Median Wage**	**Wage %**
Less than High School	$25,000		$22,000	
Wage as % of Assoc. Degree Wages		56.8%		55.0%
Wage as % of BA+ Wages		38.5%		36.7%
High School Degree or GED	$35,000		$32,000	
Wage as % of Assoc. Degree Wages		79.5 %		80.0%
Wage as % of BA+ Wages		53.8%		53.3%
Some College	$40,000		$38,000	
Associate's Degree	$44,000		$40,000	
Bachelor's Degree or Higher	$65,000		$60,000	

Source: Compiled from Current Population Survey downloaded from IPUMS CPS. (Flood et al. 2015)



Source: Current Population Survey downloaded from IPUMS CPS.

Figure 1



Source: Current Population Survey downloaded from IPUMS CPS.

Figure 2

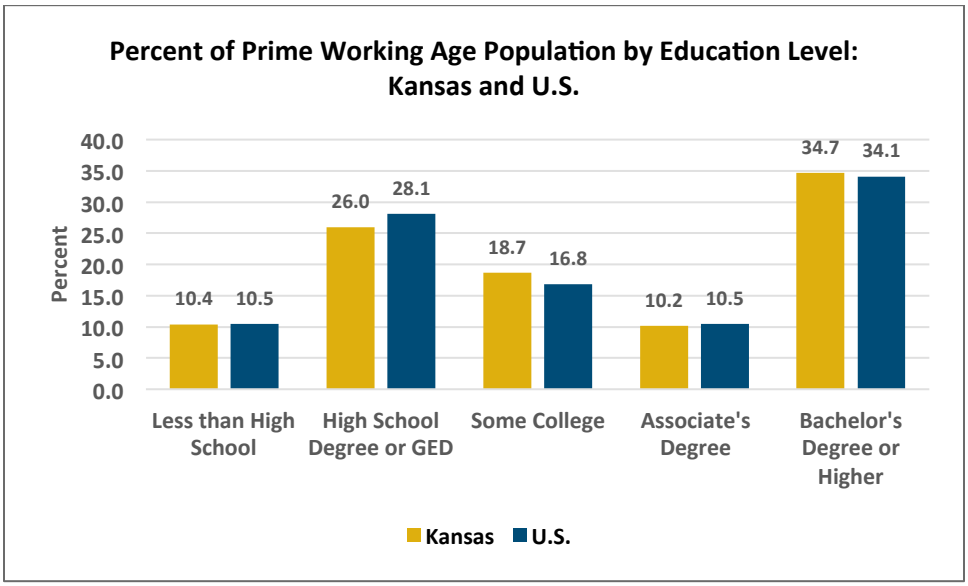
About 36 percent of the Kansas population age 25-64 lacks education above the high school level—nationally the number is about 39 percent (Table 2). Less than half of Kansas adults hold an associate's degree or higher (Figure 3). According to the Kansas Department of Commerce, more than 900,000 Kansas working age adults lack any meaningful postsecondary credentials (Kansas Department of Commerce, undated). At the same time, employers struggle to find qualified workers. According to a recent survey (Manpower Group, 2015), about one-third of employers nationwide have trouble filling positions. Employers cite a shortage of applicants, lack of

experience among those who do apply, lack of technical competencies, and lack of industry-specific qualifications as reasons that positions go unfilled.

Table 2: Education Level of U.S. and Kansas Populations, 2015
Ages 25-64

Education Level	U.S.		Kansas	
	Number	% Pop	Number	% Pop
Less than High School	17,374,527	10.5%	150,905	10.4%
High School Degree or GED	46,660,447	28.1%	378,755	26.0%
Some College	27,956,878	16.8%	272,694	18.7%
Associate's Degree	17,468,472	10.5%	148,032	10.2%
Bachelor's Degree or Higher	56,678,117	34.1%	504,720	34.7%
Total	166,138,441		1,455,106	

Source: Compiled from Current Population Survey downloaded from IPUMS CPS. (Flood et al. 2015)



Source: Current Population Survey downloaded from IPUMS CPS.

Figure 3

Basics of the Accelerating Opportunity (AO) Program

The Accelerating Opportunity program is designed to fill some of the gap between the skills employers seek and the skills of the available labor force. The program encourages low-skilled students to start and complete career-oriented technical programs at community and technical colleges. Accelerating Opportunity currently operates in seven states. It is an initiative of Jobs for the Future and is funded by nine philanthropies: the Arthur M. Blank Foundation, the Annie E. Casey Foundation, the Bill & Melinda Gates Foundation, The Joyce Foundation, the Robert W. Woodruff Foundation, the W.K. Kellogg Foundation, The Kresge Foundation, the Open Society

Foundations, and the University of Phoenix Foundation (Jobs for the Future, 2013). Within Kansas, the Board of Regents (KBOR) shares responsibility for the program (AO-K) with the Kansas Department of Commerce.

Key elements of the program include:

- Adult education, such as math and writing, is integrated into course work in technical education subjects.
- Adult basic education (ABE) instructors work side by side with technical education instructors in the same classes. The courses and programs are no different than those offered to other college students, but ABE support is added.
- Students complete certificate and degree programs aligned with labor market needs as defined by the Kansas Department of Labor, so that program completers can move into immediate job openings.
- Community colleges and technical colleges collaborate with industry stakeholders to assure that instruction is relevant for job placement.
- Colleges choose technical education pathways for AO-K that lead to industry-recognized credentials.
- Credentials are "stackable" so that a student is prepared to pursue higher-level certificates or degrees in the same technical education subject area if desired.
- The program is open to students who lack basic skills in some area, as determined through testing at an adult education center. Any student with or without a high school diploma or GED may participate in the AO-K program, provided the student's test scores are in the eligibility range.
- Students may work on their GED simultaneously while pursuing a technical education certificate or degree.
- In Kansas, the program has two dedicated tuition funding sources. **AO-K TANF** is a scholarship program funded through a partnership with the Department for Children and Families that pays the full rate for approved AO-K courses for students with or without a high school diploma or GED. **AO-K Proviso** is a tuition reimbursement program funded by legislative appropriations to encourage institutions to work with those without a high school diploma or equivalent. AO-K Proviso became effective in June, 2014.

The AO Program in Kansas (AO-K)

Kansas rolled out the Accelerating Opportunity program in January, 2012. By academic year 2013 (June 2012-May 2013), 93 AO programs[1] enrolled students at 16 community and technical colleges (Table 3). By 2015, the number of programs had grown to 135. About a third of the programs are short-term courses in medical fields such as nursing assistant or medication aid. Many students enroll in two or more of these program sequentially. AO-K also includes opportunities for more advanced training and education. For example, community and technical colleges offer programs in nursing, computer science, manufacturing technology, building trades, and other fields which lead to a two-year degree (Table 4).

Not only do AO-K students earn academic certificates and degrees—they also gain industry recognized credentials by passing skill-based exams such as the CNA exam for nursing assistants, various American Welding Society (AWS) exams for welders, or the Kansas Journeymen's Exam for electricians. AO-K students earned 1,000 such credentials in academic year 2013, 1,400 in 2014, and 1,200 in 2015. Industry recognized credentials may signal to employers that the graduate is ready to work. In some cases, credentials may be a requirement for licensure. Summarizing a meeting of the National Network of Business and Industry Associations, McCarthy (2014) points out there exists "widespread frustration with the opacity of existing educational credentials, particularly academic degrees, which tell employers relatively little about what a graduate can actually do." In contrast, "industry-accredited, standards-based certifications and competency-based certificates with third-party assessments, do a great job reliably validating the skills and competencies employers need."

[1] For this report we define a program as a combination of a major and a degree or certificate level. For example, a major in welding at the CERTA level is considered a different program than a major in welding at the CERTC level.

Table 3. Accelerating Opportunity Programs at Kansas Community and Technical Colleges

Institution	Acad. Year	Number of Programs by Award Level and Program Type (Non-Medical or Medical)												
		SAPP <16 credits		CERTA 16-29 credits		CERTB 30-44 credits		CERTC 45-59 credits		ASSOC 2 yr.		Total		
		Non-Med	Med	Non-Med	Med	Non-Med	Med	Non-Med	Med	Non-Med	Med	Non-Med	Med	All
Barton County Community College	2014	1	2	1	.	.	.	.	.	.	.	2	2	4
	2015	1	2	1	.	.	.	.	.	.	.	2	2	4
Butler Community College	2015	.	1	.	.	1	.	.	.	1	1	2	2	4
Coffeyville Community College	2013	.	5	.	.	.	.	2	.	.	.	2	5	7
	2014	.	5	.	.	.	.	2	.	.	.	2	5	7
	2015	.	5	.	.	.	.	1	.	.	.	1	5	6
Dodge City Community College	2013	.	3	1	.	2	.	.	.	2	.	5	3	8
	2014	.	3	1	.	3	.	.	.	5	.	9	3	12
	2015	.	3	1	.	2	.	.	.	5	.	8	3	11
Fort Scott Community College	2013	.	3	.	.	.	.	.	.	.	.	.	3	3
	2014	.	4	1	.	.	.	.	.	.	.	1	4	5
	2015	.	3	2	.	.	.	.	.	.	1	2	4	6
Garden City Community College	2013	.	4	1	.	1	.	1	.	3	.	6	4	10
	2014	1	4	.	.	.	.	1	.	3	.	5	4	9
	2015	1	2	1	.	.	.	1	.	3	.	6	2	8
Highland Community College	2013	.	1	.	.	1	1	.	.	.	.	1	2	3
	2014	.	2	.	.	3	1	1	.	.	.	4	3	7
	2015	.	2	.	.	3	1	1	1	.	.	4	4	8
Hutchinson Community College	2013	.	3	.	.	2	.	1	.	1	.	4	3	7
	2014	.	3	1	.	2	.	1	.	3	.	7	3	10
	2015	.	3	2	.	2	.	1	.	3	.	8	3	11
Independence Community College	2013	.	4	1	1	.	.	.	.	.	.	1	5	6
	2014	.	3	1	1	.	.	.	.	.	.	1	4	5
	2015	.	4	.	1	.	.	.	.	.	.	.	5	5
Johnson County Community College	2015	.	2	.	.	.	.	.	.	.	.	.	2	2
Kansas City Ks Community College	2013	.	2	5	.	5	.	6	.	.	.	16	2	18
	2014	.	2	6	.	6	.	6	.	.	.	18	2	20
	2015	.	2	6	.	7	.	5	.	.	.	18	2	20
Labette Community College	2015	.	.	.	.	.	1	.	.	.	1	.	2	2
Neosho County Community College	2013	.	3	1	2	1	2	.	.	.	1	2	8	10
	2014	.	3	1	2	1	2	.	.	.	1	2	8	10
	2015	.	3	1	1	1	3	.	1	.	1	2	9	11
Seward County Community College	2013	.	2	.	.	.	.	2	.	2	.	4	2	6
	2014	1	2	.	.	1	.	2	.	3	.	7	2	9
	2015	1	3	.	.	1	1	2	1	2	2	6	7	13
Flint Hills Technical College	2013	.	.	1	.	.	.	.	.	1	.	2	.	2
	2014	.	.	1	.	1	.	.	.	2	.	4	.	4
	2015	.	.	1	.	1	.	.	.	2	.	4	.	4
Manhattan Area Technical College	2013	.	1	.	.	.	.	.	.	.	.	.	1	1
Salina Area Technical College	2013	.	1	.	.	.	.	.	.	.	.	.	1	1
Washburn Institute of Technology	2013	1	3	.	.	.	.	2	.	.	.	3	3	6
	2014	1	3	1	.	.	.	2	.	.	.	4	3	7
	2015	1	3	2	.	.	.	2	.	.	.	5	3	8
Wichita Area Technical College	2013	.	2	.	.	1	.	1	.	1	.	3	2	5
	2014	.	2	.	.	1	.	1	.	1	.	3	2	5
	2015	2	2	1	.	2	.	1	3	1	.	7	5	12
Annual Total	**2013**	**1**	**37**	**10**	**3**	**13**	**3**	**15**	**.**	**10**	**1**	**49**	**44**	**93**
	2014	**4**	**38**	**14**	**3**	**18**	**3**	**16**	**.**	**17**	**1**	**69**	**45**	**114**
	2015	**6**	**40**	**18**	**2**	**20**	**6**	**14**	**6**	**17**	**6**	**75**	**60**	**135**

Source: Compiled from data supplied by the Kansas Board of Regents.

Table 4. Number of AO-K Programs by Major and Award Level, 2015

	Award Level					
Non-Medical Programs	**SAPP <16 credits**	**CERTA 16-29 credits**	**CERTB 30-44 credits**	**CERTC 45-59 credits**	**ASSOC (2 yr)**	**Total Programs**
welding technology/welder	0	8	6	6	5	25
machine tool technology/machinist	0	2	1	2	1	6
manufacturing engineering technology/technician	1	1	1	1	1	5
automobile/automotive mechanics technology/technician	0	1	2	1	1	5
electrician	0	1	2	1	0	4
building/property maintenance	0	1	2	0	1	4
autobody/collision and repair technology/technician	0	1	1	1	0	3
truck and bus driver/commercial vehicle operator and instructor	1	1	0	0	0	2
industrial mechanics and maintenance technology	1	0	0	1	0	2
computer and information systems security/info. assurance	1	0	0	0	1	2
fire science/fire-fighting	1	0	0	0	1	2
carpentry/carpenter	0	1	0	1	0	2
mechanic and repair technologies/technicians, other	0	1	0	0	1	2
heating, air cond., vent. and refrig. maint. technology/technician	0	0	2	0	0	2
computer systems networking and telecommunications	1	0	0	0	0	1
plastics and polymer engineering technology/technician	0	0	1	0	0	1
aeronautical/aerospace engineering technology/technician	0	0	1	0	0	1
chemical process technology	0	0	1	0	0	1
agricultural and food products processing	0	0	0	0	1	1
computer programming/programmer, general	0	0	0	0	1	1
data processing and data processing technology/technician	0	0	0	0	1	1
computer systems analysis/analyst	0	0	0	0	1	1
building construction technology	0	0	0	0	1	1
Non-Medical Programs Subtotal	**6**	**18**	**20**	**14**	**17**	**75**
Medical Programs						
nursing assistant/aide and patient care assistant/aide	15	0	0	0	0	15
medication aide	12	0	0	0	0	12
emergency care attendant (EMT ambulance)	7	1	0	0	0	8
home health aide/home attendant	5	0	0	0	0	5
registered nursing/registered nurse	0	0	0	0	5	5
licensed practical/vocational nurse training	0	0	2	3	0	5
medical/clinical assistant	0	0	2	1	0	3
surgical technology/technologist	0	0	0	2	0	2
phlebotomy technician/phlebotomist	1	1	0	0	0	2
medical transcription/transcriptionist	0	0	1	0	0	1
medical insurance coding specialist/coder	0	0	1	0	0	1
respiratory care therapy/therapist	0	0	0	0	1	1
Medical Programs Subtotal	**40**	**2**	**6**	**6**	**6**	**60**
Total Programs	**46**	**20**	**26**	**20**	**23**	**135**

Source: Compiled from data supplied by the Kansas Board of Regents.

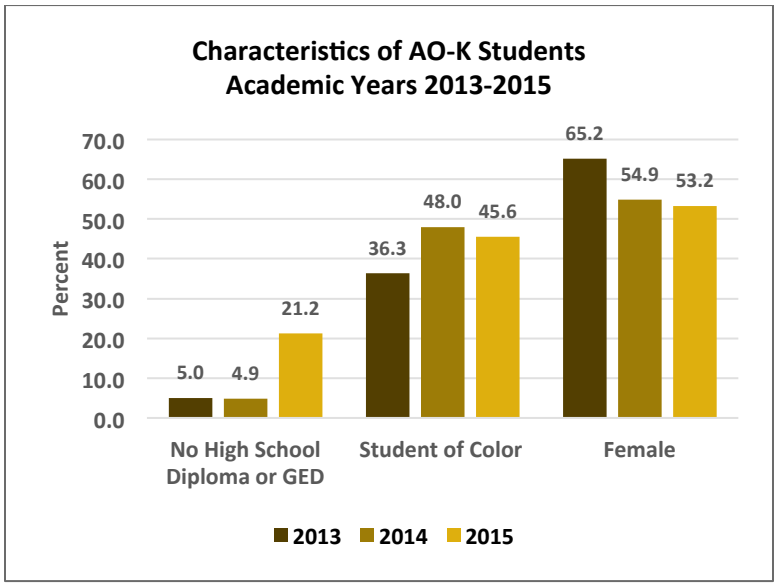
Characteristics of AO-K Students

Although the AO-K program began in 2012, significant numbers of students did not start enrolling until academic year 2013. The program enrolled about 900 new students at its peak in academic year 2014, and enrolled about 550 new students in AY 2015, the last year for which full data are available. A number of factors help to explain the decrease in enrollment in 2015 (Table 5, Figures 4 and 5). First, the original support funding from Jobs for the Future expired, shifting expenses onto community colleges and the state. Second, Kansas saw an overall decline in community college and technical education enrollment between 2014 and 2015, and potential AO-K students may have been part of that trend. Third, testing instruments used to qualify students for AO-K changed during this time period, so fewer students may have been eligible for the program. Finally, the Kansas economy started to recover from the Great Recession, and some potential students may have found jobs instead. From July, 2013 (start of AY 2014) through July 2014 (start of AY 2015), the Kansas economy gained 23,000 additional jobs, or 1.6 percent (U.S. Bureau of Labor Statistics, 2016).

Table 5. Characteristics of AO-K Students

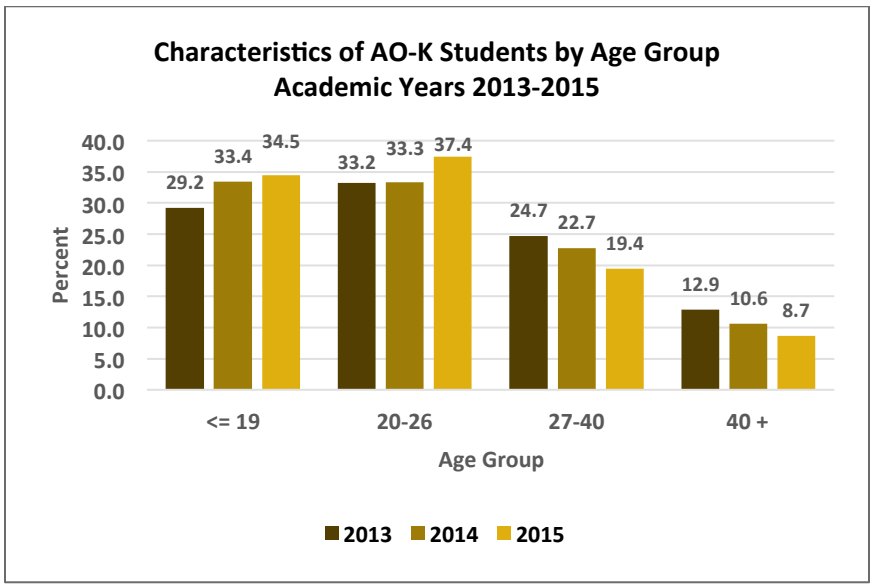
Academic Year	Number of Students	No HS Diploma or GED	Student of Color	Female	Age Group			
					<= 19	20-26	27-40	40 +
2013	722	5.0%	36.3%	65.2%	29.2%	33.2%	24.7%	12.9%
2014	893	4.9%	48.0%	54.9%	33.4%	33.3%	22.7%	10.6%
2015	553	21.2%	45.6%	53.2%	34.5%	37.4%	19.4%	8.7%

Source: Compiled from data supplied by the Kansas Board of Regents. Note: Students are recorded by the year in which they begin an AO-K program.



Source: Kansas Board of Regents.

Figure 4



Source: Kansas Board of Regents.

Figure 5

Until AY 2015, the program served very few students who did not already have diplomas. In 2015, the percentage of students without diplomas rose sharply as the Kansas **AO-K Proviso** started to provide tuition reimbursement for those without a high school background. The program serves a high proportion of students of color, about 46 percent in 2015. In contrast, students of color comprise only about 31 percent of Kansas community and technical college enrollments in general (National Center for Education Statistics, 2016). More than half of AO-K enrollees are female. Older students, age 27 and above, comprise more than one-fourth of the AO-K student group.

Purpose of this Study

The Center for Science, Technology & Economic Policy (CSTEP) at the Institute for Policy & Social Research (IPSR) at the University of Kansas was asked by KBOR to conduct a study of the quantitative effect of the AO-K program on participants with low skills and low educational attainment. This study focuses on Kansas-specific impact measures such as degrees and certificates earned, industry credentials, employment and wages. Note that the Urban Institute is currently conducting a broad study of AO in 5 states including Kansas; the Urban Institute study may also include impact measures at a later date (Anderson et al. 2014, 2015).

Methods for Quasi-experimental Design

Our study uses a quasi-experimental design that compares the outcomes of students who enter an AO-K pathway (the “treatment” group) with a matched “control” group of students who enroll in similar programs but do not receive the AO-K intervention. In theory, the behavior of the control group represents what outcomes would have looked like if AO-K programs did not exist in the state.

Treatment Group. The treatment group was intended to include all students who were reported by adult education centers as enrolling in an approved AO-K program. In practice, some AO-K students were excluded from the quantitative study because their specific AO-K program could not be identified. Colleges sometimes listed the students as "undecided" or "liberal arts" rather than designating their specific technical major.

Control Group. Selection of the control group was a two-step process. In the first step, KBOR identified a large *potential* control group (more than 10,000) of community and technical school students who enrolled in programs that were part of AO-K at some schools, but not at the school that the control group member attended. For example, during 2014 the nursing assistant program at Highland Community College was part of AO-K. The nursing assistant program at Cloud County Community College was not part of AO-K. Therefore, enrollees in the nursing assistant program at Cloud County were part of the potential control group. The programs at other schools with the same subject area and level are referred to as "similar programs" throughout this report.

In the second step of selection of the control group, we matched the potential control group candidates with the actual AO-K participants based on observed demographic and academic variables. The observed characteristics used in our matching algorithm included:

- *College readiness.* By definition, all AO-K students must have a basic skills weakness. For non AO-K students, weaknesses were assessed by whether the student actually took developmental or remedial courses, whether the student had test scores showing that she or he was not college ready, and whether it was recommended the student take developmental courses.
- *Subject area and award level.* Students were matched based on subject area (CIP code) and award level (such as CERTB or Associate's degree). A control group student must have enrolled in a program at a school where the subject area was not operated as an AO-K pathway. For example, a student who qualifies for AO-K, who majors in Welding Technology, and who enrolls in a qualified AO-K CERTB (30-45 credits) program. That student would be matched to a student at a different institution in a CERTB welding program. Note that we choose the control for a student from a different school. Many AO-K courses enroll both students who qualify for AO-K and students who are simply taking the course was part of the major. There are spillover effects of AO-K on students who receive in-class basic skills instruction even though they are not AO-K enrollees.
- *Age.* Age was broken into four distinct groups: 16-19; 20-26; 27-40; over 40.
- *Gender.* We used the code recorded in the KBOR database.
- *College credits.* Many students have completed college credits before enrolling in an AO-K or similar pathway sequence. We matched on whether the student had 16 or more credits before entering the AO-K or similar program.
- *Race and ethnicity.* Race and ethnicity were treated in a greatly simplified manner, breaking students into "students of color" and "other." This matching criterion was included because students of color previously may have faced educational challenges not experienced by others.

We required an exact match on subject area, award level, and college readiness. If there were no possible matches for the remaining criteria, we allowed two out of four to differ. Our matching algorithm performed matching "with replacement," so that a single student in the non AO-K group matched to two or more AO-K members. When there were multiple matches, the control group data were weighted to assure statistical accuracy. The majority of controls matched the AO-K group exactly on the chosen criteria.

As with all quasi-experimental designs, the credibility of the outcomes hinge on whether the control group's behavior really represents what the treatment group would have done in the absence of participation in an AO-K pathway. We could only match AO-K students with controls based on the measured data in the KBOR and Kansas Department of Labor (KDOL) databases. We had no way of comparing the individual student's motivation or personal circumstances such as number of children, marital status, job loss, or health.

Before matching, the AO-K group and the set of potential control group members showed substantial differences in measurable characteristics (see columns 3 and 5 of Table 6). The matching process resulted in a control group with characteristics quite similar to the AO-K group. Note that compared with the general population of students in similar programs (before matching), the AO-K students are older, more likely to be students of color, more likely to be female, and less likely to have a semester of college credit before enrolling.

Table 6: Comparison of AO-K Students with Students in Similar Programs After and Before Matching

Category	Measure	AO-K Program (%)	Actual Control Group: Similar Programs After Matching (%)	Potential Control Group: Similar Programs Before Matching (%)
College Readiness	Has weaknesses	100.0%	100.0%	58.6%
Age	16-19	33.4%	32.4%	27.9%
	20-26	32.7%	36.2%	48.3%
	27-40	23.5%	24.6%	17.4%
	Over 40	10.4%	6.8%	6.5%
Gender	Female	53.7%	52.2%	50.9%
Previous work	<16 credits before AO or AO Similar	23.8%	22.8%	29.8%
Race/Ethnicity	Students of color	42.0%	41.0%	25.1%

Source: Compiled from data supplied by the Kansas Board of Regents after running matching algorithm. Note that numbers differ from those in Table 5 because not all students in AO-K were matched in the quasi-experimental study and multiple years were combined.

Overview of Outcomes

After matching each AO-K student with a student in a similar program, we compared the outcomes of the two groups. Our outcome indicators include a mixture of academic and labor force outcomes:

- Percent of students completing various certificate levels: SAPP (<16 credits), CERTA (16-29hrs), CERTB (30-44hrs), and CERTC (45-59hrs).
- Percent of students completing an Associate's degree or above AAS (60-68hrs).
- Persistence—how many students drop out, complete their degrees, or stay in school from year to year.
- Average number of credits and technical credits received per student.
- Grade point average and grade distributions.
- Average number of industry credentials earned per student.
- Employment of students who start a program and employment of students who finish at least one certificate or degree.
- Median wages and median wage gains (or losses) compared with the year before each student starts an AO-K or similar program.

KBOR provided us with outcome data from 2011 through 2015. For students who started programs in 2012 and 2013, we follow the student forward through years (2012, 2013, 2014 or 2013, 2014, 2015). We follow students who started in 2014 for two years (2014 and 2015) and we follow 2015 starters for one year only.

For most indicators, we use simple linear regressions to estimate the absolute difference and the statistical significance of the difference between the mean for AO-K students (the treatment group) and the mean for matched students in the control group.
For wages, we choose to look at the median rather than the mean or average. A few students with high wages can have a very large impact on mean wages, but these students are not typical of program completers. The median is the midpoint of the distribution—half of students earn more and half earn less. The median is insensitive to outliers on the high or low end. In contrast, the mean (which would be estimated by a typical linear regression) is highly sensitive to outliers. In the case of wages we use quantile regressions to estimate the median wage differences.

In our discussion below, we indicate the statistical significance of effects as follows:

- Double asterisk (**) indicates that the difference between AO-K and similar students is significant at the 5 percent level or better.
- Single asterisk (*) indicates that the difference is significant at the 10 percent level but not the 5 percent level.
- No asterisk indicates that the difference is not statistically significant at any commonly accepted level, and that there is a high probability that differences between the groups are due to chance.

Academic Outcomes

As a result of the analysis of all of the data described above, we reach a number of conclusions about academic outcomes.

Completions. Participation in AO-K increases the probability that a student will complete one or more certificates or degrees. AO-K also increases the probability that a student will complete a program at the CERTC program (45-59 credits) level or higher. Most awards are at the SAPP level, with only 33.7 percent of participants earning a higher certificate or degree by the third year after they start the program.

Close to 64 percent of AO-K students complete a certificate or degree in their first year of study (Table 7); in contrast, only about 57 percent of students in AO-K control group complete an award in the first year. The difference in completion rates is statistically significant. By the third year after enrolling, about 83 percent of AO-K students have earned a certificate or degree, in contrast to 71 percent of the control group. Most of the awards earned are SAPP certificates. This can be seen implicitly in Table 7. For example, though year three, 82.2 percent of students earn a SAPP certificate or higher and 33.7 percent earn a CERTA of higher. Hence 48.5 percent of students earn a SAPP certificate and stop at that level.

Differences between the AO-K students and the control group are not significant when we look at the percent of students earning CERTA or CERTB certificates of higher. However, AO-K students are significantly more likely to earn a CERTC or above (23.7 percent versus 16.5 percent though year 3). The percent completing an Associate's degree or higher cannot be distinguished statistically between the two groups.[2]

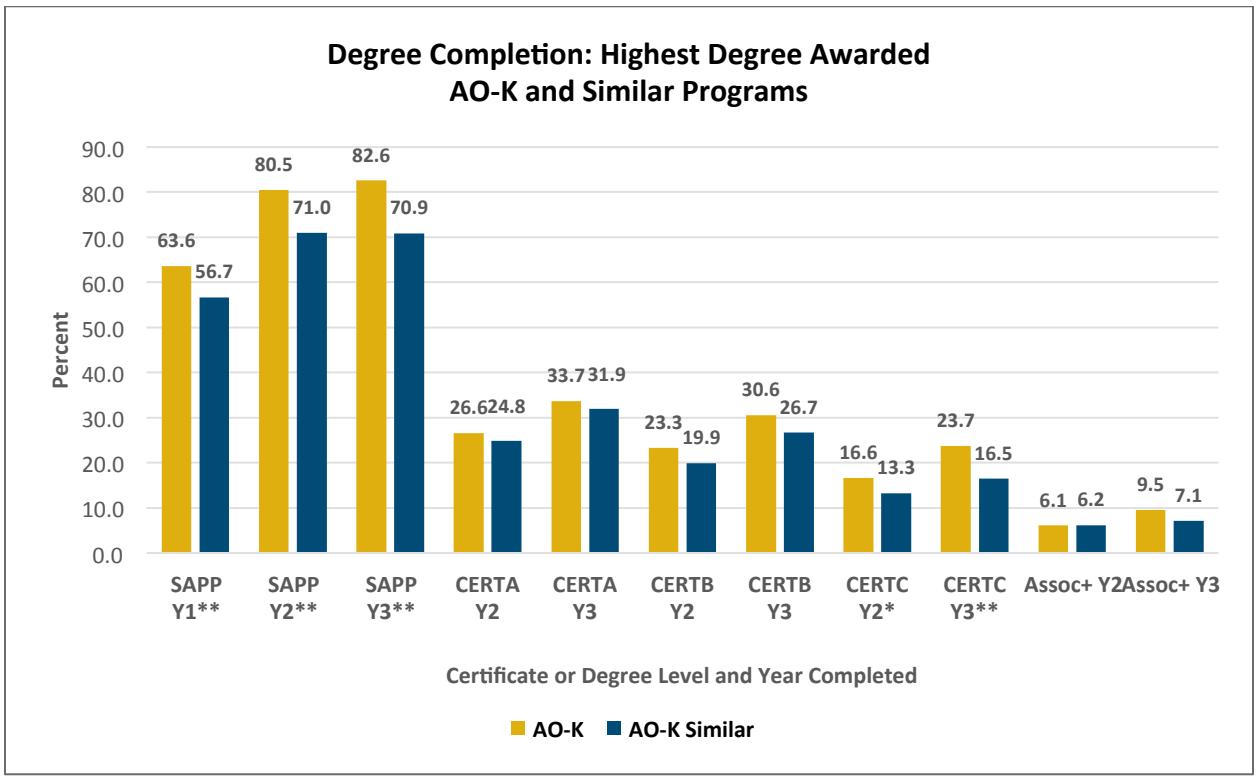
[2] AO-K can lead to a technical associate's degree, but not all levels may be approved AO programs. Nursing programs in the healthcare pathway may create anomalies in the healthcare program since they were approved, then not approved, then approved as a quasi-pathway as part of A-OK, but KHEDS does not reflect a pathway.

Table 7. Degree Completion: Highest Degree Awarded				
	Percent Completing		Significance	Number
Certificate or Degree Level	AO-K Similar	AO-K	Level of Diff	of Obs
SAPP (< 16 credits) or higher				
During year program started	56.7%	63.6%	0.0105**	2,339
Through second year after program start	71.0%	80.5%	0.0002**	1,875
Through third year after program start	70.9%	82.6%	0.0019**	972
CERTA (16-29 credits) or higher				
Through second year after program start	24.8%	26.6%	0.5433	1,875
Through third year after program start	31.9%	33.7%	0.6895	972
CERTB (30-44 credits) or higher				
Through second year after program start	19.9%	23.3%	0.2529	1,875
Through third year after program start	26.7%	30.6%	0.4122	972
CERTC (45-59 credits) or higher				
Through second year after program start	13.3%	16.6%	0.0893*	1,875
Through third year after program start	16.5%	23.7%	0.0133**	972
Associate's (2 year program) or higher				
Through second year after program start	6.2%	6.1%	0.9554	1,875
Through third year after program start	7.1%	9.5%	0.2158	972

Source: Compiled from data supplied by the Kansas Board of Regents. Note that some students can only be tracked through the first year of their program while others can be tracked for two or more years.
** Indicates that the difference between AO-K and similar students is significant at the 5 percent level.
* Indicates that the difference is significant at the 10 percent level but not at the 5 percent level.

***Persistence*.** Students who start an AO-K program may drop out without completing a certificate or degree, they may finish an academic credential and end their college careers, or they may move on to a second year of postsecondary education. Table 7 and Figure 6 show that 63.6 percent of AO-K students and 56.7 percent of the AO-K control group finish a certificate or degree within the first year—conversely, 36.4 percent of AO-K students and 43.3 percent of control group students leave the first year of study with no award in hand.

What happens to these students beyond their first year? For those who earn no certificate of degree in the first year, the pattern is very different between AO-K students and the control group (Table 8). AO-K students are much less likely to drop out with no award (37.2% versus 57.2%). Instead, 62.8 percent of these students persist in the next year and continue to seek an award. It appears that the AO-K support system helps to prevent dropouts.



Source: Kansas Board of Regents.

** Indicates that the difference between AO-K and similar students is significant at the 5 percent level.

* Indicates that the difference is significant at the 10 percent level but not at the 5 percent level.

Note: Y1=during year program started; Y2=through second year after program started; Y3= through third year after program started.

Figure 6

Students who receive a certificate or degree in their first year are about evenly split in their future behavior (Table 8). About half stop with the award they have achieved, while half persist to enroll in a second year. Second year enrollees may be earning "stackable credentials" which augment their first year accomplishments.

Overall, 52.4 percent of AO-K students and 47.3 percent of the control group students move on to a second year of college, either to finish a certificate or degree already started or to add to academic credentials already earned.

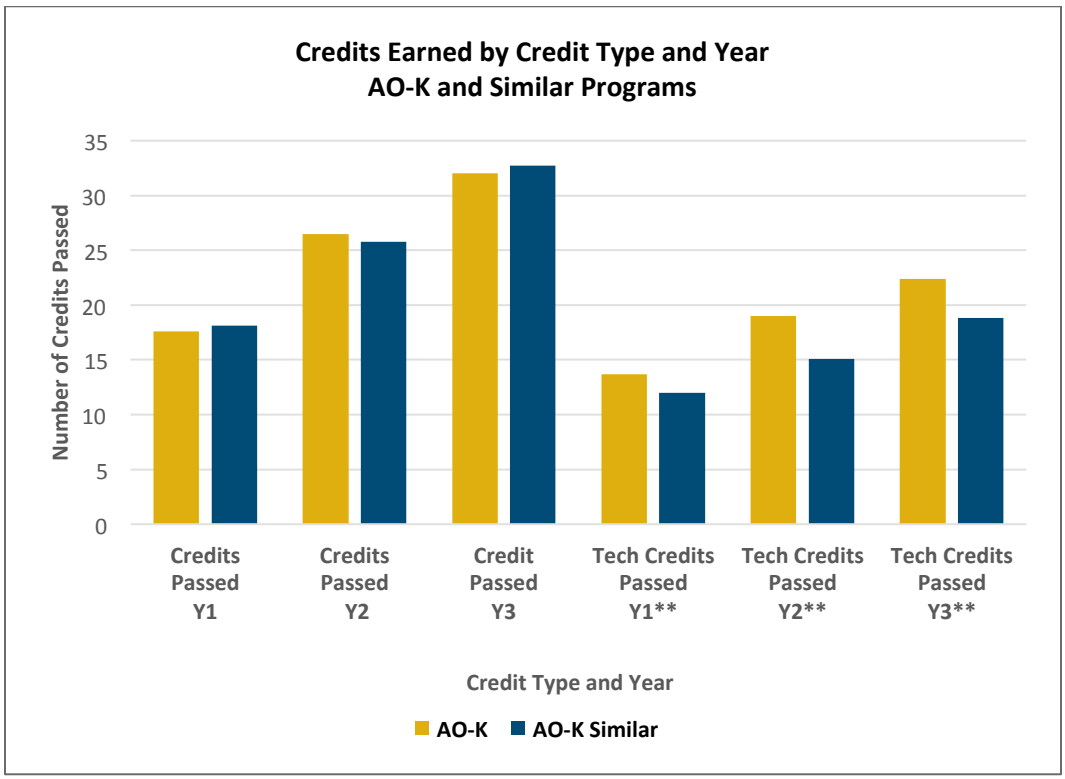
Table 8. Dropouts, Degree Completers, and Persistence				
Category	**Percent of Students AO-K Similar**	**AO-K**	**Significance Level of Diff**	**Number of Obs**
With no certificate or degree in first year	43.3%	36.4%		
Dropping out before second year	57.2%	37.2%	0.0004**	620
Continuing to second year of college (persisting)	42.8%	62.8%	0.0004**	620
With certificate or degree in first year	56.7%	63.6%		1,875
Stopping: Not continuing to second year of college	49.5%	52.0%	0.4675	1,255
Continuing to second year of college (persisting)	50.5%	48.0%	0.4675	1,255
Persistence to year 2—with and without certificate or degree	47.3%	52.4%	0.0950*	1,875

Source: Compiled from data supplied by the Kansas Board of Regents.
** Indicates that the difference between AO-K and similar students is significant at the 5 percent level.
* Indicates that the difference is significant at the 10 percent level but not at the 5 percent level.

Credits earned. AO-K students and those in similar programs earn approximately the same total number of credits. However, AO-K students earn statistically more *technical* credits, indicating that their postsecondary work is more focused on a career path. By the end of the third year after beginning the program, AO-K students have successfully completed almost four more technical credit hours than their counterparts (Table 9, Figure 7).

Table 9. Credits Earned				
Credit Type and Year	**Number of Credits AO-K Similar**	**AO-K**	**Significance Level of Diff**	**Number of Obs**
Total number of credits passed				
During year program started	18.1	17.6	0.5276	2,339
Through second year after program start	25.8	26.5	0.6520	1,875
Through third year after program start	32.7	32.0	0.7932	972
Number of technical credits passed				
During year program started	12.0	13.7	0.0038**	2,339
Through second year after program start	15.1	19.0	0.0008**	1,875
Through third year after program start	18.8	22.4	0.0055**	972

Source: Compiled from data supplied by the Kansas Board of Regents.
** Indicates that the difference between AO-K and similar students is significant at the 5 percent level.



Source: Kansas Board of Regents.

** Indicates that the difference between AO-K and similar students is significant at the 5 percent level.

Note: Y1=during year program started; Y2=through second year after program started; Y3= through third year after program started.

Figure 7

Grades and grade distribution. Do AO-K students do as well in their courses as their control group counterparts? We examined grades earned in the first year after beginning an AO-K or similar program and found that grade point averages of the two groups were almost identical. However the distribution of grades differed across groups, with AO-K students slightly less likely to earn grades at the extremes—A and F. The difference in course failure rates is statistically significant (Table 10). Supports in the classroom may help AO-K students to avoid failing in their academic work.

Table 10. Grade Point Average and Grade Distribution

Credit Type and Year	Group		Significance Level of Diff	Number of Obs
	AO-K Similar	AO-K		
Grade point average in first year	2.818	2.822	.9597	1,344
Percent of grades that are "A" in first year	38.2%	35.3%	.2276	1,344
Percent of grades that are "F" in first year	12.0%	9.1%	.0536**	1,344

Source: Compiled from data supplied by the Kansas Board of Regents. Note for this analysis we used only students who started their education in 2014 and 2015. Records for 2012 and 2013 sometimes were recorded as pass-fail rather than as letter grades.

** Indicates that the difference between AO-K and similar students is significant at the 5 percent level.

Industry credentials. Job-readiness is the explicit goal of the AO-K program. As part of the AO-K pathway, students may earn industry-recognized credentials that will give them an advantage in the labor market. Unfortunately, comparative data on industry credentials are inconsistent. For AO-K students, adult basic education centers tabulate industry credentials, and records of those credentials become part of the KBOR's permanent data on the student. For students who are not part of adult basic education, data on industry credentials come from a follow-up data collection conducted by community and technical colleges. The follow-up data may not be as accurate.

The admittedly inconsistent data show that AO-K students earn about 2.5 times as many industry credentials as students in similar programs by the end of the third year (Table 11). Further research is needed to see whether this is due to the more rigorous *recording* of credentials by AO-K programs or to actual differences in the achievement of students.

Table 11. Cumulative Number of Industry Credentials Earned

Year	Number of Credentials		Significance Level of Diff	Number of Obs
	AO-K Similar	AO-K		
Number of industry credentials per student				
During year program started	0.70	1.46	<.0001**	2,339
Through second year after program start	0.84	2.11	<.0001**	1,875
Through third year after program start	0.85	2.28	<.0001**	972

Source: Compiled from data supplied by the Kansas Board of Regents. Some data may be inconsistent.
** Indicates that the difference between AO-K and similar students is significant at the 5 percent level.

Labor Market Outcomes

The Kansas Department of Labor (KDOL) provided labor market data that was linked by ID number to the KBOR academic data. This allows us to determine whether a student is employed in a wage and salary job in Kansas and to estimate the person's annual wages. In our analysis, a person is counted as employed if she or he is employed at any time during the year. Wages are the sum of a person's records from all employers during all four quarters of the year.

Outcome measures created from the labor market data probably underestimate the extent of labor market participation. The data do not include self-employment, military employment, or employment in other states. If a student living in Kansas City, Kansas gets a job in Missouri, she or he is not included in the data.

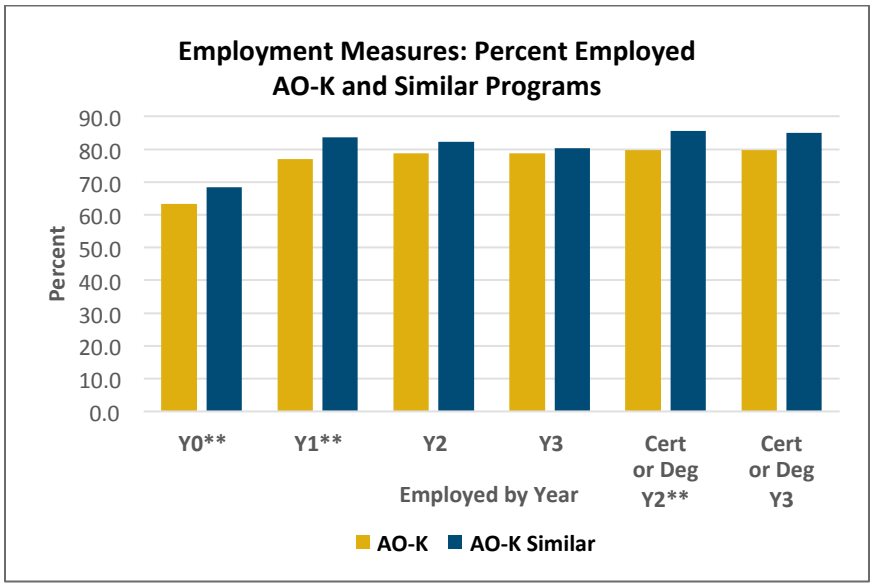
Percent Employed. Employment for both the AO-K students and the control group is low in the year before technical education starts, and employment increases substantially for both groups in the years following first enrollment. However, AO-K students and graduates are *less* likely than their counterparts to be employed in Kansas (Table 12, Figure 8). Employment differences are small and not always statistically significant at the 5 percent level. However it appears that the initial employment barriers

faced by AO-K students (as reflected in low pre-program employment) may still affect outcomes even three years after the program starts. When we look only at program completers, the percent employed generally is higher than for students in general. AO-K students still appear to lag the comparison group.

Table 12. Employment Measures

Measure	Percent Completing AO-K Similar	Percent Completing AO-K	Significance Level of Diff	Number of Obs
Percent employed				
During year before program started	68.4%	63.3%	0.0483**	2,072
During year program started	83.7%	77.1%	0.0015**	2,072
Through second year after program start	82.3%	78.7%	0.1262	1,617
Through third year after program start	80.4%	78.7%	0.6269	779
Percent employed, students completing cert. or deg.				
Through second year after program start	85.6%	79.7%	0.0518**	1,247
Through third year after program start	85.1%	79.7%	0.1133	629

Source: Compiled from data supplied by the Kansas Board of Regents and Kansas Department of Labor.
** Indicates that the difference between AO-K and similar students is significant at the 5 percent level.



Source: Kansas Board of Regents and Kansas Department of Labor.
** Indicates that the difference between AO-K and similar students is significant at the 5 percent level.
Note: Y0=during year before program started; Y1=during year program started;
Y2=through second year after program started; Y3= through third year after program started.

Figure 8

In Table 13, we explore the effect of program completion more fully. It could be that the appropriate counter-factual for employment comparisons is an individual who entered a technical training program but did not complete any certificates. We estimate models of employment completion for the second and third years after beginning a program using program completion, AO-K status, and the interaction of

AO-K status and program completion as explanatory variables. We find that completion of a certificate or degree has a large and significant effect on employment in both the second and third years after program enrollment. Once completions are entered into the model, AO-K status and interaction terms are not statistically significant.

Table 13. Effect of AO-K Status and Completion on Employment

Measure	Employment Effect	Significance Level	Number of Obs.
Second year after beginning program			
Intercept: Employment % for control group with no completions	75.4%	<.0001**	1,617
Effect of completing a degree or certificate (%)	11.8%	0.0055**	1,617
Effect of AO-K status (%)	-2.4%	0.6127	1,617
Interaction of AO-K status and completion	-4.2%	0.4370	1,617
Third year after beginning program			
Intercept: Employment % for control group with no completions	70.9%	<.0001**	779
Effect of completing a degree or certificate (%)	13.6%	0.0294**	779
Effect of AO-K status (%)	-0.2%	0.9798	779
Interaction of AO-K status and completion	-4.4%	0.5232	779

Source: Compiled from data supplied by the Kansas Board of Regents and Kansas Department of Labor.
** Indicates that the difference between AO-K and similar students is significant at the 5 percent level.

Wages. For our wage analysis (Table 13), we compare median wages of AO-K students and their counterparts in similar programs. Wage effects are somewhat ambiguous—many estimates are not statistically significant. However some patterns do emerge. First, median wages grow over time as students leave college and gain experience in the labor force. In Table 14, we see that baseline wages (for a student in the control group with no completed degree) progress from less than $6,000 in the year before program enrollment to over $16,000 in the third year after enrollment. Second, wages for AO-K students and students in the control group are very similar across time. The effect of AO-K status generally is small and not statistically significant. Third, completion of a certificate or degree has a significant positive effect on median wages in the second year after enrollment, but the effect does not carry through for year 3. The year 3 sample shrinks because we run out of data for students who entered programs after 2013, and this may affect the results.

Table 14. Effect AO-K Status and Completion on Median Wage			
Measure	**Effect on Median Wage**	**Significance Level**	**Number of Obs.**
Year before beginning program			
Baseline median wage ($)	5,885		
Effect of AO-K status ($)	326	0.5734	1,378
Year program begins			
Baseline median wage ($)	7,872		
Effect of AO-K status ($)	658	0.3236	1,665
Second year after beginning program			
Baseline median wage ($)	9,862		
Effect of completing a degree or certificate ($)	4,147	0.0335**	1,302
Effect of AO-K status ($)	1,487	0.4334	1,302
Interaction of AO-K status and completion	-2,526	0.2629	1,302
Third year after beginning program			
Baseline median wage ($)	16,648		
Effect of completing a degree or certificate ($)	-2,437	0.6150	619
Effect of AO-K status ($)	1,471	0.7930	619
Interaction of AO-K status and completion	1,968	0.7400	619

Source: Compiled from data supplied by the Kansas Board of Regents and Kansas Department of Labor.
Note: Baseline level is for control group members with no certificate or degree. Wages are measured only for employed persons. Completions in year 1 do not affect wages until year 2 in this model. Wages have been adjusted for inflation.
** Indicates that the difference between AO-K and similar students is significant at the 5 percent level.

Summary

CSTEP performed a study that matched students participating in AO-K with a "control group" student in a program with the same major and award level, but at a school where that track was not designated for AO-K supports. To the extent possible, the control group students were also matched on characteristics such as gender, ethnicity, and college readiness. The matching process is designed to even out the effects of these measurable characteristics so that we can single out the effect of AO-K.

Based on our study, it appears that the AO-K program helps students achieve academic goals such as completing programs, completing a higher-level certificate, earning technical credits, and earning industry credentials. It is less clear whether these academic achievements translate into labor market success. Employment increases for both groups of students over time, but employment of the AO-K group appears to lag behind that of the comparison group. This effect can largely be explained by the impact of initial employment status. AO-K students were less likely to be employed in the period before they started school—they may have been disadvantaged by characteristics such as family and health status. Students who complete one more certificate or degree are substantially more likely to be employed than dropouts.

Median wages earned by the AO-K students and students in the control group are similar. There is weak evidence that completion of an award leads to higher wages.

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