Promoting Career Readiness in Arkansas High Schools

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Introduction

The Arkansas Department of Education (ADE) is focused on transforming Arkansas to lead the nation in student-focused education. To accomplish this vision, one of ADE's goals is for each student to meet or exceed milestones along pathways to graduate high school prepared for college, career, and community engagement. Some career and technical education (CTE) students in Arkansas high schools take ACT® WorkKeys® to measure their foundational workplace skills in Applied Math, Workplace Documents, and Graphic Literacy. Moreover, students can earn a National Career Readiness Certificate® (NCRC®), which certifies skills to potential employers and postsecondary training programs.[1] ADE identified WorkKeys scores as a possible data source that could be embedded within their electronic transcript system (Triand, Inc.) to inform career counselors and parents statewide about students' levels of workforce readiness. For that reason, ADE partnered with ACT Research to share data and explore relationships between educational programs and foundational workplace skills measured by WorkKeys.

This report focuses on educational programs in high schools with greater-than-expected WorkKeys performance. That is, compared to other schools enrolling students with similar ACT scores and demographics, these schools exhibited higher average WorkKeys scores. Ten such schools were contacted to find out how they promote WorkKeys performance and career readiness more generally. Results revealed common themes such as supporting career exploration, connecting students and local employers, using WorkKeys Curriculum® to prepare students for the WorkKeys Assessments, and emphasizing the value of the NCRC.

Method

Statistical analyses estimated average WorkKeys performance relative to expected for 48 public high schools in Arkansas (see Appendix for details of the statistical analysis). ADE contacted 10 schools with greater-than-expected WorkKeys performance to ask the following questions:

1. Does your school have any special programs to help get students career ready?
2. How do your students prepare to take WorkKeys?
3. How do you communicate the value of taking WorkKeys and earning a National Career Readiness Certificate?
4. Is WorkKeys recognized by local employers or postsecondary training programs?

An administrator, teacher, or counselor from each of the 10 schools responded to the questions and provided consent to be named

in this report. The following Arkansas high schools are represented in results:

- Benton High School
- Camden Fairview High School
- Crossett High School
- Manila High School
- Pine Bluff High School
- Rivercrest High School
- Rogers New Technology High School
- Russellville High School
- Warren High School
- Western Yell County High School

Results

Career Readiness Programs

As part of their programs to support career readiness, nearly all schools mentioned the Career Readiness, Work Readiness, College and Career Readiness, or Jobs for America's Graduates (JAG) course. Taking WorkKeys Applied Math, Workplace Documents, and Graphic Literacy, which make a student eligible to earn an NCRC, is a highly recommended component of the standards (or "frameworks") for these courses throughout Arkansas.[2] The Readiness courses focus on developing the knowledge and skills as well as social-emotional competencies ("soft skills") needed for success in a variety of postsecondary pathways. This entails evaluating current interests and skills, conducting pathway research and planning, making decisions, and developing the discipline and dispositions to carry out plans and adapt to changes in job demands over time. The JAG program shares these goals, but it also integrates modest interventions to develop reading and math skills for students at risk of not graduating on time and often belonging to special populations (e.g., students with disabilities, economic disadvantage, or limited English proficiency). At Manila High School, approximately 80% of senior students enroll in a Career Readiness or Work Readiness course, and they attribute this to strong support at the district level and high-quality instruction.

Four survey respondents mentioned that students have opportunities to participate in internships, work-based learning, or youth apprenticeships. At Warren High School, for example, students take CTE courses at a local community-based education center, and many students engage in an internship or youth apprenticeship. Russellville High School described the integration of a career readiness curriculum into CTE courses, as well as close collaboration between counselors, teachers, and students to develop beneficial Student Success Plans. Rogers New Technology High School highlighted its broad use of project-based learning, which involves problem solving, making presentations, and demonstrating professionalism. They also create opportunities for students to interact with local leaders, employers, non-profits, and the chamber of commerce to help students find mentors and internships. Their goal is to prepare all students for college and careers, and they see NCRC attainment as validation of their approach.

Preparing for WorkKeys

Student performance on the WorkKeys Applied Math, Workplace Documents, and Graphic Literacy assessments is reported using level scores that correspond to specific knowledge and skills required in a broad range of occupations.[3] WorkKeys Curriculum provides a placement exam, instructional modules, practice exercises, and quizzes to evaluate mastery of Applied Math, Workplace Documents, and Graphic Literacy at Levels 3, 4, 5, 6, and 7. All 10 schools reported using WorkKeys Curriculum to help students prepare to take the three NCRC Assessments or to improve their scores. Indeed, Camden Fairview High School asserted that WorkKeys Curriculum "prepares them for this very well." Several schools stated that they use WorkKeys

Curriculum to determine when students are ready to take the NCRC assessments (i.e., to "test when they are ready"). For example, at Benton High School, students must first pass at least the Level 3 exam in the Curriculum. At Manila High School, student must complete at least Level 5 of the Curriculum.

Pine Bluff High School mentioned the use of classroom instruction focused on skills measured by NCRC assessments. Knowledge and skills developed through internships, work-based learning, or youth apprenticeships may also support achievement on WorkKeys Assessments. Students may also be better prepared for WorkKeys because of instructional approaches such as project-based learning at Rogers New Technology High School. Though not explicitly stated in survey responses, academic instruction in English language arts, mathematics, science, and social studies should be expected to help prepare students for the Applied Math, Workplace Documents, and Graphic Literacy assessments.

The Value of WorkKeys

Students exhibit higher motivation on achievement tests when they understand the importance or value of an assessment. High schools responded to this survey with a variety of activities they employ to impart understanding of the value of an NCRC. For example, Pine Bluff High School promotes the value of the NCRC by hosting guest speakers including industry leaders and representatives from the Arkansas Department of Workforce Services. Camden Fairview High School explains to both students and their parents how the NCRC relates to employment with industry partners. Rogers New Technology High School plans field trips to local employers to demonstrate alignment of the NCRC to "real, high-wage, high-growth positions within the community." They also show ACT videos promoting the value of the NCRC even for students who plan to earn a college degree. In addition to explaining its importance, Western Yell assigns students to conduct internet research to learn about the meaning of the NCRC and its benefits. Most information is provided by the Arkansas Division of Workforce Services website, which includes brochures for job seekers and employers as well as lists of employers who recognize the NCRC in Arkansas and nationally.[4]

The Lead Career Coach at Rivercrest High School explains the NCRC in a college and career readiness presentation, and he celebrates student success stories on social media. Faculty also receive professional development to better understand the value of the NCRC and the potential impact of WorkKeys Curriculum on general achievement, especially when reading or math is involved. Manila High School hosts guest speakers from local industries to talk about hiring requirements, including the NCRC. In another effort to highlight the value of the NCRC, students receive their NCRCs during an awards ceremony at school. Similarly, students at Crossett High School are recognized with cords to wear at graduation, a certificate, and a cash award for students who earn an NCRC at the Silver level or higher.

Warren High School is situated in an ACT Work Ready Community, which is an area where economic developers, employers, and educational institutions partner to measure skills gaps using WorkKeys and plan workforce development efforts.[5] The local ACT Work Ready Team meets monthly and plans information-sharing activities throughout the community. For students, this includes guest speakers, promotional banners, recruiting by the Internship/Youth Apprenticeship Program Coordinator, and instructors promoting the NCRC and assisting students throughout the year. Warren High School also fosters friendly competitions and provides rewards and celebrations for students who earn an NCRC.

WorkKeys Recognition

Ultimately, the value of an NCRC to an individual depends on whether employers and educational institutions require or recognize WorkKeys performance when making decisions about hiring or admission. Survey results indicate varying degrees of WorkKeys recognition. Western Yell High School indicated that local employers do not recognize WorkKeys, but students are informed about employers across the state who do. Russellville High School reported that "a few" local manufacturers recognize the NCRC, and Manila High School said that WorkKeys is recognized by "several" employers in the county and internship programs sponsored by local postsecondary institutions. In the area surrounding Warren High School, businesses are "starting to recognize WorkKeys and NCRC when hiring new employees." Some employers have established minimum WorkKeys scores through job profiling. Crossett High School noted that WorkKeys is recognized by the Federation for Advanced Manufacturing Education, the University of Arkansas at Monticello College of Technology – Crossett, and several local employers.

Benton High School provided a list of 16 employers in the county who recognize WorkKeys. Rogers New Technology High School reported that local employers, especially advanced manufacturing firms, use WorkKeys to ensure quality candidates and support employee retention. According to Pine Bluff High School, more than 50 local employers recognize WorkKeys. Camden Fairview High School indicated that "all" local industries require WorkKeys, and they gave several examples (Lockheed Martin, Aerojet, and General Dynamics). Finally, Rivercrest High School provided a list of 77 local employers who recognize WorkKeys. Also, a local college recognizes WorkKeys by offering three credit hours for the "Workplace Essentials" course, which is required for most CTE programs of study. The college also offers monetary incentives of $25–$100 depending on the NCRC level achieved.

Conclusions

A brief survey was administered to Arkansas high schools with greater-than-expected WorkKeys performance with the goal of identifying potentially effective practices for promoting career readiness. All respondents indicated that WorkKeys Assessments were required components of courses designed to prepare students for college and careers. The high schools offered a variety of additional strategies to foster career readiness. This included internships, work-based learning, or youth apprenticeship programs as well as integrating career readiness curricula into CTE courses, active counseling to support the development of students' career plans, project-based learning across the curriculum, and interaction with local business leaders. All high schools reported using WorkKeys Curriculum to help prepare students to take the NCRC assessments, and some schools use WorkKeys Curriculum to determine when students are ready to take the tests. Only one school described classroom instruction specifically targeted at the skills measured by the NCRC assessments, but general academic coursework should help students prepare for WorkKeys as well. The high schools described a variety of methods to increase awareness of the importance of performing well on WorkKeys, including informational presentations, videos, and assignments, as well as guest speakers, field trips, motivational banners, and public recognition for NCRC attainment. High schools in Arkansas and around the US can learn from each other to support the shared goals of closing skills gaps, ensuring career readiness and success, and supporting economic development.

Appendix: Statistical Analysis

Data

ACT Research extracted WorkKeys data from Arkansas examinees from 2017 through 2019 for the three NCRC assessments: Applied Math, Workplace Documents, and Graphic Literacy. To identify high school testers, the WorkKeys data were merged with Arkansas statewide ACT testing data from the 2016–2017, 2017–2018, and 2018–2019 academic years. Schools were included in the sample if they had 15 or more students who took Applied Math, Workplace Documents, and Graphic Literacy and had ACT scores. The merged data set included 2,534 students from 48 high schools. Statewide ACT testing occurs in spring of junior year, and the typical time between the ACT and WorkKeys was 9–10 months, which means that most students took WorkKeys as high school seniors. The sample was 53.2% female, 19.5% Black/African American, 12.4% Hispanic/Latino, and 62.0% White.

Analysis

Descriptive analyses were first carried out to examine the distributions of WorkKeys scores, ACT scores, and GPA as well as their correlations. Next, multi-level models were fit to the data to evaluate academic achievement and demographic variables as predictors of WorkKeys scores. In these analyses, ACT math predicted Applied Math, ACT reading predicted Workplace Documents, and ACT science predicted Graphic Literacy. Whereas the descriptive analyses grouped all students together, the multi-level models accounted for the nesting of students within schools. Models were fit with combinations of student-level and school-level predictors including ethnicity (White or Non-White), gender, and ACT score. The full model is represented by the following equations:

$$WK_{ij} = \beta_{0j} + \beta_{1j}NonWhite_{ij} + \beta_{2j}Female_{ij} + \beta_{3j}ACT_{ij} + r_{ij}$$

$$\beta_{0j} = \gamma_{00} + \gamma_{01}Prop\_NonWhite_{j} + \gamma_{02}Prop\_Female_{j} + \gamma_{03}\overline{ACT}_{j} + u_{0j}$$

$$\beta_{1j} = \gamma_{10}$$

$$\beta_{2j} = \gamma_{20}$$

$$\beta_{3j} = \gamma_{30}$$

In this model, the WorkKeys score for student *i* in school *j* is predicted by ethnicity, gender, and ACT score. Each school intercept β_{0j} is predicted by proportion non-White, proportion female, and mean ACT score. Note that entering the same predictors at both levels eliminates potential bias in the student-level coefficients caused by associations between school-level predictors and β_{0j}. In exploratory analyses, the coefficients within schools were allowed to vary, but that variation was not statistically significant. Thus, the coefficients for non-White, gender, and ACT score were held constant across schools. The school-level random effect u_{0j} served

as an indicator of average WorkKeys performance relative to expected. A positive value would indicate that, on average, students in a certain school earned higher WorkKeys scores than students in other schools controlling for all predictor variables.

Descriptive Statistics

Table 1 shows summary statistics for the distributions of student achievement variables. WorkKeys scale scores range from 65–90, and they are transformed to level scores with a maximum of 7. The average WorkKeys scores in Table 2 correspond to level 4 on Applied Math (76–79), level 4 on Workplace Documents (77–80), and level 5 on Graphic Literacy (78–81). WorkKeys level scores are tied to descriptions of specific workplace knowledge and skills, and they are used to award the NCRC. Specifically, examinees must attain Level 3 or higher on the Applied Math, Workplace Documents, and Graphic Literacy to earn Bronze, 4 or higher to earn Silver, 5 or higher to earn Gold, and 6 or higher to earn Platinum. More than 90% of the sample earned an NCRC, with 28.5% earning Bronze, 33.0% Silver, 20.1% Gold, and 9.8% Platinum.

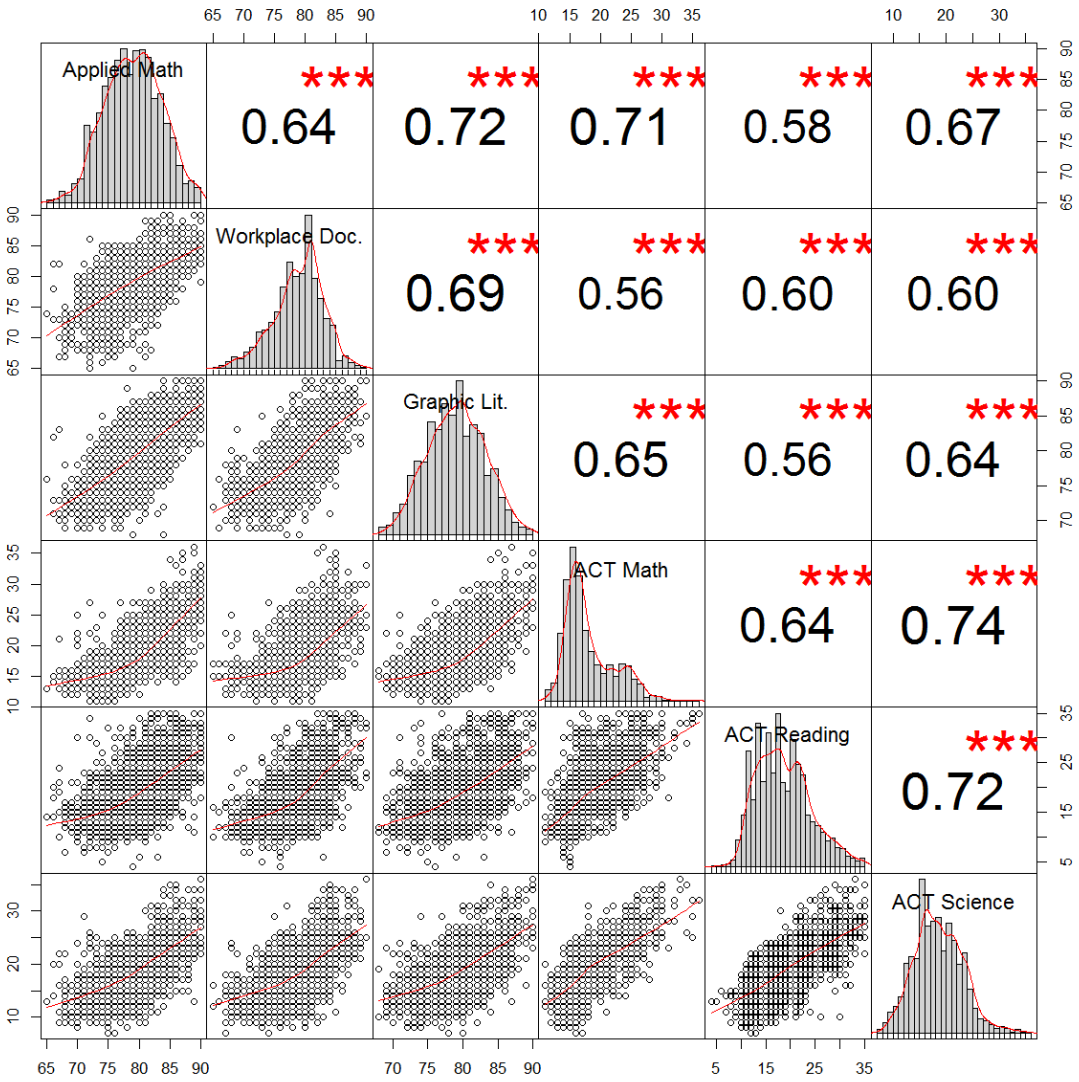
The ACT is an academic achievement test commonly used to support college admissions decisions. The average ACT scores in Table 1 suggest that the sample had slightly lower average achievement than the national 2018 high school graduating class. For comparison, the national averages were 20.5 for ACT math, 21.3 for ACT reading, and 20.7 for ACT science.[6]

Table 1. Student Achievement Variable Distributions

Variable	Mean	SD	25th Percentile	Median	75th Percentile
WorkKeys Applied Math	79.2	4.6	76.0	79.0	82.0
WorkKeys Workplace Documents	79.0	4.0	77.0	80.0	82.0
WorkKeys Graphic Literacy	79.2	4.1	76.0	79.0	82.0
ACT Math	18.3	4.0	15.0	17.0	20.0
ACT Reading	18.8	5.5	14.0	18.0	22.0
ACT Science	18.7	4.5	16.0	18.0	22.0

Figure 1 illustrates the distributions of variables used in subsequent analyses. Specifically, histograms of Applied Math, Workplace Documents, Graphic Literacy, ACT math, ACT reading, and ACT science are shown in the diagonal entries. Scatter plots showing the bivariate relationships are below the diagonal, and correlations coefficients are above the diagonals. All correlation coefficients were moderate to strong in magnitude and statistically significant ($p < .001$). Correlations among WorkKeys scores ranged from .64 to .72, correlations among ACT scores ranged from .64 to .74, and correlations between WorkKeys and ACT ranged from .56 to .71. Overall, students who demonstrated higher achievement on one measure tended to demonstrate higher achievement on all others.

Figure 1. Histograms, Scatter Plots, and Correlations for WorkKeys, ACT, and GPA.



Results

Tables 2, 3, and 4 show the multi-level model parameter estimates and indicators of statistical significance. Model 1, which is known as the "unconditional" model, serves a point of reference for the subsequent models. Across assessments, patterns in the statistical significance of model parameters were generally similar, so only the Applied Math models are described in detail. Model 2 added non-White and female as student-level predictors, and this had the effect of reducing the between-school variance (τ_{00}) and within-school variance (σ^2). However, the addition of ACT math score as a student-level predictor in Model 3 reduced those variances substantially. Put another way, ACT math scores accounted for much more variance in Applied Math scores than the non-White and female indicators. This was apparent from the increase in R^2 from .156 to .551. Model 4 investigated school-level predictors by

themselves, and only mean ACT math scores had a statistically significant coefficient. Model 5 included all student-level and school-level predictors. Only the statistically significant coefficients from Model 5 were retained in the final model (Model 6). Model 6 included only the following coefficients: student non-White indicator and student ACT math score. Note that the between-school and within-school variances were nearly identical in Model 5 and Model 6. The same Model 6 parameterization was applied for Workplace Documents and Graphic Literacy.

Table 2. Applied Math Model Parameter Estimates

Estimate		Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Intercept	γ_{00}	79.202***	80.201***	65.319***	64.981***	65.318***	65.209***
Non-White	β_{1j}/γ_{10}		-2.070***	-1.001***		-1.020***	-1.014***
Female	β_{2j}/γ_{20}		-0.515**	-0.175		-0.175	
ACT Math	β_{3j}/γ_{30}			0.782***		0.783***	0.784***
Proportion Non-White	γ_{01}				-0.804	0.213	
Proportion Female	γ_{02}				-0.168	0.043	
Mean ACT	γ_{03}				0.797***	-0.005	
τ_{00}		2.189	1.716	0.524	0.417	0.568	0.524
σ^2		18.630	17.844	9.461	18.601	9.463	9.465
R^2		.120	.156	.551	.115	.552	.551

Table 3. Workplace Documents Model Parameter Estimates

Estimate		Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Intercept	γ_{00}	79.168***	79.208***	71.271***	69.686***	69.835***	71.455***
Non-White	β_{1j}/γ_{10}		-1.300***	-0.506***		-0.494***	-0.458**
Female	β_{2j}/γ_{20}		0.796***	0.504***		0.507***	
ACT Reading	β_{3j}/γ_{30}			0.416***		0.414***	0.419***
Proportion Non-White	γ_{01}				-0.511	0.004	
Proportion Female	γ_{02}				-0.034	-0.513	
Mean ACT Reading	γ_{03}				0.514***	0.092	
τ_{00}		2.365	2.089	1.171	1.071	1.207	1.167
σ^2		14.039	13.655	9.255	14.046	9.257	9.313
R^2		.156	.180	.443	.154	.443	.439

Table 4. Graphic Literacy Model Parameter Estimates

Estimate		Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Intercept	γ_{00}	79.268***	79.809***	68.976***	68.877***	69.105***	69.016***
Non-White	β_{1j}/γ_{10}		-1.499***	-0.454**		-0.438**	-0.448**
Female	β_{2j}/γ_{20}		-0.032	0.075		0.094	
ACT Science	β_{3j}/γ_{30}			0.556***		0.555***	0.555***
Proportion Non-White	γ_{01}				-0.52	-0.057	
Proportion Female	γ_{02}				-1.724	-1.748	
Mean ACT Science	γ_{03}				0.611***	0.043	
τ_{00}		2.000	1.666	0.729	0.588	0.720	0.725
σ^2		14.986	14.637	9.326	14.987	9.328	9.324
R^2		.131	.152	.458	.127	.458	.458

Model parameter estimates allowed for estimation of the school-level random effects (u_{0j}), which indicated average WorkKeys performance relative to expected. Each school had three residuals, one for each WorkKeys Assessment (Table 5). Those residuals were averaged to identify schools with greater-than-expected WorkKeys scores (see Mean Random Effect in Table 5). The mean random effects ranged from 0.6 to 1.4 on the WorkKeys scale. While those differences may appear small, they are not so small relative to the standard deviations of WorkKeys score distributions (Table 1). Indeed, they represent effect sizes ranging from approximately 0.13 to 0.32. That is, for example, one school had average WorkKeys scores 0.32 standard deviations higher than the average for schools enrolling students with similar ACT scores and demographics. The maximum effect sizes on Applied Math, Workplace Documents, and Graphic Literacy were 0.37, 0.41, and 0.42 standard deviations, respectively. The 10 schools in Table 5 (with the 10 highest average random effects) were contacted for this study.

Table 5. Random Effects

				Applied Math			Workplace Documents			Graphic Literacy		
N	Percent Non-White	Percent Female	Mean ACT Math	Mean	Random Effect	Mean ACT Reading	Mean	Random Effect	Mean ACT Science	Mean	Random Effect	Mean Random Effect
82	39.0%	69.5%	17.9	80.9	1.7	18.7	80.9	1.6	18.4	80.0	0.8	1.4
17	76.5%	47.1%	16.7	78.8	0.6	17.1	80.1	1.3	17.1	81.2	1.7	1.2
42	35.7%	52.4%	18.9	80.9	0.8	19.9	81.0	1.2	19.6	80.6	0.7	0.9
16	25.0%	25.0%	16.2	79.4	0.8	16.6	79.7	0.9	17.3	79.5	0.6	0.8
84	20.2%	57.1%	19.6	80.9	0.4	21.4	81.1	0.7	20.6	81.6	1.1	0.7
147	57.8%	44.2%	18.7	80.0	0.7	19.7	80.1	0.6	19.3	80.3	0.7	0.7
95	17.9%	53.7%	20.6	81.7	0.4	21.1	81.1	0.8	21.0	81.4	0.7	0.7
15	46.7%	60.0%	16.2	77.5	0.0	16.1	80.1	1.4	17.0	79.2	0.5	0.6
44	11.4%	45.5%	18.6	79.9	0.1	17.4	79.8	1.0	18.0	79.9	0.7	0.6
28	100.0%	42.9%	15.8	77.1	0.3	15.4	77.9	0.4	14.8	78.2	1.0	0.6

Notes

1. ACT. (2014). ACT National Career Readiness Certificate. Iowa City, IA: ACT. Retrieved from *http://forms.act.org/certificate/pdf/NCRC-InformationFlyer.pdf*.
2. Arkansas Department of Career and Technical Education. (2019). *Occupational areas*. Retrieved from *https://dcte.ade.arkansas.gov/Page/OccupationalProgramAreas* (see Career Readiness/Work-Based Learning and Jobs for Arkansas Graduates).
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