

Academic Achievement And Work In West Virginia 2007

Results By ACT Score And College
Grade Point Average

June 2009
Revised: December 2009

Prepared for the
West Virginia Higher Education Policy
Commission

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Executive Summary

Public universities and colleges are a crucial component of the system by which nations, states, and local areas generate human capital. Research in economics has shown that human capital accumulation (frequently measured by educational attainment) generates benefits both for individuals, through higher earnings, and for local economies, through faster average income growth, as well as other socio-economic benefits. Thus, the location decisions of college graduates become a critical concern for state and local policymakers. In particular, it is important to know the extent to which higher education graduates remain in the state to work and the wages they earn.

This report summarizes West Virginia labor market experiences of graduates from West Virginia public institutions of higher education during the last decade. We analyze data which matches graduates with employment and wage data for calendar year 2007. This report provides summary and detailed information on the work participation and wages of graduates by ACT score and college grade point average. We further disaggregate results by summary degree, residency for fee purposes, gender, race, and graduation year.

Highlights of the study include:

Work Participation And Wages By ACT Score

Work participation In 2007

- Our sample includes 107,455 graduates during the 1996-2005 period. Of those graduates, we have composite ACT scores for 31,302. For graduates with ACT scores, 41.1 percent posted a composite score of 22.0 or higher, 30.6 percent scored between 19.0 and 21.0, and 28.3 percent scored below 19.0. In 2008, a student with a composite ACT score of 22.0 was in the 68th percentile for West Virginia, while a student with a score of 19.0 was in the 44th percentile.
- Of graduates with ACT scores, we find that work participation rates tend to be higher for graduates with lower scores. Indeed, for graduates scoring 22.0 or higher we find that the work participation rate was 56.4 percent in 2007. For graduates scoring between 19.0 and 21.0 the work participation rate was 62.6 percent and for graduates scoring below 19.0 the work participation rate was 64.5 percent.
- Graduates with Associate's degrees show relatively little variation in work participation by ACT score. In contrast, work participation rates for graduates with Bachelor's, First Professional, and Master's degrees vary significantly by ACT score, with higher ACT scores generally associated with lower work participation rates.
- Male and female graduates show similar patterns. Again, we find lower work participation rates for graduates with higher ACT scores.
- For most racial categories, we find that work participation rates tend to be lower for graduates with higher ACT scores. The exception is for black graduates, where we find evidence that work participation rates are positively correlated with ACT scores.
- Graduates that were in-state for fee purposes and that posted ACT scores 22.0 or higher had lower work participation rates than in-state graduates with lower ACT scores. For out-of-state graduates, we find similar work participation rates for graduates with higher and lower ACT scores.

Annualized Wages In 2007

- For graduates with West Virginia wages in 2007, we find that annualized wages in West Virginia rise with ACT score.

- In 2007, graduates with ACT scores of 22.0 or higher earned annualized wages of \$34,029 in 2007, compared to \$31,464 for graduates with ACT scores between 19.0 and 21.0, and \$28,923 for graduates with ACT scores below 19.0.
- For graduates with Associate's degrees, West Virginia wages were 10.9 percent higher for graduates with ACT scores above 22.0 than for graduates with scores below 19.0. We find a similar gap for Master's degree graduates (12.8 percent), but a much smaller gap for Bachelor's degree graduates (4.9 percent).
- Male graduates with ACT scores above 22.0 earned 9.7 percent more than graduates with ACT scores below 19.0. The gap was much larger for female graduates. Indeed, female graduates with ACT scores above 22.0 earned 24.7 percent more than female graduates with ACT scores below 19.0.
- For most race categories we find that higher ACT scores are correlated with higher wages. However, we find that for Hispanics and American Indians this correlation is weak or reversed.
- Both in-state and out-of-state graduates show a strong positive correlation between ACT scores and wages in West Virginia.

Work Participation And Wages By College GPA

Work participation In 2007

- Of the 107,455 graduates during the past decade, we have college grade point average data for 90,575 graduates. Of those graduates with grades, 35.5 percent had a grade point average of 3.50 or greater, 29.5 percent had a grade point average between 3.0 and 3.49, and 35.0 percent had a grade point average below 3.0.
- Work participation rates in 2007 are higher for graduates with college GPAs above 3.5 than for graduates with GPAs between 3.0 and 3.5 and college GPAs below 3.0.
- For graduates with Bachelor's, Doctoral, and Master's degrees, we find the highest work participation rates for those earning a GPA of 3.5 or better. For Associate's and First Professional graduates, we find the highest work participation rates for those earning a GPA of 3.0 or below.
- We find that work participation rates for in-state graduates with GPAs above 3.5 are higher than work participation rates for in-state graduates with GPAs below 3.0.

Annualized Wages In 2007

- West Virginia annualized wages are positively correlated with college GPA. Thus, graduates with better college grades earn higher wages.
- Graduates with college GPAs above 3.5 earned 26.5 percent more than graduates with college GPAs below 3.0.
- The wage gap between graduates with GPAs above 3.5 and those below 3.0 is largest for graduates with Master's and First Professional degrees. Wages are similar for graduates with Associate's and Bachelor's degrees.

Employment Data Description

The data analyzed in this study come from the matching of demographic information on graduates from West Virginia institutions of higher education (compiled by the HEPC¹) with employment records maintained by Workforce West Virginia and the federal government. Graduates reflect the highest degree earned at the time of measurement (during the 1996-1997 to 2005-2006 period).

The bulk of the employment data used is gathered from West Virginia unemployment compensation records. This is a well-known dataset which measures employment by place of work. It covers jobs and wages reported by firms participating in the West Virginia Unemployment Compensation system. As a general rule, any firm which employs one or more workers for some part of a day in at least 20 different weeks of a calendar year is required to contribute to the state's unemployment insurance system. Major exceptions are railroad companies and the federal government, which contribute to separate systems. The self-employed, student workers, most church workers, and unpaid family workers are also generally not covered.

We include civilian federal government employment and wages through the Federal Employment Data Exchange System at the Jacob France Institute at the University of Baltimore. The Jacob France Institute facilitates the matching of graduates with civilian government employment.

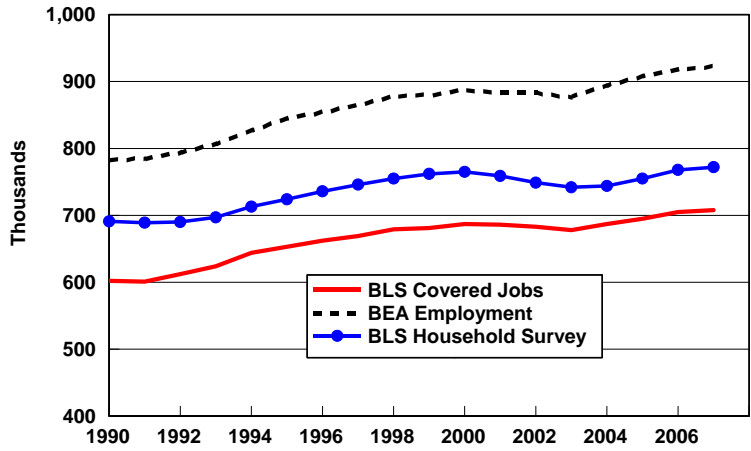
Covered employment counts 708,313 jobs at establishments in West Virginia in 2007.² As Figure 1 shows, this measure of employment is lower than two other major measures of employment: employment measured by the U.S. Bureau of Economic Analysis and employment measured by the U.S. Bureau of Labor Statistics household survey. Differences arise because of the treatment of the self-employed, who are excluded from covered jobs but are included in the BEA measure and in the BLS household survey, as well as the exclusion of student workers, most church workers, and unpaid family members from the measure of covered jobs. Further, BLS household employment is measured by place of residence, which includes state residents working out of state.

Finally, the wages documented in the report are an important source of compensation, but they are not the only source. Data on wage income is readily available, well understood, and is useful in the evaluation of returns to work of state higher education graduates. However, wage data does not include fringe benefits provided by firms, particularly employer-paid pension and health insurance. This source of income has accounted for an increasing share of work compensation during the last 30 years. Indeed, the share of other labor income to gross earnings by place of work has risen from 6.3 percent in 1969 to 13.3 percent by 2007 for West Virginia.

¹ We would like to thank Larry Ponder of the WVHEPC for providing the bulk of the data used in this study.

² Federal government jobs are added in separately for completeness.

Figure 1
Three Measures Of West Virginia Employment



Work Participation And Wages Of Public Higher Education Graduates By ACT Scores

Data on ACT Scores

Over the ten year period, 1996-1997 to 2005-2006, we have composite ACT scores for 31,302 graduates from higher education institutions in West Virginia. These graduates were divided into three categories by ACT score: those scoring a 22 and above, those scoring between 19 and 21, and those scoring below 19. These groups were then broken down and analyzed by degree earned, gender, race, residency for fee purposes, and graduation year, as shown in Table 1. A Bachelor degree was the most popular degree earned, at 68.3 percent, followed by an Associate degree, at 20.3 percent, and a Master degree, at 8.1 percent. Females outnumbered males, 60.1 percent to 39.9 percent. White ethnicity was the largest race category in the sample, at 95.6 percent, and in-state graduates dictated the origin of graduates, with 92.0 percent.

Table 1
Summary Statistics for W.Va. Public Higher Education Graduates During The Past Decade
With ACT Scores Available

	Graduates				Share of Graduates			
	All Graduates With ACT Scores	ACT 22+	ACT 19-21	ACT Below 19	All Graduates With ACT Scores	ACT 22+	ACT 19-21	ACT Below 19
Total	31,302	12,858	9,580	8,864	--	--	--	--
Degree								
Associate	6,346	1,506	2,047	2,793	20.3	11.7	21.4	31.5
Bachelor	21,389	9,424	6,551	5,414	68.3	73.3	68.4	61.1
Doctoral	15	14	n/d	n/d	0.0	0.1	n/d	n/d
First Prof	648	549	81	18	2.1	4.3	0.8	0.2
Master	2,547	1,307	793	447	8.1	10.2	8.3	5.0
Gender								
Male	12,503	5,175	3,709	3,619	39.9	40.2	38.7	40.8
Female	18,799	7,683	5,871	5,245	60.1	59.8	61.3	59.2
Race								
White	29,924	12,508	9,241	8,175	95.6	97.3	96.5	92.2
Black	833	113	201	519	2.7	0.9	2.1	5.9
Hispanic	138	54	41	43	0.4	0.4	0.4	0.5
Asian	221	105	52	64	0.7	0.8	0.5	0.7
American Indian	89	38	21	30	0.3	0.3	0.2	0.3
Unknown	97	40	24	33	0.3	0.3	0.3	0.4
Residency								
In State	28,802	11,858	8,842	8,102	92.0	92.2	92.3	91.4
Out of State	1,759	694	522	543	5.6	5.4	5.4	6.1
Other	741	306	216	219	2.4	2.4	2.3	2.5
Year								
1996	99	29	33	37	0.3	0.2	0.3	0.4
1997	338	106	112	120	1.1	0.8	1.2	1.4
1998	1,137	423	353	361	3.6	3.3	3.7	4.1
1999	2,245	883	722	640	7.2	6.9	7.5	7.2
2000	2,975	1,095	951	929	9.5	8.5	9.9	10.5
2001	3,674	1,415	1,180	1,079	11.7	11.0	12.3	12.2
2002	4,308	1,777	1,284	1,247	13.8	13.8	13.4	14.1
2003	4,798	1,973	1,498	1,327	15.3	15.3	15.6	15.0
2004	5,632	2,423	1,669	1,540	18.0	18.8	17.4	17.4
2005	6,096	2,734	1,778	1,584	19.5	21.3	18.6	17.9

n/d: not disclosed

W.Va. ACT score (Percentile): 22 (68th), 19 (44th) in 2008.

Work Participation by ACT Score

In 2007, the work participation rate for graduates with reported ACT scores was 60.6 percent. Therefore, of the 31,302 graduates in the sample, 18,970 were employed in West Virginia for at least one quarter in 2007. Students earning Associate degrees were the most likely among all degrees to work in the state with a participation rate of 71.6 percent, illustrated in Table 2. After graduates earning an Associate degree, First Professional degree recipients had the highest work participation rate, at 64.7 percent, followed by Master degree recipients, at 62.4 percent. Females, at 61.7 percent, were more likely to work in West Virginia than men, at 58.9 percent; and in-state graduates, with a work participation rate of 64.1 percent, were much more likely to work in the state than out-of-state graduates, with a participation rate of only 14.9 percent. For graduates with listed race, those having White ethnicity were the most likely to work in the state, at 61.1 percent, while Asian graduates were the least likely to work in West Virginia, at 38.0 percent.

Table 2
Work Participation And Annualized Wages For W.Va. Public Higher Education Graduates
By ACT Score

	Work Participation Rates in 2007 (In Percent)				Annualized Wages In 2007			
	All Graduates With ACT Scores	ACT 22+	ACT 19-21	ACT Below 19	All Graduates With ACT Scores	ACT 22+	ACT 19-21	ACT Below 19
Total	60.6	56.4	62.6	64.5	31,679	34,029	31,464	28,923
Degree								
Associate	71.6	70.5	72.9	71.1	29,225	30,560	30,496	27,558
Bachelor	56.8	53.0	59.0	60.7	30,364	30,846	30,554	29,407
Doctoral	n/d	n/d	n/d	n/d	n/d	n/d	n/d	n/d
First Prof	64.7	64.3	71.6	n/d	77,157	77,767	74,658	n/d
Master	62.4	60.9	63.2	65.5	38,664	39,970	38,480	35,433
Gender								
Male	58.9	54.8	61.4	62.1	36,227	37,758	36,116	34,405
Female	61.7	57.5	63.4	66.1	28,794	31,631	28,621	25,369
Race								
White	61.1	56.6	63.0	65.9	31,944	34,199	31,688	29,256
Black	49.1	54.9	53.2	46.2	24,005	30,966	23,092	22,613
Hispanic	46.4	40.7	43.9	55.8	25,182	24,100	25,738	25,757
Asian	38.0	37.1	42.3	35.9	26,061	26,438	27,808	23,749
American In	59.6	55.3	52.4	70.0	31,822	29,988	31,901	33,615
Unknown	66.0	60.0	70.8	69.7	18,677	16,840	18,019	21,081
Residency								
In State	64.1	59.6	66.0	68.8	31,829	34,190	31,570	29,110
Out of State	14.9	14.6	15.5	14.7	24,496	25,922	27,002	20,159
Other	31.4	29.1	37.0	29.2	27,831	30,489	28,255	23,606
Year								
1996-1997*	57.6	55.2	54.5	62.2	31,208	31,068	33,839	29,247
1997-1998*	60.1	47.2	64.3	67.5	32,659	34,950	33,343	30,636
1998-1999*	47.1	36.6	52.7	54.0	37,359	42,651	37,448	33,067
1999-2000	48.5	44.8	49.9	52.0	39,050	39,989	40,538	36,325
2000-2001	54.7	49.0	58.5	57.6	36,097	39,178	36,069	33,033
2001-2002	55.3	50.3	57.0	59.8	35,652	39,897	34,453	32,216
2002-2003	60.0	57.1	61.1	62.9	34,883	39,573	32,870	30,832
2003-2004	61.4	57.2	63.5	65.1	31,269	33,498	31,039	28,610
2004-2005	66.1	62.4	67.0	70.6	29,646	31,976	29,766	26,284
2005-2006	68.6	63.3	72.0	73.9	25,456	26,772	25,269	23,714

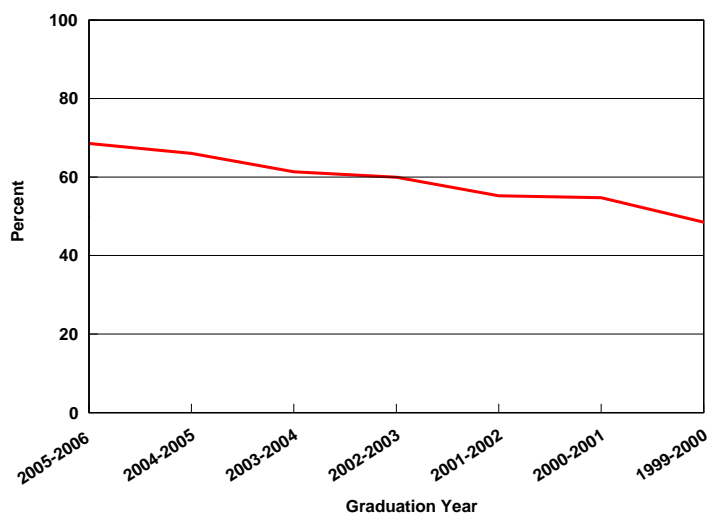
n/d: data not disclosed

*Little or no data for first professional or masters graduates.

W.Va. ACT score (Percentile): 22 (68th), 19 (44th) in 2008.

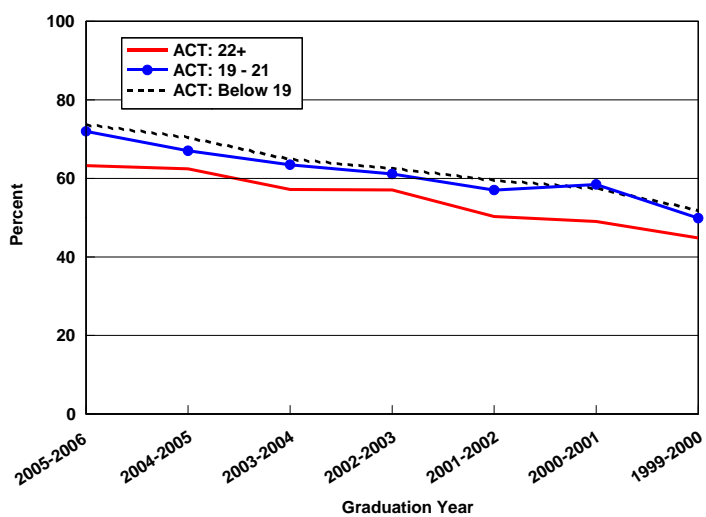
Work participation rates are highest among recent graduates, as illustrated in Figure 2. Participation rates gradually fall over time, from 68.6 percent for the most recent graduates, to 48.5 percent for the graduating class of 1999-2000.

Figure 2
Work Participation Rates For W.Va.
Public Higher Education Graduates
With ACT Score Reported



The same trend can be seen when participation rates are broken down by ACT score in Figure 3, as the most recent graduates have the highest participation rate for all ACT levels. A significant difference can be seen in participation rates between ACT levels. Those scoring 22+ have a much lower work participation rate, averaging only 56.4 percent, compared to 62.6 percent for those scoring 19-21, and 64.5 percent for those scoring below 19.

Figure 3
Work Participation Rates For W.Va.
Public Higher Education Graduates
By ACT Score



For graduates earning a Bachelor or Master degree, the highest work participation rate came from those scoring an ACT score below 19. Bachelor and Master degree recipients saw jumps in participation rates as ACT scores decreased, as those receiving Bachelor degrees increased work participation rates, from 53.0 percent for those scoring a 22+, to 60.7 for those scoring below 19, and those receiving Master degrees increased participation rates, from 60.9 percent for those scoring a 22+, to 65.5 percent for those scoring below 19. Work participation rates peaked for both First Professional and Associate degree recipients with graduates receiving an ACT score 19-21, at 71.6 percent and 72.9 percent respectively.

Both male and female graduates saw work participation rates rise as ACT scores went down. Male graduates increased participation rates, from 54.8 percent when scoring 22+, to 62.1 percent when scoring below 19. Likewise, female graduates increased participation rates, from 57.5 percent when scoring 22+, to 66.1 percent when scoring below 19.

Graduates having White, Hispanic, or American Indian ethnicity also saw the highest work participation rates come from those with an ACT score below 19. Graduates with White ethnicity increased participation rates 9.3 percentage points, from 56.6 for those scoring 22+, to 65.9 for those scoring below 19; Hispanic graduates increased participation rates 15.1 percentage points, from 40.7 percent for those scoring 22+, to 55.8 percent for those scoring below 19; and American Indian graduates increased participation 17.6 percentage points, from 52.4 percent for those scoring 19-21 (the lowest participation rate for American Indian ethnicity), to 70.0 percent for those scoring below 19. Graduates having Asian ethnicity saw the lowest work participation rate from those with an ACT score 19-21, at 42.3 percent, and graduates having Black ethnicity had the highest participation rates from those scoring 22+, at 54.9 percent.

In-state graduates followed the same general trend, with the highest participation rates coming from graduates receiving an ACT score below 19. Participation rates increase for in-state graduates, from 59.6 percent for those scoring 22+, to 68.8 percent for those scoring below 19. Out-of-state graduates, on the other hand, were most likely to work in West Virginia, at 15.5 percent, if scoring 19-21 on the ACT.

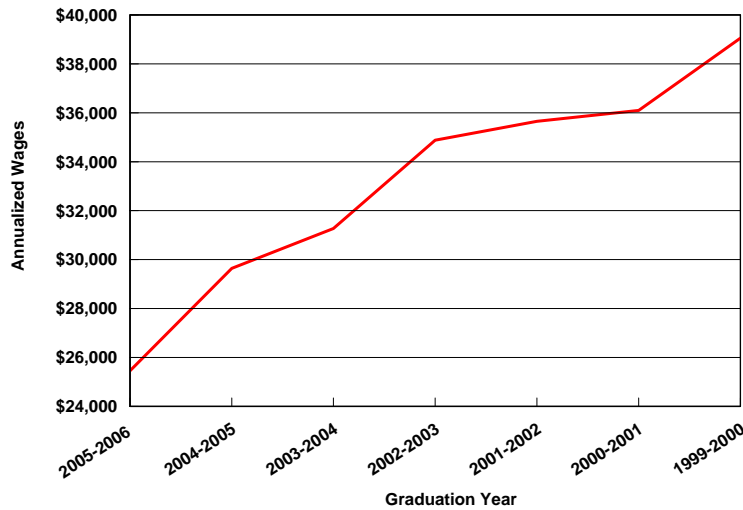
Wages by ACT Score

The average annualized wage for graduates over the ten year period with ACT scores was \$31,679, shown in Table 4.³ First Professional degrees averaged the highest wage at \$77,157. While females both outnumbered and out participated males, the average annualized male salary was substantially larger than the annualized female salary, \$36,227 compared to \$28,794. In-state graduates, averaging \$31,829, out earned out-of-state graduates, averaging only \$24,496. White ethnicity graduates averaged the highest annualized wage among all races at \$31,944, \$122 more than those having American Indian ethnicity, who averaged the second highest wage.

As time after graduation increases, wage is also expected to increase due to increased experience in the labor market. In 2007, wages steeply increase, as expected, from \$25,456 for the most recent graduates to \$39,050 for the graduates from 1999-2000, as shown in Figure 4.

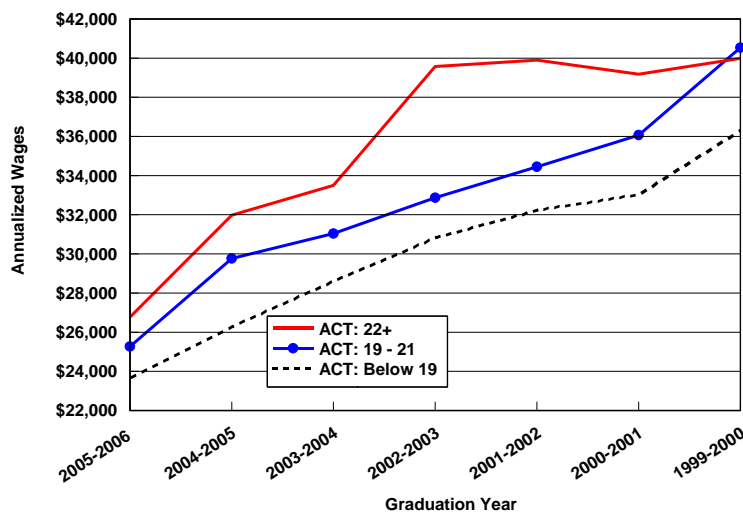
³ The adjustment is to divide a worker's total wages for the year by the number of quarters worked. The resulting quarterly wage is then 'annualized' by multiplying by four. Thus, a worker with total wages of \$33,000 for the year, with three quarters worked, will have an average annualized wage of \$44,000 ($=(\$33,000/3)*4$).

Figure 4
Annualized Wages For W.Va.
Public Higher Education Graduates
With ACT Score Reported



A substantial difference in wage can be seen when broken down by ACT score, as Figure 5 shows. Graduates who scored 22+ on their ACT averaged an annual wage \$2,565 higher than those with a score 19-21 and \$5,106 higher than those scoring below 19. The state of West Virginia offers one of the nation's lowest average wages, and therefore, other states may offer a more attractive wage that draws graduates with higher ACT scores away from West Virginia.

Figure 5
Annualized Wages For W.Va.
Public Higher Education Graduates
By ACT Score



For all disclosed data on degrees earned, average annualized wage increases with ACT score. Wages for Associate degree recipients increased \$3,002, from 27,558 for those scoring below 19, to 30,560, for those scoring 22+. Similarly, Bachelor degree recipients saw an increase of \$1,439 from \$29,407, for those scoring below 19, to \$30,846 for those scoring 22+; First Professional degree recipients increased their wage \$3,109 from \$74,658 for those scoring 19-21 (the lowest wage from data disclosed) to \$77,767 for those scoring 22+; and Master degree recipients earned an increase of \$4,537 for those scoring a higher on the ACT, from \$35,433 for those scoring below 19, to \$39,970 for those scoring 22+.

Both male and female graduates, likewise, saw increased wage from higher ACT scores. Male graduates increased their wage \$3,353, from \$34,405 for those scoring below 19, to \$37,758 for those scoring 22+. Female graduates saw a much larger wage increase from improved ACT scores. Females' wages increased \$6,262, from \$25,369 for those scoring below 19, to \$31,631 for those scoring 22+.

Both White and Black ethnicities followed the trend, as wages increased in conjunction with ACT scores. Graduates having White ethnicity saw an increase of \$4,943, from \$29,256, to \$34,199, as scorers moved from below 19 to 22+, while graduates having Black ethnicity saw an increase of \$8,353, from \$22,613, to \$30,966, over the same transition. Graduates having Hispanic or American Indian ethnicity, however, demonstrated the opposite trend. As ACT scores increased, wage decreased for both ethnicities. Graduates having Hispanic ethnicity saw wages fall \$1,657, from \$25,757 for scorers below 19, to \$24,100 for scorers 22+. Those having American Indian ethnicity incurred an average wage decrease of \$3,627, from \$33,615 to \$29,988, as ACT scores increased from below 19 to 22+. Meanwhile, graduates having Asian ethnicity saw their highest average wage when receiving an ACT score 19-21, at \$27,808.

In-state graduates kept with the popular trend, as wages increased with ACT scores. At \$34,190, graduates scoring 22+ received \$2,620 more than graduates scoring 19-21, earning \$31,570, and \$5,080 more than graduates scoring below 19, earning \$29,110. Out-of-state graduates, however, averaged their highest wage when receiving a score 19-21, at \$27,002.

Work Participation And Wages Of West Virginia Graduates By College GPA

Data on College GPA

Over the same ten year period, 1996-1997 to 2005-2006, 90,575 graduates from public higher education institutions in West Virginia, with college grade point average (GPA) recorded, were similarly separated into three groups: those averaging 3.5 and above, those averaging between 3.0 and 3.49, and those averaging below 3.0, as shown in Table 3. These groups were then similarly broken down and analyzed by degree earned, gender, race, residency for fee purposes, and graduation year.

A Bachelor degree was the most popular in this sample, accounting for 60.0 percent of all degrees earned, followed by a Master degree, at 21.9 percent, and an Associate degree, at 13.0 percent of degrees earned. In-state graduates dominated the composition of residency for fee purposes, at 74.2 percent. White ethnicity was by far the largest, comprising of 91.9 percent of the sample, followed by graduates with Black ethnicity, at 3.5 percent, and Asian ethnicity, at 3.2 percent. Females totaled 15.6 percentage points more than males.

Table 3
Summary Statistics for W.Va. Public Higher Education Graduates During The Past Decade
With College GPA Available

	Graduates				Share of Graduates			
	All Graduates With College				All Graduates With College			
	GPA	GPA 3.5+	GPA 3.0-3.499	GPA Below 3.0	GPA	GPA 3.5+	GPA 3.0-3.499	GPA Below 3.0
Total	90,575	32,182	26,680	31,713	--	--	--	--
Degree								
Associate	11,816	2,493	4,067	5,256	13.0	7.7	15.2	16.6
Bachelor	54,308	11,149	18,033	25,126	60.0	34.6	67.6	79.2
Doctoral	1,438	1,327	110	n/d	1.6	4.1	0.4	n/d
First Prof	2,422	525	908	989	2.7	1.6	3.4	3.1
Master	19,864	16,405	3,346	113	21.9	51.0	12.5	0.4
Gender								
Male	38,239	10,782	10,808	16,649	42.2	33.5	40.5	52.5
Female	52,336	21,400	15,872	15,064	57.8	66.5	59.5	47.5
Race								
White	83,229	29,536	24,814	28,879	91.9	91.8	93.0	91.1
Black	3,158	635	695	1,828	3.5	2.0	2.6	5.8
Hispanic	834	317	221	296	0.9	1.0	0.8	0.9
Asian	2,856	1,503	817	536	3.2	4.7	3.1	1.7
American Indian	254	90	59	105	0.3	0.3	0.2	0.3
Unknown	244	101	74	69	0.3	0.3	0.3	0.2
Residency								
In State	67,183	24,257	19,878	23,048	74.2	75.4	74.5	72.7
Out of State	20,239	6,897	5,748	7,594	22.3	21.4	21.5	23.9
Other	3,153	1,028	1,054	1,071	3.5	3.2	4.0	3.4
Year								
1996-1997	8,077	2,476	2,318	3,283	8.9	7.7	8.7	10.4
1997-1998	8,454	2,894	2,439	3,121	9.3	9.0	9.1	9.8
1998-1999	8,487	2,853	2,387	3,247	9.4	8.9	8.9	10.2
1999-2000	8,448	2,858	2,464	3,126	9.3	8.9	9.2	9.9
2000-2001	8,422	2,988	2,349	3,085	9.3	9.3	8.8	9.7
2001-2002	8,673	3,043	2,496	3,134	9.6	9.5	9.4	9.9
2002-2003	8,611	3,184	2,507	2,920	9.5	9.9	9.4	9.2
2003-2004	9,217	3,542	2,747	2,928	10.2	11.0	10.3	9.2
2004-2005	10,956	4,103	3,329	3,524	12.1	12.7	12.5	11.1
2005-2006	11,230	4,241	3,644	3,345	12.4	13.2	13.7	10.5

n/d: not disclosed

Work Participation by College GPA

In 2007, 43,906 of the 90,575 graduates with reported college GPA earned wages while being employed within the state. This gives a work force participation rate of 48.5 percent, as shown in Table 4. Students earning Associate degrees had the highest work participation rate at 66.6 percent, while those earning a Doctoral degree had the lowest likelihood to stay within the state with only a 24.9 percent work participation rate. Females, at 52.6 percent, were almost ten percentage points more likely than males, at 42.8 percent, to work in West Virginia. In-state graduates were considerably more likely to work within the state, with work participation rate at 61.6 percent, than were out-of-state graduates, whose work participation rate was only 8.7 percent.

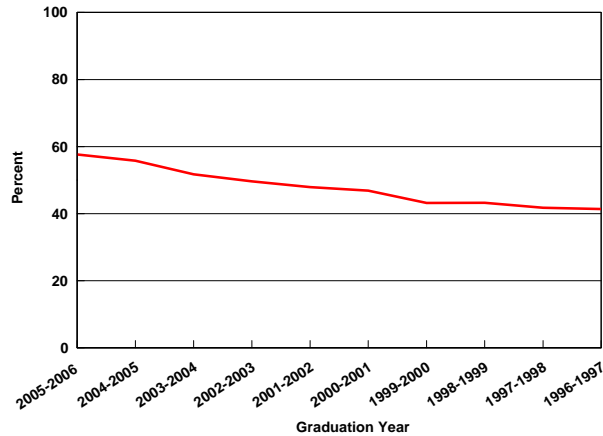
Table 4
Work Participation And Annualized Wages For W.Va. Public Higher Education Graduates
By College GPA

	Work Participation Rates in 2007 (In Percent)				Annualized Wages In 2007			
	All Graduates With College GPA	GPA 3.5+	GPA 3.0-3.499	GPA Below 3.0	All Graduates With College GPA	GPA 3.5+	GPA 3.0-3.499	GPA Below 3.0
Total	48.5	51.2	47.5	46.5	39,046	43,620	38,435	34,469
Degree								
Associate	66.6	66.6	66.2	66.8	32,464	31,834	32,647	32,622
Bachelor	43.6	45.9	44.4	41.9	34,299	34,645	34,936	33,647
Doctoral	24.9	25.2	20.9	n/d	63,266	62,896	68,653	n/d
First Prof	52.1	48.4	53.1	53.3	88,022	110,558	98,508	67,569
Master	51.8	54.3	40.4	28.3	48,651	48,416	50,423	39,358
Gender								
Male	42.8	43.0	42.6	42.8	45,324	53,165	46,264	39,618
Female	52.6	55.3	50.9	50.7	35,313	39,878	33,970	29,658
Race								
White	50.6	53.8	49.3	48.4	39,265	43,666	38,607	34,838
Black	33.6	38.0	35.4	31.4	30,589	41,364	31,305	25,759
Hispanic	24.9	26.8	24.4	23.3	34,450	42,371	26,834	30,654
Asian	11.8	11.4	10.6	14.9	46,070	47,969	49,174	38,637
American Indian	46.9	56.7	44.1	40.0	35,395	35,813	33,295	36,186
Unknown	32.8	28.7	44.6	26.1	23,874	28,806	22,699	18,080
Residency								
In State	61.6	63.8	60.0	60.6	39,212	43,812	38,555	34,678
Out of State	8.7	10.7	8.4	7.0	36,015	40,300	36,524	29,630
Other	24.9	24.6	25.8	24.2	37,037	41,490	36,605	33,142
Year								
1996-1997	41.4	44.3	40.6	39.7	49,122	55,041	49,405	43,940
1997-1998	41.7	46.0	39.6	39.4	47,735	52,543	49,415	41,208
1998-1999	43.2	48.8	40.7	40.1	45,588	49,123	46,053	41,463
1999-2000	43.2	45.5	42.0	42.0	43,657	48,521	44,829	37,916
2000-2001	46.8	50.7	44.8	44.6	42,337	47,520	41,919	36,954
2001-2002	47.9	49.9	48.0	45.8	39,581	44,259	37,931	36,012
2002-2003	49.6	52.0	48.3	48.2	38,800	43,375	38,728	33,485
2003-2004	51.7	54.0	49.8	50.7	35,849	41,027	34,790	30,150
2004-2005	55.8	56.8	54.9	55.4	32,925	37,008	32,180	28,748
2005-2006	57.6	56.8	57.9	58.4	28,749	33,433	28,033	23,742

n/d: data not disclosed

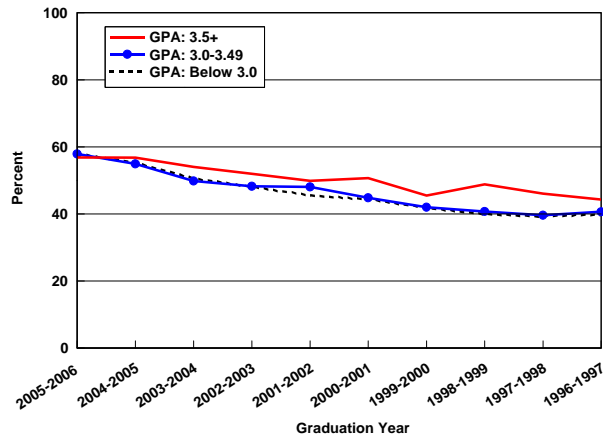
Work participation rates were significantly higher among recent graduates. In 2007, for the state's most recent graduates, participation rates were the highest at 57.6 percent. Figure 6 shows the decreasing time trend, as participation rates fall roughly 16 percentage points over the ten year period to 41.4 percent for the graduates during the 1996-1997.

Figure 6
Work Participation Rates For W.Va.
Public Higher Education Graduates
With College GPA Reported



Graduates with a college GPA 3.5+ had the highest work participation rates at 51.2 percent, and that was higher than both the graduates with their GPA 3.0-3.49, at 47.5 percent, and graduates with GPA below 3.0, at 46.5 percent. As shown in the Technical Appendix, regression analysis suggests that college GPA is mildly negatively correlated with West Virginia work participation, once we get away from the rigid classification groupings. Figure 7 shows a similar decreasing time trend in work participation; as rates similarly fall from nearly 57-58 percent range for the most recent graduates, to slightly above 40 percent for graduates in the 1996-1997 class for all three GPA groups.

Figure 7
Work Participation Rates For W.Va.
Public Higher Education Graduates
By College GPA



For graduates earning an Associate or first professional degree, the highest work participation rates came from those earning a GPA below 3.0. The highest participation rate for those earning a Bachelor degree came from those earning a GPA 3.5 or better, at 45.9 percent. Graduates earning Master’s and Doctoral degrees also drew the highest work participation rates from top students, those earning a GPA 3.5+, at 54.3 percent and 25.2 percent, respectively.

Male graduates had the highest work participation rate from those who earned a GPA 3.5+, at 43.0 percent, followed by those earning a below GPA 3.0, at 42.8 percent, and lastly by those earning a GPA between 3.0 and 3.49, at 42.6 percent. Female graduates also saw the highest work participation rate come from those who earned a GPA 3.5 and above, at 55.3 percent, followed by those earning a GPA between 3.0 and 3.49, at 50.9 percent, and lastly by those earning a GPA below 3.0, at 50.7 percent.

For most races (White, Black, Hispanic, American Indian) work participation rates were highest for the graduates earning a GPA of 3.5 or higher. The exceptions were Asian graduates and graduates for whom no race was recorded. Work participation rates were highest for Asian graduates earning a GPA below 3.0.

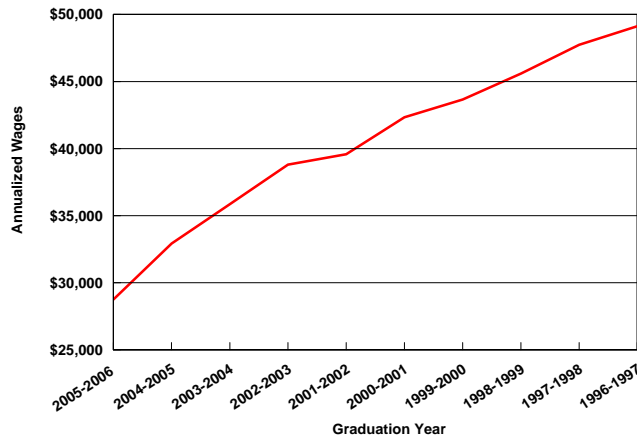
In-state graduates who earned a GPA of 3.5 or better were the most likely to remain in the state to work, with a participation rate of 63.8 percent. Work participation rates for were similar for in-state graduates with lower GPAs. Out-of-state graduates see a much lower participation rate for all GPA levels, but the highest occurred for those earning either a GPA 3.5+ or 3.0-3.49, both 10.7 and 8.4 percent, respectively.

Wages by College GPA

The average annualized wage for all graduates with reported college GPA working at least one quarter within the state of West Virginia during 2007 was \$39,046, as shown in Table 4. We find a familiar pattern in the data. First Professional degrees averaged the highest annualized wage, at \$88,022, with a gap of more than \$24,000 over Doctoral degrees, the second highest annualized wage, at \$63,266. Likewise, male wages, at \$45,324, were more than \$10,000 more than the average annualized female salary, at \$35,313. In-state graduates averaged a higher wage than out-of-state graduates; \$39,212 compared to \$36,015. Graduates with Asian ethnicity averaged by far the highest wage at \$46,070, 17.3 percent higher than those with White ethnicity, who averaged the second highest wage, at \$39,265.

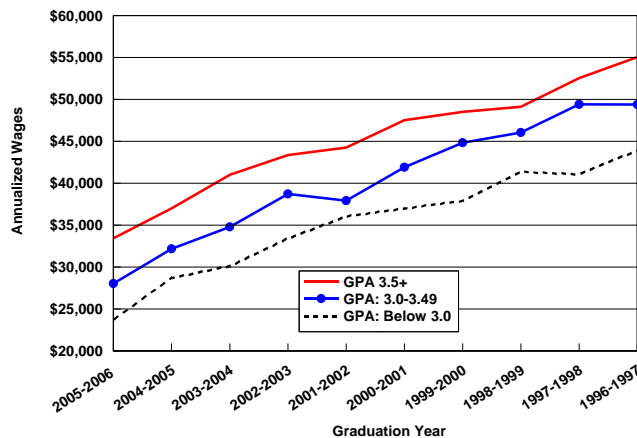
The greater the amount of time an employee spends in the labor force, the more experience he/she has, and therefore should expect a higher wage. Figure 8 illustrates this expected time trend. In 2007, graduates from 1996-1997, most of whom have been in the labor force for 10 years, earned an annualized average wage of \$49,122, \$20,373 more than the graduates from 2005-2006 who were new to the labor force and earned an annualized average wage of \$28,749.

Figure 8
Annualized Wages For W.Va.
Public Higher Education Graduates
With College GPA Reported



Graduates with a college GPA 3.5+ earned the highest annualized wage, averaging \$43,620. Following were graduates who had a GPA between 3.0 and 3.49, earning \$38,435. The lowest average annualized wage was earned by graduates who had a GPA below 3.0 at \$34,469. All three GPA groups generate increasing wages with experience, as Figure 9 shows. Indeed, for each, 10 years of experience generates at least an additional \$20,000 in additional wage income.

Figure 9
Annualized Wages For W.Va.
Public Higher Education Graduates
By College GPA



For most degrees (Associate, Bachelor, Doctoral, and Master) graduates earning GPAs in the middle range (3.0-3.49) earned the highest wages. Only in the case of First Professional degrees did graduates with GPAs 3.5 and higher earn the most.

Male graduates received the highest wage when earning a GPA of 3.5 and higher at \$53,165. Male graduates with a GPA 3.0-4,49 earned \$46,264 and those with a GPA below 3.0 earned \$39,618. The pattern was similar for female employees.

For most races, graduates earning GPAs of 3.5 or better earned the highest wages. However, for Asian graduates, students earning GPAs in the 3.0-3.49 range earned the most (although wages are close to those for students earning higher GPAs).

In-state graduates received the highest annualized wage when earning a GPA 3.5+, at \$43,812 with lower wages for lower GPAs. Out-of-state graduates earned \$40,300 with a GPA 3.5+, but saw the average wage fall to \$29,630 with a GPA below 3.0.

Technical Appendix: Regression Analysis

In order to assess further the impact of ACT scores and college GPA on work participation and annualized wages, we analyze the data using regression analysis.

Work Participation In 2007

First, we create our dependent variable (EMPL). This is a binary variable set to 1.0 if the graduate has at least one quarter of work during 2007. Then we regress EMPL on a set of graduate characteristics, including summary degree, residency for fee purposes, gender, year that degree was granted, college GPA, and ACT score. Table TA1 summarizes the data used in the regressions.

Table TA1	
Description Of Variables Used In Regressions	
Variable Name	Definition
EMPL	Indicator of employment. Equal 1.0 if graduates worked at least one quarter in West Virginia in 2007
DEG_UC	Equals 1.0 if graduate earned undergraduate certificate
DEG_ASSOC	Equals 1.0 if graduate earned Associate's degree
DEG_FP	Equals 1.0 if graduate earned First Professional degree
DEG_MA	Equals 1.0 if graduate earned Master's degree
DEG_PMC	Equals 1.0 if graduate earned Post-Master's Certificate
DEG_DOC	Equals 1.0 if graduate earned Doctoral degree
RES_INSTATE	Equals 1.0 if graduate was in-state for fee purposes
SEX_M	Equals 1.0 if graduate was male
YR	Equals year of graduation
CUM_GPA	College cumulative GPA
ACT_CP	Composite ACT score
ANNLZD_WGS	Annualized wages for graduates working in West Virginia in 2007

Table TA2 shows the regression results from a Probit model including both CUM_GPA and ACT_CP. Note that we have 27,206 observations in this regression since not all graduates report both ACT and college GPA scores in the dataset.

As Table TA2 shows, we find a negative correlation between probability of employment in West Virginia in 2007 and CUM_GPA and ACT_CP. However, only the coefficient on ACT_CP is significantly different from zero at conventional significance levels. Note also that we tend to see positive and significant coefficients on Associate's, First Professional, and Master's degrees and negative and a significant negative coefficient on Doctoral degrees. This makes sense, because these coefficients are interpreted relative to a Bachelor's degree (it is the excluded category) and we generally observe that work participation rates for graduates with Bachelor's degrees are below those for most other summary degrees.

A similar interpretation applies to RES_INSTATE and SEX_M, because work participation rates tend to be high for in-state graduates (relative to out-of-state graduates) and low for males (relative to females).

We expect the coefficient on YR to be positive and significant since graduates in 2005 tend to have higher work participation rates than graduates in 1996.

Finally, we do not include race indicators in the regression, since this does not add much explanatory power over and above the variables already included.

Table TA2		
Probit Regression Results		
Dependent Variable: EMPL		
Included Observations: 27,206		
Variable	Coefficient	P-Value
Constant	-183.855	0.0000
DEG_UC	0.299691	0.0024
DEG_ASSOC	0.389549	0.0000
DEG_FP	0.185595	0.0018
DEG_MA	0.05168	0.0889
DEG_PMC	-0.4329	0.3037
DEG_DOC	-0.88904	0.0111
RES_INSTATE	1.227144	0.0000
SEX_M	-0.07518	0.0000
YR	0.091672	0.0000
CUM_GPA	-0.0224	0.2552
ACT_CP	-0.02566	0.0000
McFadden R-Squared: 0.0763		
LR Statistic: 2792.480		
Prob(LR Statistic): 0.000		

The result that CUM_GPA is not significantly different from zero does not mean that college GPA is unimportant as an indicator of work in West Virginia. It does mean that it does not add much explanatory power over and above the ACT score. Indeed, if we exclude ACT_CP from the regression, then CUM_GPA becomes negative and significant at the 1 percent level.

Annualized Wages in 2007

In order to examine the correlation between ACT score, college GPA, summary degree, residency, gender, and graduation year and annualized wages (ANNLZD_WGS), we run a Tobit regression using annualized wages in 2007 as the dependent variable. We truncate the sample to include only those graduates with wages in the state in 2007.

The results (shown in Table TA3) suggest a positive correlation between ACT scores and wages in 2007, as the coefficient on ACT_CP is positive and significantly different from zero. The coefficient on college GPA is also positive and significant at conventional significance levels.

We find the coefficient on DEG_ASSOC to be negative and significant, while the coefficients on First Professional and Master's degrees are positive and significant. This reflects the fact that wages for Bachelor's degree graduates tend to be higher than wages for Associate's degree graduates, but below wages for First Professional and Master's degree graduates.

For this sample, we find a positive coefficient for in-state graduates, suggesting higher wages in 2007. In addition, we find a positive coefficient for male graduates, reflecting their higher wages.

We also find that the coefficient on YR is negative, which reflects the fact that graduates in 2005 tended to earn less 2007 than did workers that graduates in 1996.

Table TA3 Tobit Regression Results Dependent Variable: ANNLZD_WGS Included Observations: 16,367		
Variable	Coefficient	P-Value
Constant	8141481	0.0000
DEG_UC	-25155.5	0.0000
DEG_ASSOC	-3384.26	0.0000
DEG_FP	63477.41	0.0000
DEG_MA	16524.87	0.0000
DEG_PMC	25948.21	0.0900
DEG_DOC	35410	0.0197
RES_INSTATE	7434.769	0.0003
SEX_M	13445.77	0.0000
YR	-4072.66	0.0000
CUM_GPA	4213.28	0.0000
ACT_CP	284.3518	0.0010

Appendix: List Of Institutions And Degrees

Public Higher Education Institutions

Bluefield State College
Community and Technical College at WVU Tech
Community and Technical College of Shepherd
Concord University, Fairmont State University
Eastern West Virginia Community and Technical College
Fairmont State Community and Technical College
Glennville State College
Marshall Community and Technical College
Marshall University
New River Community and Technical College
Potomac State College of West Virginia University
Shepherd University
Southern West Virginia Community & Tech College
West Liberty State College
West Virginia Northern Community College
West Virginia School of Osteopathic Medicine
West Virginia State Community and Technical
West Virginia State University
West Virginia University
West Virginia University Institute of Technology
West Virginia University at Parkersburg

Degrees

Undergraduate Certificate
Associate's Degree
Bachelor's Degree
First Professional
Master's Degree
Post-Master's Certificate
Doctoral Degree