EVIDENCED-BASED OUTCOMES: THE IMPACT OF UTILIZING A FRONT-END ASSESSMENT PROCESS IN A POST-SECONDARY APPRENTICESHIP PROGRAM

John S. Gaal, EdD
Director of Training & Workforce Development
Carpenters' District Council of Greater St. Louis & Vicinity
Adjunct Professor
Webster University
Labor-Management Relations

Abstract

The intent of this practitioner-based research study is to determine if the assessment process performed in the early stages of a US-DOL-approved apprenticeship program serves as a factor in positively impacting student outcomes upon program completion. A series of t-tests were used to measure the outcomes of various groups that utilized similar validated assessments and/or remediation methods. The main participants of this study are post-secondary carpenter apprentices in the Midwest.

Introduction

Wagner (2008, p. 24) suggests, "It's time to hold ourselves and all of our students to a new and higher standard of rigor, defined according to 21st century criteria." Despite this edict, recent 4th and 8th grade math test score results from the National Assessment of Educational Progress indicate that little to no progress has been made since the implementation of No Child Left Behind in 2002 (Dillon, 2009). To this end, Gordon (2009, p. 29) asserts, "Too many students and younger workers lack the required higher reading, math, science and communications skills for growing 21st century careers."

According to a recent nationwide study by Conway and Gerber (2009), over 90 percent of the 260 construction-related pre-apprenticeship programs surveyed provide mathematics/measurement as an element of their job readiness skills training programs. Interestingly enough, Gaal (2009, p. 8) posits, "…in an era of accountability, allowing the "reformists" to entirely shape the agenda in hopes that the reform movement is merely another phase that may pass is a misguided and dangerous strategy." Therefore, in an effort to better prepare apprentices for their upper terms of advanced training, the St. Louis Carpenters Joint Apprenticeship Program (STL-CJAP) introduced ACT's WorkKeys Applied Math (AM) and Reading for Information (RFI) assessments in October 2002. To remain in good standing, newly indentured apprentices are required to obtain the following minimum (level) scores within their first six months of apprenticeship: 6 (AM) and 3 (RFI). Guskey (2007, p. 28) proclaims, "…assessments alone do little to improve student learning…What really counts is what happens after the assessments." Therefore, apprentices not attaining the specific industry-profiled cut scores are exposed to a variety of remediation methods (i.e., computer-based programs, individual tutoring, short-term seated courses, etc.) prior to re-testing. The math and reading concepts tested are embedded in the remainder of the four-year apprenticeship curriculum and, thusly, allow for the productive delivery of advanced construction methods versus focusing on remedial issues related to math and reading. In addition, as of October 2007, in order to issue the Missouri Career Readiness Certificate (MoCRC) to graduating apprentices, the CJAP implemented a rule that required all final year apprentices to be assessed with the Locating Information (LI) assessment. The STL-CJAP's LI assessment profile is Level 4. The MoCRC would accompany their US-DOL Office of Apprenticeship Journey-worker certificate upon graduation…both of these certificates are viewed by industry as portable, nationally recognized workforce credentials.

A carpentry program similar in content and length was identified in the Midwest. This Midwestern Carpenters Joint Apprenticeship and Training Committee (MW -CJATC) agreed to serve as this study's control group. Upon approval, MW-CJATC's apprentices in their final year of apprenticeship were assessed with the LI assessment not unlike their counterparts from St. Louis. However, MW-CJATC apprentices are not subjected to an early-stage assessment process utilizing WorkKeys AM and RFI assessments.

Methodology

The author enlisted the assistance of the Lead Instructor (Ron Tierney) at the STL-CJAP and the Coordinator with a MW-CJATC to administer the LI assessments. (Notes: Both of these individuals have received training for proctoring WorkKeys assessments. As requested, the names of the MW-CJATC program and/or its Coordinator are being withheld to protect this program's privacy.) In addition, the author enlisted the assistance of the director (Jim Duane) of the University of Missouri—St. Louis' Regional Center for Education and Work (RCEW) to collect, analyze, and report the LI assessment (scale) scores. The MW-CJATC served as the control group for this applied research study. The MW-CJATC program issued and collected 33 LI assessments during March 2009. Meanwhile, the STL-CJAP served as the experimental group for this applied research study. The STL-CJAP issued and collected 390 LI assessments during the first three months of 2009. The author utilized MS Excel's random sampling feature to randomly select sample data for 33 participants from the STL-CJAP's population of 390. Therefore, for purposes of this study, N = 66. Regarding the data mentioned above, statistical analysis

was performed—on SPSS—utilizing a one-tailed t-test for independent samples. (See the appendix for additional scenarios of interest to the MW-CJATC and RCEW.)

Results

When comparing means with the t-test for independent samples, the findings are as follows—

	STL-CJAP	MW-CJATC
$\sum X_1$	2623	
Mean	79.48	
Std Dev	2.69	
S^2_1	7.24	
n_1	33	
$\sum X_2$		2562
Mean		77.64
Std Dev		2.67
S^2_2		7.13
n_2		33

H_A: $\mu_e > \mu_c$ (Accept the alternative hypothesis: Experimental Mean is greater than Control Mean)
$t = 2.788$
t_{crit} (.01, 60) = 2.390
2.788 > 2.390
Reject H_O: $\mu_e = \mu_c$ (Reject the null hypothesis: Experimental Mean is equal to Control Mean)

Worksheet:
t-test for independent samples (STL/MW)—

$$t = \frac{79.48 - 77.64}{\sqrt{\frac{(33-1)7.24 + (33-1)7.13}{33+33-2}(1/33 + 1/33)}}$$

$$t = \frac{1.84}{0.66}$$

$$t = 2.788$$

Demographics

The STL-CJAP had 33 (100 percent) males participate in this study. Their ethnic breakdown was as follows: five (15 percent) preferred not to answer, one (three percent) Asian, one (three percent) Latino, two (six percent) African-American, and 24 (73 percent) Caucasian.

The MW-CJATC had 31 (94 percent) males and two (six percent) females participate in this

study. Their ethnic breakdown was as follows: one (three percent) Native American, one (three percent) Asian, two (six percent) African-American, and 29 (88 percent) Caucasian.

Conclusion

As the data above reveal, the outcomes of those apprentices (STL-CJAP) exposed to a rigorous front-end assessment process were significantly different than those apprentices (MW-CJATC) who were not exposed to a rigorous front-end assessment process. Consequently, Hersh (2009, p. 53) insists, "Assessments must be timely and appropriate to inform students and teachers during, not after, learning—in time and in ways that allow for correction…." To be sure, the author acknowledges that an experimental or longitudinal approach may suggest other findings and would be interested in performing further research related to this study. Nevertheless, David (2008, p. 87) argues, "A growing body of evidence suggests that when teachers collaborate to pose and answer questions informed by data from their own students, their knowledge grows and their practice changes." Accordingly, the positive impact cited above provides empirical evidence that should encourage other post-secondary carpentry-related training programs to consider implementing validated, industry-based assessments (i.e., WorkKeys)—when coupled with rigorous, focused remediation—early-on as a means of improving the quality of their outcomes!

References

Conway, M. and Gerber, A. (2009, July). *Construction pre-apprenticeship programs: Results from a national survey*. Washington, DC: The Aspen Institute.

David, J. (2008, December—2009, January). Collaborative inquiry. *Educational Leadership, 66*, 87-88.

Dillon, S. (2009, October 15). Sluggish results seen in math scores. *The New York Times*, p. A18.

Gaal, J. (2009, Spring). Future union leadership: A promising & intense immersion model. *Online Journal of Workforce Education and Development, 3*, 1-19. Retrieved from http://wed.siu.edu/Journal/VolIIInum3/Article_2.pdf on August 2, 2009.

Gordon, E. (2009, September). The future of jobs and careers. *Techniques, 84*, 28-31.

Guskey, T. (2007, December—2008, January). The rest of the story. *Educational Leadership, 65*, 28-35.

Hersh, R. (2009, September). A well-rounded education for a Flat World. *Educational Leadership, 67*, 50-53.

Wagner, T. (2008, October). Rigor redefined. *Educational Leadership, 66*, 20-24.

Appendix

Scenario: MW-CJATC Benefit

At the request of the MW-CJATC's Coordinator, the following statistical analysis was performed to determine how the apprentices in the MW-CJATC's system compared to the STL-CJAP's profile. The WorkKeys' Locating Information assessment cut score profiled for Apprentice Carpenters in St. Louis was Level 4. The scale scores for Level 4 are in the range of 75 through 79. To this end, a t-test for a single sample was utilized to determine if the MW-CJATC's mean was significantly different than 77 (the mean of the Level 4 scale scores).

MW-CJATC	
N	33
Mean	77.64
Std Dev	2.67
Std Error Mean	0.464

H_o: $\mu_{MW} = \mu_{STL}$ (Accept the null hypothesis: MW-CJATC Mean is equal to STL-CJAP Profile Mean)
$t = 1.371$
t_{crit} (.01, 30) = 2.457
$1.371 < 2.457$
Reject H_A: $\mu_{MW} > \mu_{STL}$ (Reject the alternative hypothesis: MW-CJATC Mean is greater than STL-CJAP Profile Mean)
As per the results, no significant difference exists between the mean of the MW-CJATC and STL-CJAP's average scale score profiled for the WorkKeys' Locating Information assessment.

Worksheet:
t-test for single sample (MW-CJATC)—

$$t = \frac{77.64 - 77}{0.465}$$

$$t = 1.371$$

Scenario: RCEW Benefit

At the request of the RCEW's director, the following statistical analysis was performed to determine how the apprentices in the STL-CJAP's system compared to the Regional mean of like workers. To this end, a t-test for a single sample was utilized to determine if the STL-CJAP's mean was significantly different than the mean of the region's population, as described above, having been assessed with WorkKeys' Locating Information (the mean for the 520 assessments was 77.35).

STL-CJAP	
N	33
Mean	79.48
Std Dev	2.69
Std Error Mean	0.468

H_o: $\mu_{STL} = \mu_{REG}$ (Reject the null hypothesis: STL-CJAP Mean is equal to Regional Mean)
$t = 4.548$
t_{crit} (.01, 30) = 2.457
$4.548 > 2.457$
Accept H_A: $\mu_{STL} > \mu_{REG}$ (Accept the alternative hypothesis: STL-CJAP Mean is greater than Regional Mean)
As per the results, a significant difference exists between the mean of the STL-CJAP and the Regional mean for the WorkKeys' Locating Information assessment.

Worksheet:
t-test for single sample (STL-CJAP)—

$$t = \frac{79.48 - 77.35}{0.468}$$

$$t = 4.548$$