TOWES
TEST OF WORKPLACE ESSENTIAL SKILLS

skills

Scaling TOWES & Linking to IALS
Executive Summary

Workplace

Reading Text

Document Use

Numeracy

Scaling TOWES and Linking to IALS

Kentaro Yamamoto, Irwin Kirsch, March, 2002

Executive Summary

This technical report, *Scaling TOWES and Linking to IALS,* continues the extensive effort to validate TOWES. It contains the results of analyses designed to answer three questions regarding TOWES (Test of Workplace Essential Skills) items.

1. *To what degree is the scoring of TOWES items reliable?,*
2. *To what degree is item order a concern in terms of how individuals performed?, and*
3. *To what degree are item characteristics of TOWES items (i.e., difficulty and discrimination) similar to those of the IALS (International Adult Literacy Survey) items?*

TOWES was developed to assess three dimensions of general skills: Reading Text, Using Documents, and Numeracy. A total of 412 (305 TOWES and 107 IALS) questions were asked of 2,689 individuals. However, individuals responded to only a subset of the 412 questions; sometimes the subset contained strictly TOWES items and sometimes it contained both TOWES and IALS items. Note, however, that each TOWES item was responded to by at least 500 individuals.

1. To what degree is the scoring of TOWES items reliable?

The goal of TOWES is to compare test scores of individuals. The statistical methods used to derive test scores assume that all scorers mark in a consistent way. Consistency of scoring was estimated by re-scoring a subset of tests. On average, 200 responses to each TOWES and IALS item were re-scored. The proportion of agreement was 0.97 for the TOWES items and 0.96 for the IALS items, which is clearly high enough to support the contention that the items are consistently scored.

2. To what degree is order a concern in terms of how individuals performed?

Variations of TOWES are configured by changing the order of items. If the difficulty of an item changes depending on where the item appears TOWES results could not be compared from test to test. Using the proportion correct, an analysis of variance indicated that there were no significant effects of item order. This information is useful insofar as it allows test booklets to be created of subsets of items without having to attend to where in the test booklet they appear.

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3. ***To what degree are item characteristics of TOWES items (i.e., difficulty and discrimination) similar to those of the IALS (International Adult Literacy Survey) items?***

IALS was selected for comparison for several reasons. First, IALS is a test of general adult literacy skills and assesses the same three dimensions as does TOWES. Second, it has been administered to tens of thousands of individuals in 23 countries rendering its item parameters very stable.

TOWES linking tests included a set of IALS items to support linkage of the two proficiency scales. Linkage depends, however, on these items functioning in a similar way to IALS. The study is a two-stage process to test whether or not this is the case. First, the IALS item parameters from this sample were assessed for their similarity to the IALS population item parameters. To do this, a total of 96 of the IALS items were used (33 Reading Text, 32 Using Documents, and 31 Quantitative Literacy). The other 11 IALS items were dropped from the analysis due to poor item characteristics (e.g., almost all participants passed or almost all participants failed). It was found that in this sample, that 89 of the 96 IALS items fit the item parameters from the population. Thus, these 89 items retained the population item parameters. The other 7 IALS items (1 Reading Text, 2 Document Use, and 4 Numeracy) received new item parameters based on this particular sample.

In the second stage, the 96 IALS items parameters were set. TOWES item parameters were generated in relation to those 96 IALS items. More specifically, three separate analyses were carried out. One was that the 76 TOWES Reading Text item parameters were generated based on the item parameters of the 33 Reading Text IALS items. The second was that the 118 TOWES Using Document item parameters were generated based on the item parameters of the 32 Using Document IALS items. Third, the 96 TOWES Quantitative Literacy item parameters were generated based on the item parameters of the 31 Quantitative Literacy IALS items. The fit of the TOWES items was very good. On average, the root mean squares deviation of observed proportion correct from predicted proportion correct was 0.061 for Reading Text, 0.022 for Document Use, and 0.023 for Numeracy. The closer to 0.00 these values are the better the fit, and consequently these are very good.

The conclusion, then from the two-stage process, is that TOWES items have similar characteristics compared to IALS items.

As part of our efforts to continuously improve the psychometric properties of TOWES, additional sampling at various work sites is ongoing. We have, for example, another 1,500 cases with which to carry out item-level analyses. A research project that directs our attention to establishing the criterion-related validity at the scale level is currently underway.

About the Authors

Kentaro Yamamoto and Irwin Kirsch played lead roles in various aspects of the first and subsequent international adult literacy surveys. For more information see the technical report for the First International Adult Literacy Survey.[1]

The Executive Summary was written by Theresa Kline, Ph.D., University of Calgary and consultant for the TOWES Joint Venture. The full technical report, *Scaling TOWES and Linking to IALS* is available on request.

About TOWES

TOWES was designed to build on the IALS information about the correlations between literacy and work. As Scott Murray from Statistics Canada suggests,

> *Literacy is strongly correlated with life chances and use of opportunities. While the processes that lead to employment are complex, there can be no doubt about its importance to employment stability, the incidence of unemployment and income.*[2]

The commitment of the TOWES joint venture is to identify workplace essential skills clearly and then to provide effective upgrading when indicated. The more effort invested in making TOWES valid and reliable, the better we are able to meet that objective.

References

(1) Yamamoto, K. (1998). Scaling and Scale Linking. In T.S. Murray, I.S. Kirsch, & L. Jenkins. *Adult Literacy in OECD Countries* . (Technical report on the First International Adult Literacy Survey). National Center for Education Statistics. Washington, DC: U.S. Department of Education.

(2) *Literacy, Economy and Society: Results of an International Survey*, Statistics Canada, 1996. p 116.

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TOWES is a joint venture of the BC Construction Industry Skills Improvement Council (*SkillPlan*) and **Bow Valley College**.

SkillPlan and Bow Valley College have jointly developed this workplace skills assessment tool in response to the identified needs of Canadian businesses and their employees. The joint partners feel that its development will also be of use to practitioners in the workplace education field. TOWES staff have a close and current understanding of workplace essential skills and the methodology used to collect data about those skills. This research expertise, coupled with the two organizations' practical knowledge of workplace training, have contributed to the high quality and usability of TOWES.

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