***Learning Materials in Instruction***
**Summary Report**

**Background**

In the spring of 2008, SkillPlan, the BC Construction Industry Skills Improvement Council, began a research project called *Learning Materials in Instruction* as part of an HRSDC-funded initiative. For more than ten years, the federal government has invested in the development of work-related learning materials ranging from short instructional tools to full curricula as part of an integrated strategy to increase the Essential Skill levels of Canadians.  As with any significant investment, the expectation is that there will be a return on that investment. In this case, the implicit and intuitive assumption has been that the development and use of these resources will increase skill levels.

The primary purpose of this research project was to examine that assumption and explore whether work-related materials, as part of an instructional curriculum, are in fact more effective in skill development than other instructional materials. The key research question then was:

> *How does the choice of learning materials in instruction impact the acquisition of Essential Skills and contribute to learner success?*

**The Study**

Theresa Kline, PhD from the University of Calgary, was the primary researcher responsible for data collection, analysis and presentation of the final report (see Appendix 2). Within the study two groups were compared. Group 1 used work-related instructional materials 50% or less of the time. Group 2 used work-related instructional materials more than 50% of the time. Both groups represented instructional settings which target the enhancement of employment-related skills or prepare learners for vocational training (see Appendix 1). The data for this study were collected from 270 learners at eight (8) college sites between May 2008 and June 2009.

**The Findings**

This study focused on instructional materials and their impact on learner skill gains. The study concluded Group 2, instruction which includes more than 50% work-related learning materials, results in learners increasing their employment related skills – specifically reading, document use and numeracy skills – at a higher rate than Group 1, instruction which includes 50% or less work-related materials. This finding is supported statistically. It follows that programs which are intended to prepare participants for employment and workplace opportunity can increase learner success by using work-related learning materials that allow learners to practice skills that mimic work tasks.

A number of supporting and related findings were also generated through this project. Those findings are cited below where each is followed by notes that expand on the result.

> 1. *There was no evidence to indicate that level of Essential Skills at pre-testing predicted passing or failing/not completing the program.  However, it was found that higher Essential Skills at the beginning of the programs predicted higher final marks.*

Learners with higher skills at the start of a program are likely to end with higher final marks than those individuals who start with lower skills. The level of skills, however, did not predict whether or not they would complete the course.

> 2. *Learners' Essential Skills scores were improved over time by additional educational programming.*

Regardless of the type of instructional materials and other program variables, learners learn when the opportunity is provided. Education programming of all types is important to skills acquisition.

> 3. *The higher the percent of work-related materials used in the program, the more likely the learner was to stay in the program or pass.*

Several instructors commented on why using work-related materials worked well.

" *Anything that is contextualized for the learners… examples are real to them … clients can relate to these … it would be great if we had contextualized accounting and health related materials…relevance of materials is especially important for adults…youth like hands-on, they can't wait to get out into the workplace… the students like visual content (graphic, tables).*"

Conversely, instructors commented on what works poorly in instruction.

"*If they can't see why they are learning it … if it isn't related to their goals. Equations and Shakespeare would not be useful to them… government-mandated tasks are seen as 'add ons' and not valuable to the learners.*"

This anecdotal information suggests that learners who see the connection between learning and employment are more engaged and stay or complete a program. The statistics in this study show that the amount of work-related material in a program is related to increased retention.

> 4. *It was found that learners, who tended to have lower Essential Skills to begin with, were more often located at sites where more work-related materials were used.*

Perhaps, instructors typically working with lower-level learners have found that these learners in particular are reluctant to return to traditional instruction using academic materials. Therefore, these instructors have been motivated to find alternative approaches to instruction; in these cases, the integration of work-related materials.

Lower level learners often have the fewest learning strategies to cope with printed materials and as a result become frustrated easily. For these learners, practice using new learning strategies using work-related documents may build their confidence and allows for greater skills acquisition.

The next two findings and the top of Table 15 have been grouped together.

5. *It was found that learners with low Essential Skills at the beginning of their programs made significantly higher gains on all three of the Test of Workplace Essential Skills subscales (i.e., Reading Text, Document Use, and Numeracy) when in a program that used more than 50% work-related materials.*

6. *It was also found that learners with high Essential Skills at the beginning of their programs made significantly higher gains on Reading Text when in a program that used more than 50% work-related materials.*

Table 15: Tests of Gain Scores within Low and High Essential Skill Learner Groups (Appendix 2)

Group 1 - **50% or less** work-related materials used in the program

Group 2 - **more than 50%** work-related materials used in the program

| Low Essential Skill | Group | Mean | t-value | Degrees of freedom | p-level |
|---|---|---|---|---|---|
| Reading Text Gains | 1 | 9.2 | 2.38 | 93 | = .02 |
| | 2 | 26.4 | | | |
| Document Use Gains | 1 | 16.4 | 2.13 | 92 | = .04 |
| | 2 | 31.8 | | | |
| Numeracy Gains | 1 | 3.6 | 2.75 | 98 | = .01 |
| | 2 | 26.2 | | | |

In those sites where the learners' pretest scores were lower level (scores under 234 on TOWES) and the instruction included more than 50% work-related material (Group 2), significant score gains were made in all three domains tested (Reading Text, Document Use and Numeracy). In Group 1 where a lower percentage of work-related materials were used, score gains were considerably lower. For example, in Reading Text, Group 1 learners increased scores by 9.2 (mean) but in Group 2 learners increased scores by 26.4 (mean).

Significant score gains in Group 2 are likely attributable to instruction that relates closely to the assessment instrument used to measure score gain. The learning materials and the assessment use the same theoretical framework used in IALS and Essential Skills complexity scales. Both use the following definitions of skills.

**Prose literacy (Reading Text)**\* – *the knowledge and skills needed to understand and use information from texts.*

**Document literacy (Document Use)**\* – *the knowledge and skills required to locate and use information contained in various formats such as tables and maps.*

**Quantitative literacy (Numeracy)**\* – *the knowledge and skills required to apply arithmetic operations to numbers embedded in printed materials.*

\* *From the International Adult Literacy Survey 1995*

These definitions suggest applied approaches to instruction, which may vary from traditional academic approaches to instruction in several ways.

1. Reading Text defined as information processing (IALS) is reading to do something whether in everyday life or at work. The purpose for most reading in educational settings is to learn.
2. Document Use is interpreting information displays that include words and visual cues. For example, list structures, entry forms and mimetic documents. Reading in educational settings typically focuses on reading continuous text.
3. Numeracy involves math operations and translation. An applied quantitative task involves document use or reading skills to locate numbers to then decide which operation is required before a calculation can be made. Math in educational settings typically focuses on a hierarchy of math operations.

To reduce variables, the main resource for this study was SkillPlan's publication, *Reading at Work*. This main resource was supplemented with other work-related resources in sites that used work-related materials more than 50% of the time. *Reading at Work* is a publication that treats reading as information processing. Effective reading strategies are modeled using workplace examples. Learners intentionally practice skills that are the same skills needed to complete the tasks presented in TOWES and at work. Although not teaching the content of the test, instruction using *Reading at Work* and other work-related material is teaching the transferable skills tested in TOWES. So, it is not surprising that these learners improved most on the part of the test that assessed reading skill.

It should be noted that the focus of all programs was on Reading Text and Document Use. A score gain in numeracy is likely attributable to improved skills in translation. As low scoring learners improved Reading and Document Use skills, they were better able to locate numbers in printed material and set up numbers to then calculate.

The bottom of Table 15 follows.

Table 15: Tests of Gain Scores within Low and High Essential Skill Learner Groups  (Appendix 2)

Group 1 -  **50% or less** work-related materials used in the program
Group 2 -  **more than 50%**  work-related materials used in the program

| High Essential Skill | Group | Mean | t-value | Degrees of freedom | p-level |
|---|---|---|---|---|---|
| Reading Text Gains | 1 | .8 | 1.95 | 102 | = .05 |
|  | 2 | 13.2 |  |  |  |
| Document Use Gains | 1 | 7.5 | 1.25 | 102 | = .32 (ns) |
|  | 2 | 15.1 |  |  |  |
| Numeracy Gains | 1 | 11.8 | 1.00 | 102 | = .32 (ns) |
|  | 2 | 5.8 |  |  |  |

In those sites where the learners' pretest scores were higher level (scores over 234 on TOWES) and the instruction included more than 50% work-related material (Group 2), score gains exceeded those in Group 1 in all three domains tested (Reading, Document Use and Numeracy). This score gain was significant for Reading Text but not for Document Use and Numeracy. Nevertheless, the results are in a positive direction. Perhaps a larger sample might produce significant results in all three domains.

> 7. *Further research that allows for more control of programming is needed to enhance our understanding of the role of workplace-related instructional materials. This initial study indicates a positive link between the use of work-related materials in instruction and learner gain scores.*

Essential Skills is a field of study with a brief history and limited academic discussion. Research that examines practices helps professionals to make decisions about how to increase effectiveness. At the heart of the matter is deciding how "effectiveness" is defined and measured. Adults in instructional settings have many goals not all of which are related to employment. Learning for learning's sake has value for both the teachers and learners. Despite this ambivalence of purpose, participation in learning has benefits.

This research study begins to answer key questions related to the role of learning materials in instruction and whether or how learning materials relate to skill acquisition and learner success. Important learnings through the study are that:

- an increase in work-related materials in instruction contributes significantly to increases in learners' Essential Skills.
- learners who score 234 or less (low level 2) are likely to benefit the most by more work-related materials.
- learners are more likely to stay in programs when work-related materials are used in instruction.

This study strongly suggests that intentional instruction that includes work-related materials and an approach that improves information-processing skills leads to significant Essential Skills gains. IALS research links levels of these skills with employability and resulting financial success – for the individual and for the economy as a whole. HRSDC's Essential Skills Profiles provide information about Essential Skills levels required for jobs in Canada. These levels overall appear to be greater than those skills available in Canada's population of working age adults. Those individuals with more skills are more employable because they meet at least some of the requirements demanded by occupations.

Programs designed to prepare adults for employment and workplace opportunity can increase learner success by using work-related learning materials to practice skills that mimic work tasks.

The more we know about what works in program design, the more able we are to serve our learners and contribute to the economic well being of Canadian workers.

**Appendix 1**
**Research Sites**
Instructors, with the support of their institutions, were invited to participate in the study as "pilot sites" sometime between September 2008 and June 2009. To qualify as a pilot site:

- programs had an enrollment of 15 or more adults or youth (over 16 years)
- reading instruction was provided for a minimum of 40 contact hours with preference given to programs with delivery frameworks ten weeks or more in duration
- programs that include the objectives of enhancement of employability skills or preparation for vocational training

Douglas College (BC), Lambton College (ON), SIAST (SK), Durham College (ON), Northern Lights College (BC), Conestoga College (ON), Cambrian College (ON) and Seneca College (ON) participated as a Site A, a Site B, or as both.

**Site A Required Conditions**
Instruction included work-related materials 20% or less of the time or none at all.

- The term "work-related learning materials" refers to instructional resources that centre on authentic workplace documents and learning activities that mimic worker tasks.
  Note that this variable was modified to 50% or less and became Group 1 in the research report.

**Site B Required Conditions**
Instruction included work-related materials 80% or more of the time.

- To reduce variables, the main resource for this study was *Reading at Work*, *Workplace Reader* and *Facilitator's Guide*. This main resource was used at least 50% of the time and supplemented with other work-related resources.
  Note that this variable was modified to more than 50% and became Group 2 in the research report.

**Administrative Requirements**
- Administer pre and post tests provided by SkillPlan (approximately 5 to 6 hours total). The assessment tool used in the study was TOWES (Test of Workplace Essential Skills, General Series 1 and 2).
- Provide data, for example attendance records and in class score results. To simplify freedom of information requirements, no names were required.
- Participate in a survey or telephone interview.
- Identify one or more learners to participate in an interview.

**Instructor Requirements**
To reliably measure the impact of learning materials across research sites the minimum for all instructors was:

- Three or more years of professional experience as an instructor.
- A basic understanding of Essential Skills and the assessment tool TOWES.

**Appendix 2**

Essential Skills In Instruction

Final Report

June 29, 2009

Presented to: Lynda Fownes, Executive Director

SkillPlan

Presented by: Theresa Kline, Ph.D.

**Executive Summary**

The primary purpose of this study was to assess whether workplace related materials, as part of an instructional curriculum, is more effective than other instructional materials.  Secondary purposes were to assess whether and the extent to which an assessment of Essential Skills at the beginning of a program would predict important program outcomes. The data for this study were collected from 270 learners at eight (8) college sites between May 2008 and June 2009.

There was no evidence to indicate that level of Essential Skills at pre-testing predicted passing or failing/not completing the program.  However, it was found that higher Essential Skills at the beginning of the programs predicted higher final marks.

Learners' Essential Skills scores were improved over time by additional educational programming.

The higher the percent of workplace related materials used in the program, the more likely the learner was to stay in the program/pass.

It was found that learners, who tended to have lower Essential Skills to begin with, were more often located at sites where more work-related materials were used.

It was found that learners with low Essential Skills at the beginning of their programs made significantly higher gains on all three of the Test of Workplace Essential Skills subscales (i.e., Reading Text, Document Use, and Numeracy) when in a program that used more than 50% work-related materials.

It was also found that learners with high Essential Skills at the beginning of their programs made significantly higher gains on Reading Text when in a program that used more than 50% work-related materials**.** One of the requirements for the work-related materials groups was that they use a SkillPlan publication *Reading at Work.* This uses an instructional approach that mimics reading tasks at work and thus is similar to the tasks on the TOWES – the assessment tool used to assess Essential Skill levels. So, it is not surprising that these learners improved most on the part of the test that assessed reading skill.

Further research that allows for more control of programming is needed to enhance our understanding of the role of workplace-related instructional materials. This initial study indicates a positive link between the use of work-related materials in instruction and learner gain scores.

## Purpose

The primary purpose of this study was to assess whether, and the extent to which, work-related materials, as part of an instructional curriculum, is more effective than other instructional materials. Effectiveness was operationalized as program outcomes (retention and final marks) and gains in Essential Skills over the duration of the program.

Secondary purposes were to assess whether and the extent to which an assessment of Essential Skills at the beginning of a program would predict important program outcomes (passing/failing and final marks).

## Methodology

The data for this study were collected/compiled through the efforts of many individuals. There were eight (8) sites that participated in the research, and at each site there were one or more people involved in ensuring that the test scores, and learner information from their coursework was entered in a timely fashion and sent to the principal researcher. All data were collected between May 2008 and June 2009.

A project administrator was identified at each site to be the contact person for the principal researcher. Each participating site was asked to provide information about:

1. The percent of instructional materials based on workplace documents were used in the course.
2. The learners' pre-test scores and levels on the TOWES test.
3. The learners' post-test scores and levels on the TOWES test.
4. Whether or not the learner completed the course (or withdrew).
5. Whether or not the learner passed or failed the course.
6. The learners' final marks (in %).
7. The learners' attendance (in %).

Learners were administered the Test of Workplace Essential Skills (TOWES) at the beginning of their program and again at the end (unless they withdrew). TOWES assesses skills in the areas of Reading Text, Document Use and Numeracy. Few sites were able to provide final marks in %, as this was not done for the program.  In addition, at some sites a pass/final mark as this is was not recorded as part of the program. Also, some sites were not able to provide attendance data.

Each site administrator was initially contacted by the principal researcher via email. A follow-up phone conversation with the principal researcher about the project and data collection requirements was held. This discussion included requesting that the quantitative information be entered into an Excel spreadsheet and sent to the principal researcher by June 2009.

Initially we had anticipated that each site would use either 80% or more or 20% or less work-related instructional materials in delivering their programs.  However, some used 30%, some 50%, some 75%, etc.  Thus, we created a new variable indicating which sites used 50% or less workplace related instructional materials (Group 1) or more than 50% workplace related instructional materials (Group 2) in delivering their programs.

To be included in the research database, TOWES pre-test scores, as well as either TOWES post-test scores or whether or not the learner had completed the program, or both was required. In total 270 learners were included in the research. The Table 1 shows the number of learners from each site as well as the percent of instructional materials used containing workplace related materials. This is followed by tables containing the descriptive statistics of this sample.

Table 1: Site/Data Description

| Site | Number of Participants | % Instructional Materials Using Workplace Documents |
|------|------------------------|------------------------------------------------------|
| Cambrian College, Sudbury, ON | 19 | 30% |
| Conestoga College, Kitchener, ON | 45 | 20% |
| Douglas Community College, Surrey, BC | 108 | 80-100% |
| Durham College, Oshawa, ON | 4 | 10% |
| Lambton College, Sarnia, ON | 11 | 15-20% |
| Northern Lights College, Dawson Creek, BC | 26 | 100% |
| Seneca College, Toronto, ON | 27 | 50% |
| SIAST, Saskatoon, SK | 30 | 75% |

Table 2: Descriptive Statistics of TOWES Data

| TOWES SCORES | N | Min. | Max. | Mean | Std. Deviation |
|---|---|---|---|---|---|
| Pre RT-Score (0-500) | 267 | 107 | 339 | 240 | 42 |
| Post RT-Score (0-500) | 201 | 164 | 339 | 254 | 39 |
| Pre RT-Level (1-5) | 267 | 1 | 4 | 1.84 | .78 |
| Post RT-Level (1-5) | 201 | 1 | 4 | 2.10 | .76 |
| Pre DU-Score (0-500) | 263 | 96 | 326 | 217 | 42 |
| Post DU-Score (0-500) | 200 | 127 | 326 | 235 | 39 |
| Pre DU-Level (1-5) | 263 | 1 | 4 | 1.47 | .67 |
| Post DU-Level (1-5) | 200 | 1 | 4 | 1.75 | .71 |
| Pre NU-Score (0-500) | 270 | 130 | 355 | 254 | 46 |
| Post NU-Score (0-500) | 204 | 155 | 354 | 269 | 47 |
| Pre NU-Level (1-5) | 270 | 1 | 4 | 2.10 | .87 |
| Post NU-Level (1-5) | 204 | 1 | 4 | 2.39 | .93 |

Table 3: Frequency Table of Pass vs. Fail or Did not Complete Program

| Pass vs. Failed/Did Not Complete | Frequency | Percent | Valid Percent (17% missing removed) |
|---|---|---|---|
| Did not Complete or Pass | 50 | 19% | 20% |
| Pass or Complete | 200 | 74% | 80% |

Table 4: Descriptive Statistics of Other Continuous Variables

| Other Outcomes | N | Min. | Max. | Mean | Std. Deviation |
|---|---|---|---|---|---|
| Attendance (%) | 217 | 6 | 100 | 69 | 26 |
| Final Marks | 30 | 50 | 96 | 82 | 11 |
| % Workplace Instructional Materials Used | 270 | 10 | 100 | 66 | 31 |

Table 5: Frequency Table of Use of Workplace-Related Materials Used As a Dichotomous Variable

| Workplace Instructional Materials Used | Frequency | Percent |
|---|---|---|
| 50% or less | 106 | 39% |
| More than 50% | 164 | 61% |

## Results

For each analysis, as many cases were used as possible (casewise deletion). This was done to preserve as many cases as possible for each analysis.

For the entire sample, there were significant skill gains on all TOWES measures (point score and level) between pre-and post-testing.

Table 6: Tests of TOWES Scores – Entire Sample

| TOWES SCORES | Mean | t-value | Degrees of freedom | p-level |
|---|---|---|---|---|
| Pre RT-Score (0-500) | 240 | 6.72 | 198 | <.001 |
| Post RT-Score (0-500) | 255 | | | |
| | | | | |
| Pre RT-Level (1-5) | 1.88 | 6.24 | 198 | <.001 |
| Post RT-Level (1-5) | 2.11 | | | |
| | | | | |
| Pre DU-Score (0-500) | 216 | 9.10 | 197 | <.001 |
| Post DU-Score (0-500) | 236 | | | |
| | | | | |
| Pre DU-Level (1-5) | 1.44 | 7.16 | 197 | <.001 |
| Post DU-Level (1-5) | 1.75 | | | |
| | | | | |
| Pre NU-Score (0-500) | 255 | 6.07 | 203 | <.001 |
| Post NU-Score (0-500) | 269 | | | |
| | | | | |
| Pre NU-Score (1-5) | 2.11 | 5.63 | 203 | <.001 |
| Post NU-Score (1-5) | 2.39 | | | |

**Correlations Between Pre-Test TOWES Scores and Passing/Failing and Final Marks**

There were no correlations between TOWES skill scores on pre-testing and learners' completing the program or not. However, the correlations between final marks and Reading Text $r$ = .42, $p$ = .02 (sample size = 30) and Document Use $r$ = .60, $p$ < .001 (sample size = 30) TOWES pre-test scores were significant.

**Correlations Between % Workplace Instructional Materials and Passing/Failing and Final Marks**

There was a significant correlation between the percentage of work-related materials used in instruction and completing/not completing the program. Those learners in programs using more work-related materials were more likely to complete/pass their programs. However, those learners with a higher percentage of work-related materials in their program had LOWER final marks: $r$ = -.54, $p$ = .002 (sample size = 30).

To explore this finding further, the correlations between the percentage of work-related materials used in instruction and TOWES scores were assessed. It was found that the correlations between the percentage of work-related materials used in instruction and Reading Text $r$ = -.25, $p$ < .001 (sample size = 267) and Document Use $r$ = -.23, $p$ < .001 (sample size = 263) TOWES pre-test scores were significant. This indicated that the Essential Skills levels of participants was confounded with the percent of work-related materials used in the programs. Specifically, those learners with lower Essential Skills at the pre-test levels were in programs that used more work-related materials. To support this contention, it was found that those learners in programs where there was 50% or less workplace materials used in instruction, had significantly higher Pre-test TOWES scores on Reading Text and Document Use, but not on Numeracy (Table 7). Interestingly, at Post-testing, these differences were no longer present (Table 8).

Table 7: Tests of Pre-TOWES Measures between Learners with 50% or less (1) vs. more than 50% (2) Workplace Materials Use in Program

| TOWES SCORES | Group | Mean | t-value | Degrees of freedom | p-level |
|---|---|---|---|---|---|
| Pre RT-Score (0-500) | 1 | 250 | 3.15 | 265 | = .002 |
| | 2 | 234 | | | |
| Pre RT-Level (1-5) | 1 | 2.05 | 3.62 | 265 | < .001 |
| | 2 | 1.70 | | | |
| | | | | | |
| Pre DU-Score (0-500) | 1 | 226 | 2.91 | 261 | = .004 |
| | 2 | 211 | | | |
| Pre DU-Level (1-5) | 1 | 1.69 | 4.18 | 261 | < .001 |
| | 2 | 1.34 | | | |
| | | | | | |
| Pre NU-Score (0-500) | 1 | 256 | 0.69 | 268 | = .49 (ns) |
| | 2 | 252 | | | |
| Pre NU-Level (1-5) | 1 | 2.21 | 1.64 | 268 | = .10 (ns) |
| | 2 | 2.03 | | | |

Notes:

t-value: a standardized value indicating the degree of difference between the means two groups of scores (larger values indicate the means are more different)

degrees of freedom: the number of values in the final calculation of a statistic that are free to vary based on the sample sizes of the groups

p-level: the probability of obtaining the t-value calculated by chance alone: values less than .05 are considered statistically significant and therefore indicate reliable differences between groups.

Table 8: Tests of Post-TOWES Measures between Learners with 50% or less (1) vs. more than 50% (2) Workplace Materials Use in Program

| TOWES SCORES | Group | Mean | t-value | Degrees of freedom | p-level |
|---|---|---|---|---|---|
| Pre RT-Score (0-500) | 1 | 260 | 1.48 | 199 | = .14 (ns) |
| | 2 | 252 | | | |
| Pre RT-Level (1-5) | 1 | 2.21 | 1.40 | 199 | = .16 (ns) |
| | 2 | 2.05 | | | |
| | | | | | |
| Pre DU-Score (0-500) | 1 | 237 | 0.56 | 198 | = .56 (ns) |
| | 2 | 234 | | | |
| Pre DU-Level (1-5) | 1 | 1.89 | 1.87 | 198 | = .06 (ns) |
| | 2 | 1.68 | | | |
| | | | | | |
| Pre NU-Score (0-500) | 1 | 270 | 0.13 | 202 | = .90 (ns) |
| | 2 | 269 | | | |
| Pre NU-Level (1-5) | 1 | 2.40 | 0.05 | 202 | = .96 (ns) |
| | 2 | 2.39 | | | |

This same data examined in a different way provides more information about the relationship between Essential Skills and program. Specifically, Tables 9 and 10 show the differences between pre- and post-test scores on TOWES measures for each group separately. Those that were in programs with 50% or less work-related materials (Group 1) used are shown in Table 9 and TOWES scores for those in programs with more than 50% work-related materials (Group 2) used are shown in Table 10.

The data provided show that those learners who were in programs with 50% or less work-related materials improved significantly on Document Use and Numeracy scores, but not on Reading Text scores nor for any Levels. However, those learners who were in programs with more than 50% work-related materials improved significantly on all TOWES measures.

Table 9: Tests of TOWES Scores – 50% or less Workplace Materials Used in Program

| TOWES SCORES | Mean | t-value | Degrees of freedom | p-level |
|---|---|---|---|---|
| Pre RT-Score (0-500) | 257 | 0.99 | 60 | = .326 (ns) |
| Post RT-Score (0-500) | 260 | | | |
| | | | | |
| Pre RT-Level (1-5) | 2.13 | 0.84 | 60 | = .402 (ns) |
| Post RT-Level (1-5) | 2.21 | | | |
| | | | | |
| Pre DU-Score (0-500) | 230 | 2.66 | 58 | = .01 |
| Post DU-Score (0-500) | 240 | | | |
| | | | | |
| Pre DU-Level (1-5) | 1.76 | 1.92 | 58 | = .06 (ns) |
| Post DU-Level (1-5) | 1.92 | | | |
| | | | | |
| Pre NU-Score (0-500) | 261 | 2.65 | 62 | = .01 |
| Post NU-Score (0-500) | 270 | | | |
| | | | | |
| Pre NU-Level (1-5) | 2.27 | 1.93 | 62 | = .06 (ns) |
| Post NU-Level (1-5) | 2.40 | | | |

Table 10: Tests of TOWES Scores – More than 50% Work-Materials Used in Program

| TOWES SCORES | Mean | t-value | Degrees of freedom | p-level |
|---|---|---|---|---|
| Pre RT-Score (0-500) | 232 | 7.57 | 137 | < .001 |
| Post RT-Score (0-500) | 252 | | | |
| | | | | |
| Pre RT-Level (1-5) | 1.66 | 7.52 | 137 | < .001 |
| Post RT-Level (1-5) | 2.06 | | | |
| | | | | |
| Pre DU-Score (0-500) | 210 | 9.34 | 138 | < .001 |
| Post DU-Score (0-500) | 234 | | | |
| | | | | |
| Pre DU-Level (1-5) | 1.30 | 7.41 | 138 | < .001 |
| Post DU-Level (1-5) | 1.68 | | | |
| | | | | |
| Pre NU-Score (0-500) | 252 | 5.49 | 140 | < .001 |
| Post NU-Score (0-500) | 269 | | | |
| | | | | |
| Pre NU-Level (1-5) | 2.04 | 5.36 | 140 | < .001 |
| Post NU-Level (1-5) | 2.39 | | | |

In an effort to understand the data, a summary Essential Skills score was formed by taking the average of all three subscales of the TOWES test at pre-testing time. This action was done to simplify the rest of the analyses and because the TOWES scores are positively and significantly correlated with one another, (see Table 11) suggesting that those who do well on one subscale, do well on the others and vice versa.

Table 11: Correlations Between TOWES Subscale Scores (at Pre-Test)

| TOWES Subscale | Reading Text | Document Use | Numeracy |
|---|---|---|---|
| Reading Text | -- | | |
| Document Use | .72 | -- | |
| Numeracy | .60 | .69 | -- |

Table 12 shows the mean of the summary Essential Skills for the entire sample and for each of the two instructional groups

Table 12: Descriptive Statistics of Overall Essential Skill Scores

| Average Essential Skill Score | N | Min. | Max. | Mean | Std. Deviation |
|---|---|---|---|---|---|
| Entire Sample | 270 | 130 | 340 | 236 | 38 |
| 50% or less workplace materials (Group 1) | 106 | 130 | 340 | 243 | 44 |
| More than 50% workplace materials (Group 2) | 164 | 136 | 327 | 232 | 33 |

There is an average of an 11 point Essential Skill difference (higher) between those learners in programs using 50% or less work-related materials and those in programs with more than 50% work-related materials.

Next, the sample was median-split for on the basis of their overall Essential Skill score at pre-test. Those with low skills (N = 135) had an average Essential Skill score of 234 or lower and those with higher skills (N=135) had an Essential Skill higher than 234.

TOWES test gain scores were calculated for the overall sample and for each of the instructional groups. Table 13 shows the mean gain scores for each instructional group and Table 14 shows the gain scores for the low versus high pre-overall Essential Skill level.

Table 13: Descriptive Statistics of Gain Scores for each Instructional Group

| Overall Sample | N | Min. | Max. | Mean | Std. Deviation |
|---|---|---|---|---|---|
| Reading Text Gains | 199 | -80 | 88 | 15 | 32 |
| Document Use Gains | 198 | -92 | 101 | 20 | 31 |
| Numeracy Gains | 204 | -66 | 140 | 14 | 34 |
| **50% or Less (Group 1)** | | | | | |
| Reading Text Gains | 61 | -77 | 81 | 4 | 30 |
| Document Use Gains | 59 | -69 | 72 | 11 | 31 |
| Numeracy Gains | 63 | -57 | 60 | 9 | 25 |
| **More than 50% (Group 2)** | | | | | |
| Reading Text Gains | 138 | -80 | 88 | 20 | 31 |
| Document Use Gains | 139 | -92 | 101 | 24 | 30 |
| Numeracy Gains | 141 | -66 | 140 | 17 | 36 |

Table 14: Descriptive Statistics of Gain Scores for Low and High Overall Essential Skill

| Low Overall Essential Skill at Pre-Test | N | Min. | Max. | Mean | Std. Deviation |
|---|---|---|---|---|---|
| Reading Text Gains | 95 | -80 | 88 | 22 | 30 |
| Document Use Gains | 94 | -39 | 101 | 29 | 29 |
| Numeracy Gains | 100 | -57 | 140 | 21 | 36 |
| **High Overall Essential Skill at Pre-Test** | | | | | |
| Reading Text Gains | 104 | -77 | 81 | 9 | 32 |
| Document Use Gains | 104 | -92 | 85 | 12 | 31 |
| Numeracy Gains | 104 | -66 | 98 | 8 | 30 |

Examining these tables it can be seen that there seems to be higher gain scores for those in programs with more than 50% work-related instructional materials, and that those with lower Essential Skills to start with make more skill gains.

After splitting the cases into those of low versus high Essential Skills at pre-test, a test of the mean differences in gain scores based on instruction type were conducted for each of the TOWES subscales. Table 15 shows these means and the significance of their differences.

Table 15: Tests of Gain Scores within Low and High Essential Skill Learner Groups Between Those with 50% or less (1) vs. more than 50% (2) Workplace Materials Use in Program

| Low Essential Skill | Group | Mean | t-value | Degrees of freedom | p-level |
|---|---|---|---|---|---|
| Reading Text Gains | 1 | 9.2 | 2.38 | 93 | = .02 |
| | 2 | 26.4 | | | |
| | | | | | |
| Document Use Gains | 1 | 16.4 | 2.13 | 92 | = .04 |
| | 2 | 31.8 | | | |
| | | | | | |
| Numeracy Gains | 1 | 3.6 | 2.75 | 98 | = .01 |
| | 2 | 26.2 | | | |
| | | | | | |
| High Essential Skill | Group | Mean | t-value | Degrees of freedom | p-level |
| Reading Text Gains | 1 | .8 | 1.95 | 102 | = .05 |
| | 2 | 13.2 | | | |
| | | | | | |
| Document Use Gains | 1 | 7.5 | 1.24 | 102 | = .22 (ns) |
| | 2 | 15.1 | | | |
| | | | | | |
| Numeracy Gains | 1 | 11.8 | 1.00 | 102 | = .32 (ns) |
| | 2 | 5.8 | | | |

This table allows for the conclusion that those learners with low Essential Skills at the beginning of their programs made significantly higher gains on all three TOWES subscales - Reading Text, Document Use, and Numeracy when in a program that used more than 50% work-related materials.

The table also allows for the conclusion that learners with high Essential Skills at the beginning of their programs made significantly higher gains on Reading Text when in a program that used more than 50% work-related materials. One of the requirements for the work-related materials groups was that they use SkillPlan's publication *Reading at Work*.  This uses an instructional approach that mimics reading tasks at work and thus is similar to the tasks on the Test of Workplace Essential Skills (TOWES) – the assessment tool used to assess Essential Skill levels. So, it is not surprising that these learners improved most on the part of the test that assessed reading skill.

<div align="center">

**Conclusions**

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There was no evidence to indicate that level of Essential Skills at pre-testing predicted program retention. Anecdotal evidence has suggested that using work-related materials improves learner engagement (defined as staying in program/passing), and was supported by the empirical evidence in this study. It was also found that higher Essential Skills at the beginning of the programs predicted higher final marks.

Learners' Essential Skills scores were improved over time by additional educational programming. It was found that learners' scores were more improved if they had lower Essential Skills at the beginning of their program. However, these findings were confounded with site. Specifically, those learners with lower Essential Skills at the pre-test levels were in programs that used more work–related materials. Therefore, those learners at sites using more work-related materials, tended to have lower Essential Skills to begin with, and thus they could benefit more than those at sites using less work-related materials.

However, it can be concluded that those individuals with lower Essential Skills may benefit significantly more by having work-related materials in their programs. It was found, though, that even those learners with higher levels of Essential Skills at the beginning of their programs made higher gains in Reading Text when the program materials had high work-related content.

To thoroughly test this hypothesis, though, a study at the same site with learners of similar pre-tested skill levels would need to be exposed to different percentages of work-related materials. In a controlled setting, post-test scores to assess gains could be accurately attributed to the instructional materials. While this was the approach that was desired by those sponsoring the research, it was not possible to be this prescriptive about programming at each site.