AFFECTIVE OUTCOMES FOR STUDENTS AND HOSTS PARTICIPATING IN SCHOOL-SPONSORED WORKPLACE LEARNING

by

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VOLUME 2 (APPENDIXES)

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PRETEST AND POSTTEST SURVEY QUESTIONNAIRES

PART I

SCHOOL STUDENT PRETEST QUESTIONNAIRE

STUDENT'S NAME……………………………………………………………

BLUE GUM HIGH SCHOOL

ASSR STRUCTURED WORKPLACE SURVEY

QUESTIONNAIRE ONE

There are some things we would like to know about you and your thoughts about school, some school subjects, and yourself. This information will be used to evaluate Blue Gum High School's progress in meeting students' needs in the area of vocational education.

YOUR NAME IS NEEDED TO PROPERLY RESEARCH THE SCHOOL'S PROGRESS IN REACHING ITS AIMS IN VOCATIONAL EDUCATION.

THE INFORMATION YOU GIVE IN THESE ANSWERS WILL REMAIN CONFIDENTIAL AND WILL NOT FORM PART OF ANY REPORT OR OTHER DOCUMENT PRODUCED ABOUT YOU.

Please answer the following questions as honestly as you can. Your answers will not be used for any purpose other than research into our vocational education program.

To the right of each question are five possible answers: SA, A, U, D, and SD. These stand for Strongly Agree (SA); Agree (A); Uncertain (U); Disagree (D); Strongly Disagree (SD). To answer each question, please circle, tick, or underline the answer you believe applies to you.

SECTION A

1. We have interesting lessons at school	SA	A	U	D	SD
2. The most enjoyable part of my day is the time I spend at school	SA	A	U	D	SD
3. I don't like school	SA	A	U	D	SD
4. I find school interesting and challenging	SA	A	U	D	SD
5. I enjoy everything I do at school	SA	A	U	D	SD
6. The things I look forward to in school are weekends and holidays	SA	A	U	D	SD
7. School is not very enjoyable	SA	A	U	D	SD
8. I like most of my school subjects	SA	A	U	D	SD
9. I will leave school as soon as possible	SA	A	U	D	SD
10..I am bored most of the time in school	SA	A	U	D	SD
11. I enjoy most of my school work	SA	A	U	D	SD

12. I will be glad to leave school	SA	A	U	D	SD
13. I want to stay at school as long as possible	SA	A	U	D	SD
14. The sooner I can leave school the better	SA	A	U	D	SD
15. I don't like missing a day at school	SA	A	U	D	SD
16. There is no point me staying at school after I am 16	SA	A	U	D	SD
17. I agree with people who say that school days are the happiest days	SA	A	U	D	SD

SECTION B

1. I like mathematics lessons more than any other	SA	A	U	D	SD
2. I like to try to solve mathematical puzzles and problems	SA	A	U	D	SD
3. I think mathematics is a dull and uninteresting subject	SA	A	U	D	SD
4. Outside the classroom, I don't like to think about mathematics	SA	A	U	D	SD
5. I like to make up sums and problems and do them at home	SA	A	U	D	SD
6. I don't like mathematics because the examples are too hard and make me think	SA	A	U	D	SD
7. Mathematics is one of the most interesting subjects	SA	A	U	D	SD
8. I want to do mathematics as much as possible	SA	A	U	D	SD
9. More time should be given to mathematics at school	SA	A	U	D	SD
10. I dislike mathematics	SA	A	U	D	SD

11. I do as little mathematics as possible	SA	A	U	D	SD
12. Mathematics is a difficult subject which I don’t enjoy	SA	A	U	D	SD

SECTION C

1. I enjoy my science lessons	SA	A	U	D	SD
2. I like reading about the exploration of space	SA	A	U	D	SD
3. Science has too many technical words which are hard to remember	SA	A	U	D	SD
4. There are too many facts to learn in science	SA	A	U	D	SD
5. I want to learn all I can about living things	SA	A	U	D	SD
6. Science is a very difficult subject	SA	A	U	D	SD
7. I often read stories about great scientists and their discoveries	SA	A	U	D	SD
8. I like doing science experiments	SA	A	U	D	SD
9. Science is an exciting subject	SA	A	U	D	SD
10. Science lessons are mostly a waste of time	SA	A	U	D	SD
11. I’d like to belong to a science club	SA	A	U	D	SD
12. I always look forward to science lessons	SA	A	U	D	SD
13. I enjoy science more than any other subject	SA	A	U	D	SD
14. I often borrow books about science from the library	SA	A	U	D	SD
15. Outside the classroom I don’t want to think about science	SA	A	U	D	SD
16. There is far too much fuss about science nowadays	SA	A	U	D	SD
17. I want to train to become a scientist	SA	A	U	D	SD
18. I think science is a dull subject	SA	A	U	D	SD

19. I often look up things about science in an encyclopaedia	SA	A	U	D	SD
20. Science is not an important subject and less time should be given to it at school	SA	A	U	D	SD

SECTION D

1. I like being asked questions in class	SA	A	U	D	SD
2. I tend to leave my homework to the last minute	SA	A	U	D	SD
3. I enjoy trying hard to work out a difficult problem	SA	A	U	D	SD
4. I work hard all the time at school	SA	A	U	D	SD
5. I want as much education as I can get	SA	A	U	D	SD
6. I find it hard to keep my mind on my school work	SA	A	U	D	SD
7. I try my hardest to get high marks at school	SA	A	U	D	SD
8. It is not worth spending a lot of time on hard homework problems	SA	A	U	D	SD
9. In school we like to annoy the teacher by playing up	SA	A	U	D	SD
10. I don't always try my hardest at school	SA	A	U	D	SD
11. When I find the work at school difficult I do extra at home	SA	A	U	D	SD
12. When the teacher is out of the room I tend to stop work	SA	A	U	D	SD
13. I like to sit next to someone who works hard all the time	SA	A	U	D	SD
14. I don't always revise for tests	SA	A	U	D	SD
15. I always try to do my schoolwork carefully and neatly	SA	A	U	D	SD
16. I like to have homework every night because it helps me learn	SA	A	U	D	SD

17. I like to complete all work set	SA	A	U	D	SD
18. Sometimes I forget to do all my homework	SA	A	U	D	SD
19. When I can't understand something I always ask a question	SA	A	U	D	SD
20. Sometimes I pretend to be sick to avoid a test	SA	A	U	D	SD

PART II

SCHOOL STUDENT POSTTEST QUESTIONNAIRE

STUDENT'S NAME……………………………………………………………

BLUE GUM HIGH SCHOOL

ASSR STRUCTURED WORKPLACE SURVEY

QUESTIONNAIRE TWO

There are some things we would like to know about you and your thoughts about school, some school subjects, and yourself. This information will be used to evaluate Blue Gum High School's progress in meeting students' needs in the area of vocational education.

YOUR NAME IS NEEDED TO PROPERLY RESEARCH THE SCHOOL'S PROGRESS IN REACHING ITS AIMS IN VOCATIONAL EDUCATION.

THE INFORMATION YOU GIVE IN THESE ANSWERS WILL REMAIN CONFIDENTIAL AND WILL NOT FORM PART OF ANY REPORT OR OTHER DOCUMENT PRODUCED ABOUT YOU.

Please answer the following questions as honestly as you can. Your answers will not be used for any purpose other than research into our vocational education program.

To the right of each question are five possible answers: SA, A, U, D, and SD. These stand for Strongly Agree (SA); Agree (A); Uncertain (U); Disagree (D); Strongly Disagree (SD). To answer each question, please circle, tick, or underline the answer you believe applies to you.

SECTION A

1. We have interesting lessons at school	SA	A	U	D	SD
2. The most enjoyable part of my day is the time I spend at school	SA	A	U	D	SD
3. I don't like school	SA	A	U	D	SD
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5. I enjoy everything I do at school	SA	A	U	D	SD
6. The things I look forward to in school are weekends and holidays	SA	A	U	D	SD
7. School is not very enjoyable	SA	A	U	D	SD
8. I like most of my school subjects	SA	A	U	D	SD
9. I will leave school as soon as possible	SA	A	U	D	SD
10..I am bored most of the time in school	SA	A	U	D	SD
11. I enjoy most of my school work	SA	A	U	D	SD

12. I will be glad to leave school	SA	A	U	D	SD
13. I want to stay at school as long as possible	SA	A	U	D	SD
14. The sooner I can leave school the better	SA	A	U	D	SD
15. I don't like missing a day at school	SA	A	U	D	SD
16. There is no point me staying at school after I am 16	SA	A	U	D	SD
17. I agree with people who say that school days are the happiest days	SA	A	U	D	SD

SECTION B

1. I like mathematics lessons more than any other	SA	A	U	D	SD
2. I like to try to solve mathematical puzzles and problems	SA	A	U	D	SD
3. I think mathematics is a dull and uninteresting subject	SA	A	U	D	SD
4. Outside the classroom, I don't like to think about mathematics	SA	A	U	D	SD
5. I like to make up sums and problems and do them at home	SA	A	U	D	SD
6. I don't like mathematics because the examples are too hard and make me think	SA	A	U	D	SD
7. Mathematics is one of the most interesting subjects	SA	A	U	D	SD
8. I want to do mathematics as much as possible	SA	A	U	D	SD
9. More time should be given to mathematics at school	SA	A	U	D	SD
10. I dislike mathematics	SA	A	U	D	SD

11. I do as little mathematics as possible	SA	A	U	D	SD
12. Mathematics is a difficult subject which I don't enjoy	SA	A	U	D	SD

SECTION C

1. I enjoy my science lessons	SA	A	U	D	SD
2. I like reading about the exploration of space	SA	A	U	D	SD
3. Science has too many technical words which are hard to remember	SA	A	U	D	SD
4. There are too many facts to learn in science	SA	A	U	D	SD
5. I want to learn all I can about living things	SA	A	U	D	SD
6. Science is a very difficult subject	SA	A	U	D	SD
7. I often read stories about great scientists and their discoveries	SA	A	U	D	SD
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9. Science is an exciting subject	SA	A	U	D	SD
10. Science lessons are mostly a waste of time	SA	A	U	D	SD
11. I'd like to belong to a science club	SA	A	U	D	SD
12. I always look forward to science lessons	SA	A	U	D	SD
13. I enjoy science more than any other subject	SA	A	U	D	SD
14. I often borrow books about science from the library	SA	A	U	D	SD
15. Outside the classroom I don't want to think about science	SA	A	U	D	SD
16. There is far too much fuss about science nowadays	SA	A	U	D	SD
17. I want to train to become a scientist	SA	A	U	D	SD
18. I think science is a dull subject	SA	A	U	D	SD

19. I often look up things about science in an encyclopaedia	SA	A	U	D	SD
20. Science is not an important subject and less time should be given to it at school	SA	A	U	D	SD

SECTION D

1. I like being asked questions in class	SA	A	U	D	SD
2. I tend to leave my homework to the last minute	SA	A	U	D	SD
3. I enjoy trying hard to work out a difficult problem	SA	A	U	D	SD
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17. I like to complete all work set	SA	A	U	D	SD
18. Sometimes I forget to do all my homework	SA	A	U	D	SD
19. When I can’t understand something I always ask a question	SA	A	U	D	SD
20. Sometimes I pretend to be sick to avoid a test	SA	A	U	D	SD

APPENDIX B

TEACHERS' VALIDATION QUESTIONNAIRES

BLUE GUM HIGH SCHOOL

ASSR IMPLEMENTATION 1999
VOCATIONAL EDUCATION

TEACHER QUESTIONNAIRE
NOVEMBER 1999

This year some Grade 10 students have undertaken structured workplace learning in [host workplace] Supermarkets. To evaluate the worth of that program, all Grade 10 students have responded to questionnaires to four variables: Like School, Achievement Motivation, Like Mathematics, and Like Science. To assist with validation of this study you are asked to complete the questionnaire blow according to the degree to which this student exhibits external evidence about their attitudes to the variables listed below.

STUDENT'S NAME..

SUBJECT **HOME GROUP (PASTORAL CARE)**

PLEASE TURN TO THE NEXT PAGE

Please tick the appropriate space below:

1. Like School Variable: Please assess this student's **interest in and enjoyment of school learning**

very low	low	moderate	high	very high

2. Achievement Motivation Variable: Please assess this student's **achievement motivation or desire to do well at school**

very low	low	moderate	high	very high

Thank you for your time and effort at this busy time of year.

Please return your completed questionnaire to Allan Welch

BLUE GUM HIGH SCHOOL

ASSR IMPLEMENTATION 1999

VOCATIONAL EDUCATION

TEACHER QUESTIONNAIRE
NOVEMBER, 1999

This year some Grade 10 students have undertaken structured workplace learning in [host workplace] Supermarkets. To evaluate the worth of that program, all Grade 10 students have responded to questionnaires to four variables: Like School, Achievement Motivation, Like Mathematics, and Like Science. To assist with validation of this study you are asked to complete the questionnaire blow according to the degree to which this student exhibits external evidence about their attitudes to the variables listed below.

STUDENTS NAME..

SUBJECT **MATHEMATICS AND/OR SCIENCE**

PLEASE TURN TO THE NEXT PAGE

Please tick the appropriate space below:

1. Like Mathematics Variable: Please assess this student's **interest in and enjoyment of mathematics**

very low	low	moderate	high	very high

2. Like Science Variable: Please assess this student's **interest in and enjoyment of science**

very low	low	moderate	high	very high

Thank you for your time and effort at this busy time of year.

Please return your completed questionnaire to Allan Welch

APPENDIX C

HOST WORKPLACE MENTOR QUESTIONNAIRE

BLUE GUM HIGH SCHOOL/HOST ENTERPRISE
SUPERMARKETS STRUCTURED WORKPLACE
LEARNING PROGRAM

EFFECT ON WORKPLACES SURVEY: SEPTEMBER 2000

INFORMATION SHEET

This survey is being undertaken by Mr Allan Welch, a researcher from the University of Tasmania in conjunction with Blue Gum High School and Purity Supermarkets. The Chief Investigator for the research is Professor John Williamson, Head of School of Secondary and Post-Compulsory Education, phone 6324 3038. The data yielded by this survey will be included as part of Mr Welch's study for the degree of Doctor of Philosophy in the Faculty of Education.

CONFIDENTIALITY

Your participation is voluntary, and your responses, written or verbal, will remain anonymous and will in no way be attributed to you as an individual in any research report. If, however, you wish to participate in an interview with a researcher from the University of Tasmania you will need to identify yourself for follow-up action. If interviewed you may be asked to say why you responded to this questionnaire in certain ways and/or provide expanded or additional information for the survey. **If you wish to be interviewed, please complete the personal details below and leave this cover sheet attached to the questionnaire. Otherwise, please detach this cover sheet from the questionnaire.**

Statement of Informed consent*

For ethical reasons it is necessary for you to give informed consent for your participation in this survey. By signing your name below you will be acknowledging that you:

Have read and understood the information above;

Understand the nature of the survey and its possible effects;

Understand how you can participate both in written and verbal forms;

Understand that all data will be treated as confidential;

Agree to the publication of research data gathered through this survey provided that you cannot be identified as a subject.

* If you are selected for interview, a second, more detailed statement of informed consent will be provided. The second form will be read in conjunction with the information above and on page 2 of this questionnaire.

If you have any concerns or complaints of an ethical nature or about the manner in which the research project is being conducted you may contact the Chair or Executive Officer of the University Human Research Ethics Committee. The Chair is Dr. Margaret Otlowski, phone 6226 7569 and the Executive Officer is Ms Chris Hooper, phone 6226 2763.

Respondent's Name..

(Please print clearly)

Respondent's Signature..

Supermarket at...

Thank you for taking some time from your busy day to read and answer this survey. The purpose of this survey is to gauge the effect of the 1999 and 2000 Blue Gum

High School/Purity Supermarkets Structured Workplace Learning Program on staff in Purity workplaces. You are invited to provide your perceptions of how the Program affected you in your workplace by completing this questionnaire. Firstly though, some background to the survey.

In 1999 and 2000, some grade 10 students from Blue Gum High School were involved in structured workplace learning in Purity Supermarkets. They attended for one or two days per week for up to ten weeks. During this time, students were trained and assessed in your workplace as competent in some of the competencies for the Certificate 1 in Retail (Introduction to Sales and Service).

This questionnaire is made up of 10 statements and you are asked to respond to each by either strongly agreeing (SA), agreeing (A), disagreeing (D), or strongly disagreeing (SD) with each statement. Space is available at the end of the survey to write any additional comments you may think relevant to this matter.

This questionnaire should take about 10 to 15 minutes to complete.

You may elect to be interviewed by leaving the information and consent cover sheet attached to your completed questionnaire. The interview would take about 15 to 20 minutes.

When your questionnaire is complete, please hand it directly to Allan Welch who will be present during the time you are completing the questionnaire.

Were you aware of the presence of students from the 1999/2000 Blue Gum High School/Purity Supermarkets Structured Workplace Learning Program in your workplace?
(Please indicate your answer by circling, ticking, or underlining):

Yes **No**

If you answered **No,** please hand back this questionnaire to Allan Welch.

If you answered **Yes,** please continue.

Were you involved with Blue Gum High School students either directly, for example as a trainer, supervisor, coach or mentor, or indirectly as a fellow worker in a team or department?

(Please indicate your answer by circling, ticking, or underlining):

Yes **No**

If you answered **No,** please hand back this questionnaire to Allan Welch.

If you answered **Yes,** please turn to the next page.

BLUE GUM HIGH SCHOOL/HOST ENTERPRISE SUPERMARKETS
WORKPLACE LEARNING PROGRAM

EFFECT ON WORKPLACES SURVEY: SEPTEMBER 2000

Please answer the following questions by underlining, ticking, or circling your most preferred answer

SA (Strongly Agree), A (Agree), D (Disagree), SD (Strongly Disagree).

1.Most of these students worked well in our teams.	SA	A	D	SD

SA (Strongly Agree), A (Agree), D (Disagree), SD (Strongly Disagree).

2. Most of these students were too young for our department.	SA	A	D	SD

SA (Strongly Agree), A (Agree), D (Disagree), SD (Strongly Disagree).

3. I was pleased to be involved in the training of these students.	SA	A	D	SD

SA (Strongly Agree), A (Agree), D (Disagree), SD (Strongly Disagree).

4. We wasted a lot of time when we had a student for training.	SA	A	D	SD

SA (Strongly Agree), A (Agree), D (Disagree), SD (Strongly Disagree).

5. Helping these students created too much extra work for our team.	SA	A	D	SD

SA (Strongly Agree), A (Agree), D (Disagree), SD (Strongly Disagree).

6. It was not worth the effort for [the host enterprise] to train these students.	SA	A	D	SD

SA (Strongly Agree), A (Agree), D (Disagree), SD (Strongly Disagree).

7. I think that helping these students improved my workplace skills.	SA	A	D	SD

SA (Strongly Agree), A (Agree), D (Disagree), SD (Strongly Disagree).

8. Most of the students in our department learned quickly.	SA	A	D	SD

SA (Strongly Agree), A (Agree), D (Disagree), SD (Strongly Disagree).

9. I think that I became more responsible through helping these students.	SA	A	D	SD

SA (Strongly Agree), A (Agree), D (Disagree), SD (Strongly Disagree).

10. I think that we have improved [the host enterprise's] public image by training these students.	SA	A	D	SD

Do you want to say anything else about the Program's effect on you in the workplace? Please use the space on the following pages if you wish to do so.

APPENDIX C

Optional written comments

Thank you for your cooperation in completing this questionnaire. Please hand it directly to Allan Welch. **Remember that you can elect to be interviewed about your responses by leaving your signed consent form attached to the front of this questionnaire.**

APPENDIX D

DESCRIPTIVE AND INFERENTIAL DATA ANALYSES FOR RESEARCH QUESTION 1

Descriptive analyses of data at Level 1

Tables and figures below summarise relevant aggregated Control and Experimental, disaggregated gender-assigned, and temporally-disaggregated pretest and posttest data. These summaries provide opportunities to detect pretest bias and/or selection-maturation effects in the data that may mask true treatment effects and threaten the validity of subsequent statistical testing (Cook & Campbell, 1979; Reichardt, 1979). Figures portray these data graphically in the form of box and whisker plots that allow ready detection of these masking effects.

These box and whisker plots are depicted conventionally with the interquartile range representing the distribution of data encompassed by the 2nd and 3rd quartiles, and the lower and upper whiskers delineating the distribution of data encompassed by the 1st and 4th quartiles respectively (Peers, 1996). Extreme individual ranks and outliers are depicted outside these limits. Extreme ranks are defined as being '…three or more box lengths from the upper or lower edge of the box…' (Coakes & Steed, 2001: 33) and are designated as stars. Outliers are defined as '…values between one-and-a-half and three box lengths from the upper or lower edge of the box '(Coakes & Steed, 2001: 33) and are designated as circles.

Table D1 *Pretest data from Control and Experimental subsamples at Level 1*

Statistics		**Subsample**	
		Control (n = 43)	Experimental (n = 22)
Median		1.00	1.00
Interquartile Range		1.00	1.00
Range	Maximum	2.00	2.00
	Minimum	-2.00	-1.00

Figure D1. Pretest responses at Level 1 from Control (C) and Experimental (E) subsamples

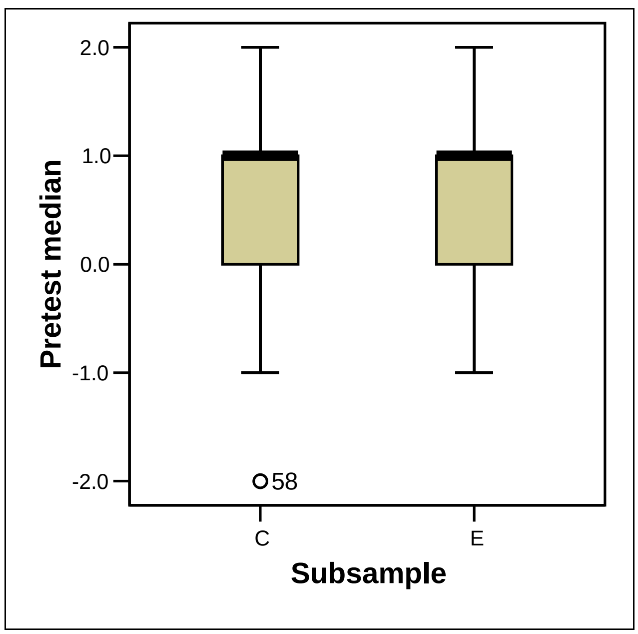
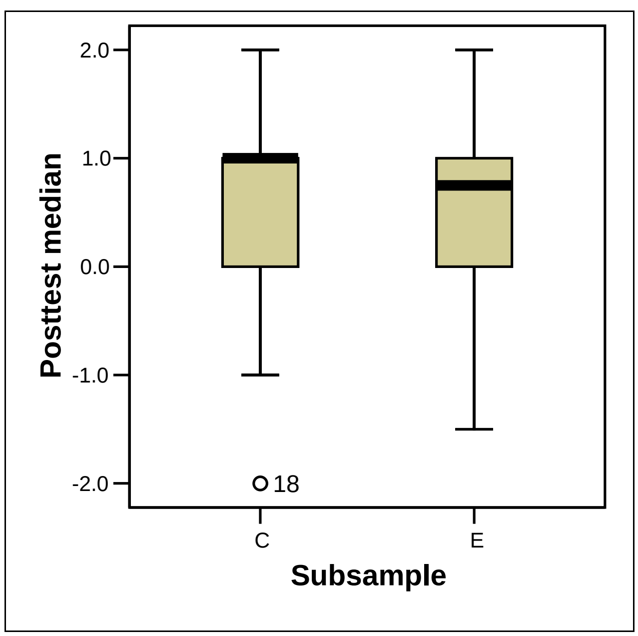


Table D1 and Figure D1 summarise data from the Control and Experimental subsample's pretest at Level 1 of the Taxonomy. Based on median ranks, there is no pretest bias present in this data. The presence of an outlier in the Control group suggests between-group variability that that may affect estimation of the treatment effect (Reichardt, 1979). Table 4.24 and Figure 4.8 summarise posttest data at Level 1 of the Taxonomy.

Table D2 *Posttest data from Control and Experimental subsamples at Level 1*

Statistics		Control ($n = 43$)	Experimental ($n = 22$)
Median		1.00	0.75
Interquartile Range		1.00	2.00
Range	Maximum	2.00	2.00
	Minimum	-2.00	-1.50

Figure D2. Posttest responses at Level 1 from Control (C) and Experimental (E) subsamples



Based on median ranks, there is an apparent negative treatment effect in the comparison of pretest and posttest data for the Control and Experimental subsamples at Level 1 of the Taxonomy. However, there is increased posttest within-group variability evident in the Experimental group, suggesting that a selection-maturation effect may be masking the true treatment effect (Cook & Campbell, 1979; Reichardt, 1979).

Data presented Table 4.5 and Figure 4.2, and Table 4.7 and Figure 4.3 suggest that there may be gender-assigned differences in treatment effect at Level 1 of the Taxonomy. Table D3 and Figure D3 summarise pretest responses from female subsamples at Level 1 of the Taxonomy.

Table D3 *Pretest data from female subsamples at Level 1*

Statistics		**Subsample**	
		Control female (n = 16)	Experimental female (n = 16)
Median		1.00	1.00
Interquartile Range		0.00	0.75
Range	Maximum	2.00	2.00
	Minimum	-1.00	-1.00

Median ranks for both female subsamples were equivalent, indicating minimal pretest bias. Evidence of between-group variability and the presence of outliers and extremes may affect estimates of the posttest treatment effect, however (Reichardt, 1979).

Figure D3. Pretest responses at Level 1 from Control Female (CF) and Experimental Female (EF) subsamples

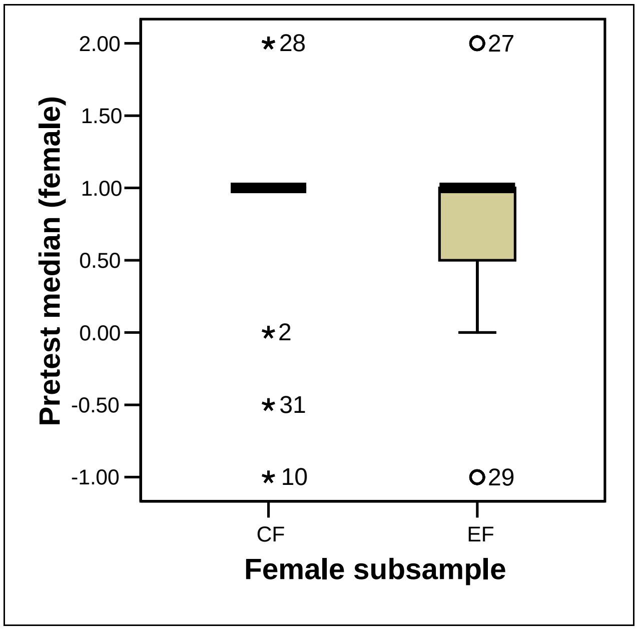
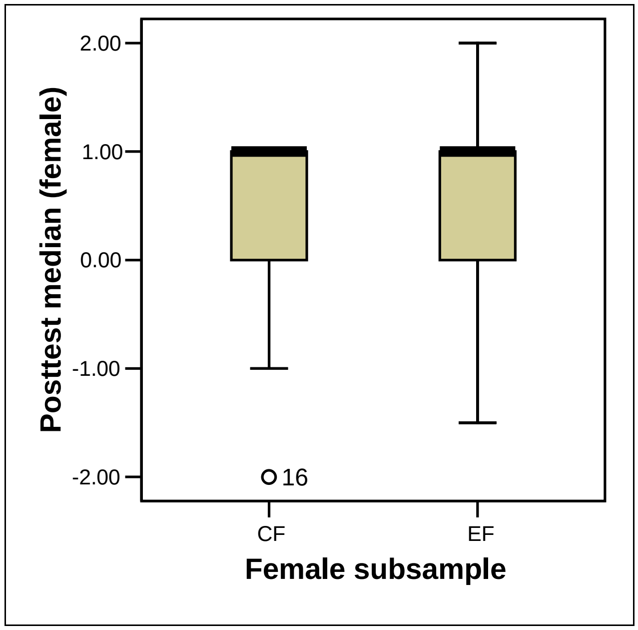


Table D4 and Figure D4 depict data from the female posttest responses at Level 1 of the Taxonomy.

Table D4 *Posttest data from female subsamples at Level 1*

Statistics		**Subsample**	
		Control female (n = 16)	Experimental female (n = 16)
Median		1.00	1.00
Interquartile Range		1.00	1.25
Range	Maximum	1.00	2.00
	Minimum	-2.00	-1.50

Figure D4. Posttest responses at Level 1 from Control Female (CF) and Experimental Female (EF) subsamples



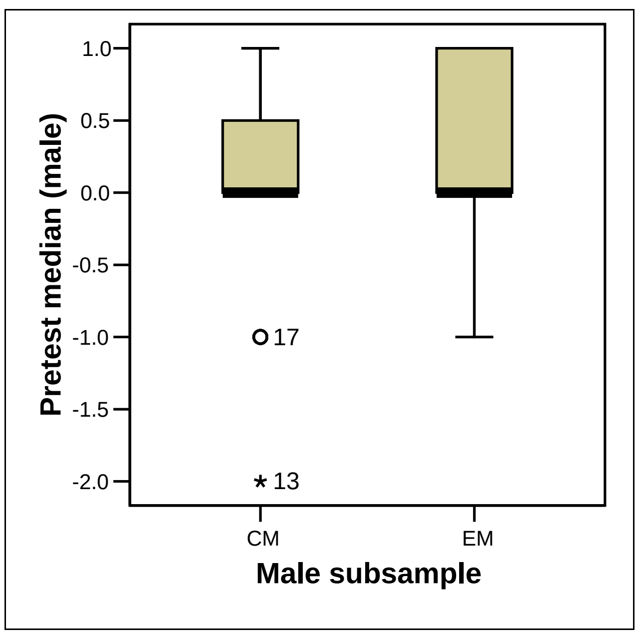
Both female subsamples' median ranks were unchanged at the posttest stage, indicating no apparent treatment effect. However, the Experimental Female subsample's range broadened, indicating increased posttest within-group variability and suggesting a selection-maturation effect that may be masking estimates of the true treatment effect (Cook & Campbell, 1979, Reichardt, 1979).

Table D5 and Figure D5 summarise male subsamples' pretest responses at Level 1 of the Taxonomy.

Table D5 *Pretest data from male subsamples at Level 1*

Statistics		Control male (n = 27)	Experimental male (n = 6)
Median		0.00	0.00
Interquartile Range		1.00	1.30
Range	Maximum	1.00	1.00
	Minimum	-2.00	-1.00

Figure D5. Pretest responses at Level 1 from Control Male (CM) and Experimental Male (EM) subsamples

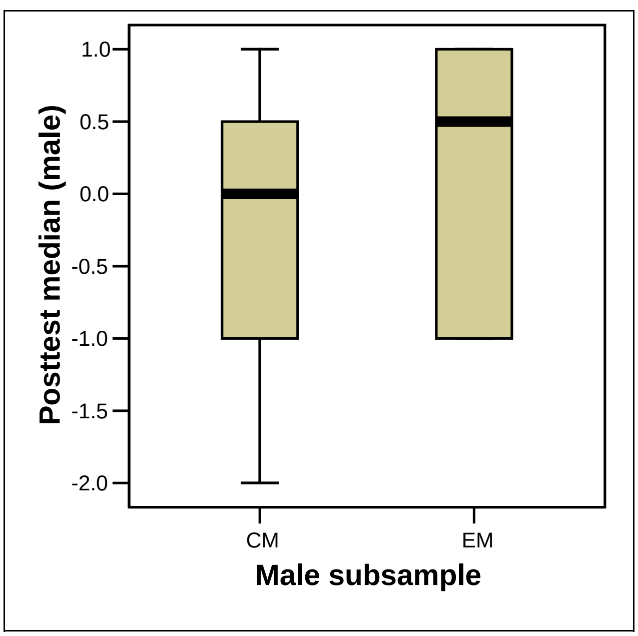


Based on median ranks, there is no pretest bias in the data summarised in Table D5 and Figure D5. Between-group variability is present, however, and it may affect posttest estimates of the treatment effect (Reichardt, 1979). Table D6 and Figure D6 summarise posttest responses for these subsamples.

Table D6 *Posttest data from male subsamples at Level 1*

Statistics		**Subsample**	
		Control male (n = 27)	Experimental male (n = 6)
Median		0.00	0.50
Interquartile Range		2.00	2.00
Range	Maximum	1.00	1.00
	Minimum	-2.00	-1.00

Figure D6. Posttest responses at Level 1 from Control Male (CM) and Experimental Male (EM) subsamples



Based on median ranks there is a positive treatment effect in the male subsamples' data. However, the Experimental Male subsample's interquartile range broadened, indicating increased posttest within-group variability and suggesting a selection-maturation effect that may be masking the true treatment effect (Cook & Campbell, 1979).

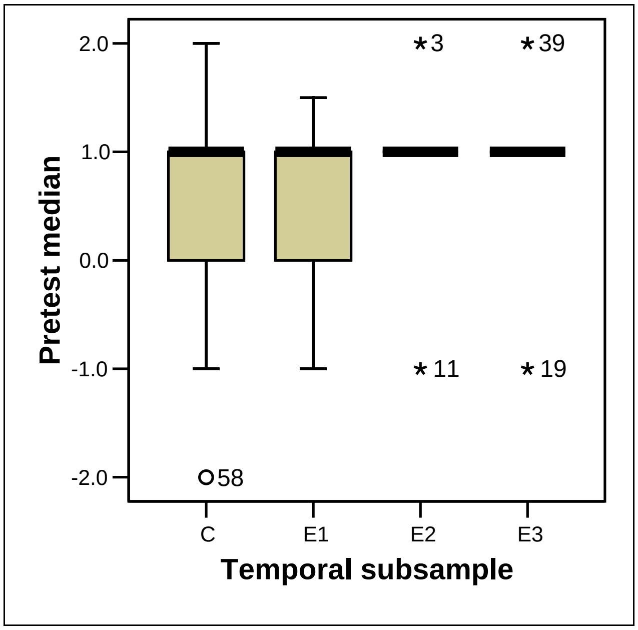
As noted in Chapter 4, temporally-disaggregated analyses addressed the timing of the treatment phases of this study. The Experimental subsample was disaggregated according to the timing of its workplace learning placement and each disaggregated subsample was designated temporally by the climatic season of its placement. Thus the first-placed Experimental subsample was designated E1 with its climatic season appended in parentheses, viz., E1 (autumn). The remaining subsamples were designated likewise: E2 (winter) and E3 (spring).

Descriptive analyses for temporally-disaggregated data are summarised below. Table D7 and Figure D7 summarise pretest responses for temporally-disaggregated subsamples at Level 1 of the Taxonomy.

Table D7 *Pretest data from temporally-disaggregated subsamples at Level 1*

Statistics		Subsample			
		C (n = 43)	E1 (autumn) (n = 9)	E2 (winter) (n = 7)	E3 (spring) (n = 6)
Median		1.00	1.00	1.00	1.00
Interquartile Range		1.00	1.00	0.00	0.80
Range	Maximum	2.00	1.50	2.00	2.00
	Minimum	-2.00	-1.00	-1.00	-1.00

Figure D7 Pretest responses at Level 1 by temporally-disaggregated subsamples

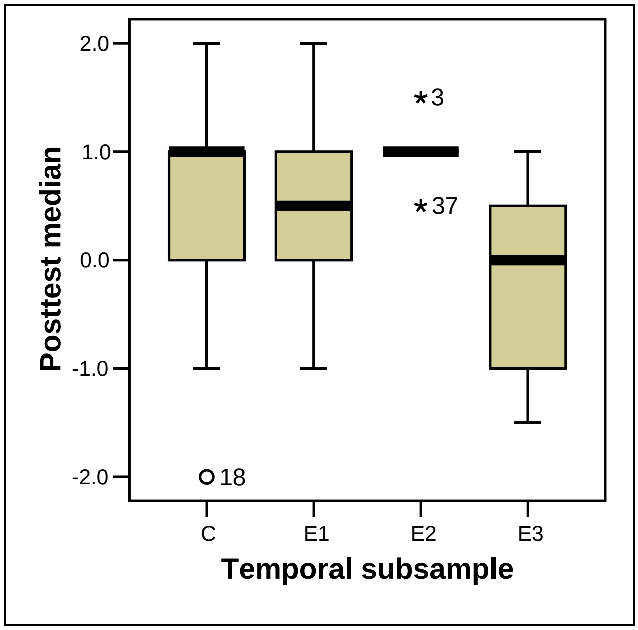


Based on pretest median ranks there is no pretest bias although between-group variability may affect estimates of subsequent treatment effects (Reichardt, 1979). Table D8 and Figure D8 summarise posttest responses for temporally-disaggregated subsamples at Level 1 of the Taxonomy.

Table D8 *Posttest data from temporally-disaggregated subsamples at Level 1*

Statistics		**Subsample**			
		C (n = 43)	E1 (autumn) (*n* = 9)	E2 (winter) (*n* = 7)	E3 (spring) (*n* = 6)
Median		1.00	0.50	1.00	0.00
Interquartile Range		1.00	1.50	0.00	1.080
Range	Maximum	2.00	2.00	1.50	1.00
	Minimum	-2.00	-1.50	0.50	-1.50

Figure D8. Posttest responses at Level 1 by temporally-disaggregated subsamples



Two of the temporally-disaggregated subsamples' median ranks fell from pretest to posttest while the Control subsample and E2 (winter) subsamples were unchanged. Based on median ranks, these data indicate a negative treatment effect for the E1 (autumn) and E3 (spring) subsamples and a neutral treatment effect for E2, the winter subsample. However, the autumn subsample, E1, and the spring subsample, E3, broadened their ranges at the posttest, indicating increased posttest within-group variability and suggesting a selection-maturation effect (Cook & Campbell, 1979; Reichardt, 1979).

Descriptive analyses of data at Level 2

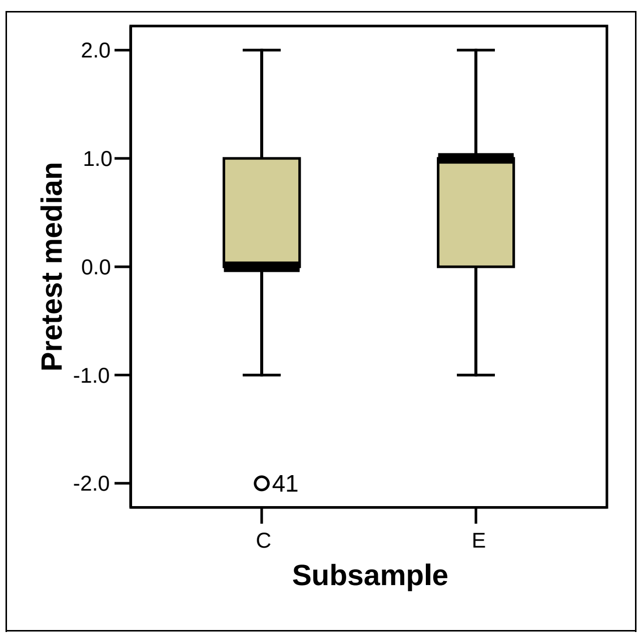
Tables and figures below summarise relevant aggregated Control and Experimental, disaggregated gender-assigned, and temporally-disaggregated pretest and posttest data. Tables summarise relevant descriptive data from pretest and posttest statistics and figures describe these data graphically in the form of box and whisker plots. As at Level 1, these box and whisker plots are interpreted conventionally.

Table D9 and Figure D9 summarise pretest responses for the Control and Experimental subsamples at Level 2 of the Taxonomy.

Table D9 *Pretest data from Control and Experimental subsamples at Level 2*

Statistics		**Subsample**	
		Control (n = 43)	Experimental (n = 22)
Median		0.00	1.00
Interquartile Range		1.00	1.00
Range	Maximum	2.00	2.00
	Minimum	-2.00	-1.00

Figure D9. Pretest responses at Level 2 from Control (C) and Experimental (E) subsamples

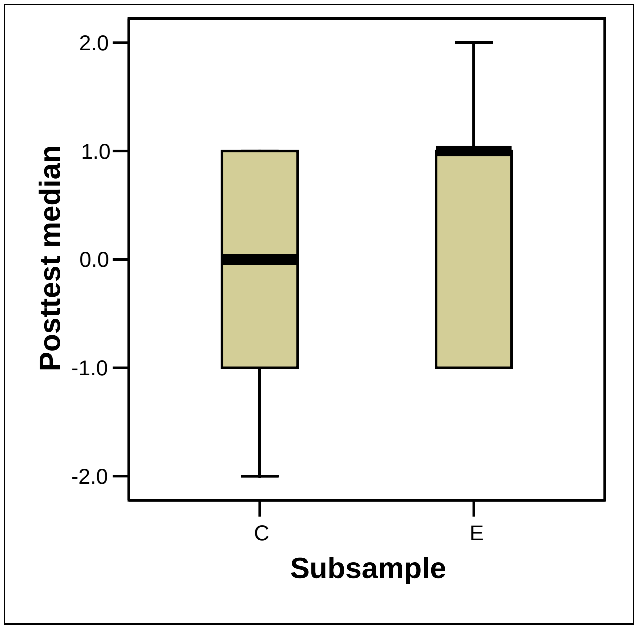


The data summarised in Table D9 and Figure D9 indicate a pretest bias in favour of the Experimental subsample. Moreover, between-group variability may affect estimation of the treatment effect (Reichardt, 1979). Table D10 and Figure D10 summarise posttest responses for Control and Experimental subsamples at Level 2.

Table D10 *Posttest data from Control and Experimental subsamples at Level 2*

Statistics		**Subsample**	
		Control (n = 43)	Experimental (n = 22)
Median		0.00	1.00
Interquartile Range		2.00	2.00
Range	Maximum	1.00	2.00
	Minimum	-2.00	-1.00

Figure D10. Posttest responses at Level 2 from Control (C) and Experimental (E) subsamples



The Experimental subsample's median rank at the posttest survey was unchanged but its interquartile range broadened, suggesting a selection-maturation effect that may be masking the true treatment effect (Cook & Campbell, 1979; Reichardt, 1979). Based on posttest differences there is an apparent positive treatment effect.

Data presented Table 4.5 and Figure 4.2, and Table 4.8 and Figure 4.3 indicate that there may gender differences influencing apparent treatment effects at Level 2 of the Taxonomy. Female subsamples' pretest responses are summarised in Table D11 and Figure D11.

Table D11 *Pretest data from female subsamples at Level 2*

Statistics		**Subsample**	
		Control female (n = 16)	Experimental female (n = 16)
Median		1.00	1.00
Interquartile Range		1.00	0.80
Range	Maximum	2.00	2.00
	Minimum	-1.00	-1.00

The data summarised in Table D11 and Figure D11 indicated no pretest bias although between-group variability may affect estimation of a subsequent treatment effect (Reichardt, 1979).

Figure D11. Pretest responses at Level 2 from Control Female (CF) and Experimental Female (EF) subsamples

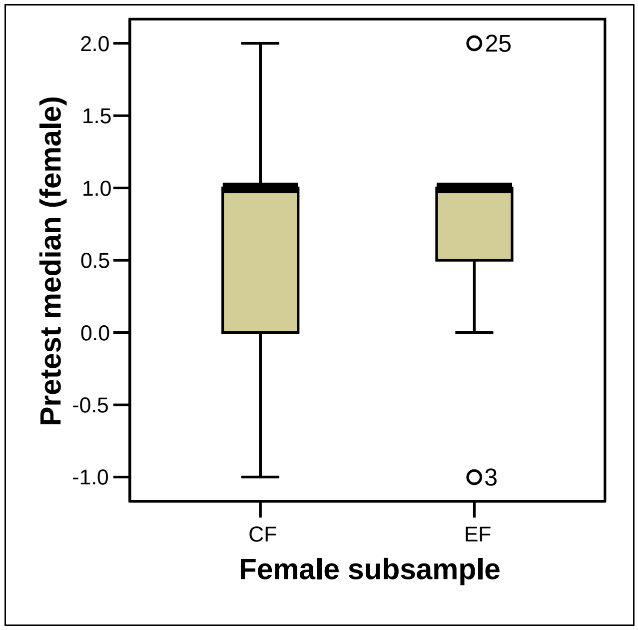
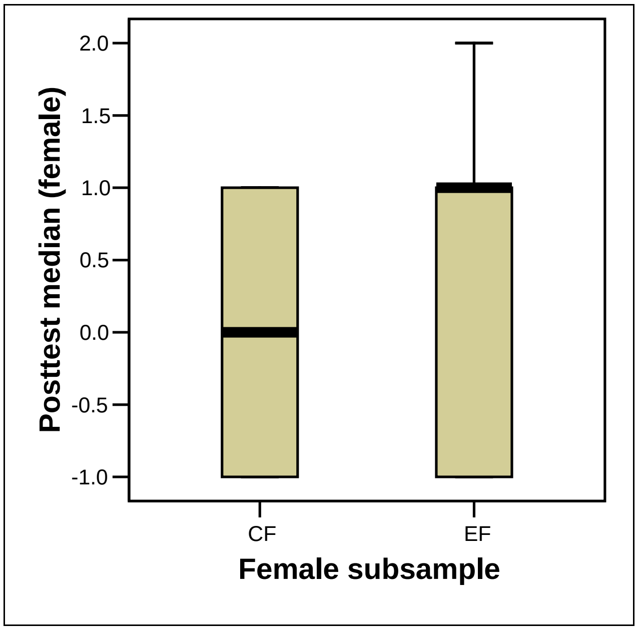


Table D12 and Figure D12 summarise posttest responses from Control Female and Experimental Female subsamples.

Table D12 *Posttest data from female subsamples at Level 2*

Statistics		Subsample: Control female (n = 16)	Subsample: Experimental female (n = 16)
Median		0.00	1.00
Interquartile Range		2.00	2.00
Range	Maximum	1.00	2.00
	Minimum	-1.00	-1.00

Figure D12. Posttest responses at Level 2 from Control Female (CF) and Experimental Female (EF) subsamples



Based on median ranks there is an apparent positive treatment effect for the Experimental Female subsample. However, its broadened interquartile range suggests a selection-maturation effect that may be masking the true treatment effect (Cook & Campbell, 1979, Reichardt, 1979).

Data presented Table 4.8 and Figure 4.3 indicated that there may gender differences attributable to male subsamples and these are examined below. Table D13 and Figure D13 summarise pretest responses from male subsamples.

Table D13 *Pretest data from male subsamples at Level 2*

Statistics	**Subsample**	
	Control male (n = 27)	Experimental male (n = 6)
Median	0.00	0.00

Table D13 (continued)

Statistics		Subsample: Control male (n = 27)	Subsample: Experimental male (n = 6)
Interquartile Range		1.00	1.30
Range	Maximum	1.00	1.00
	Minimum	-2.00	-1.00

Figure D13. Pretest responses at Level 2 from Control Male (CM) and Experimental Male (EM) subsamples

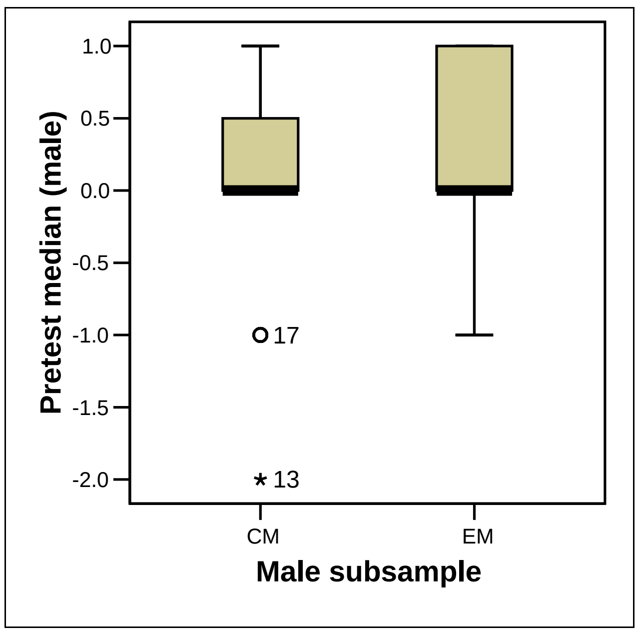
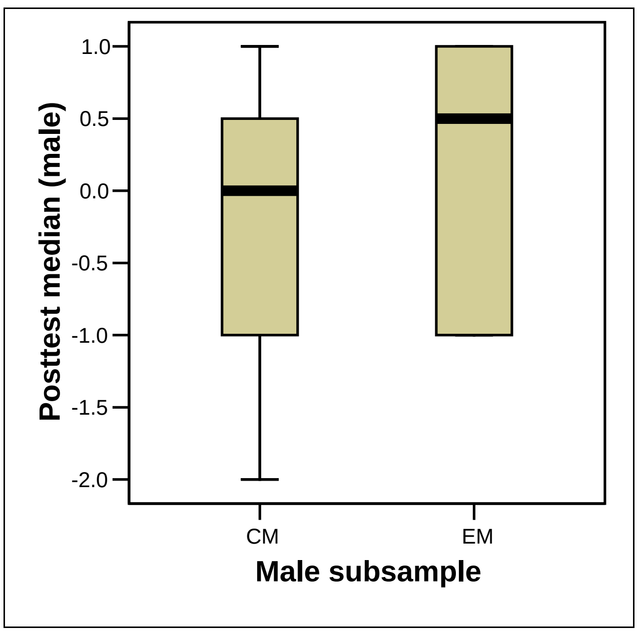


Table D13 and Figure D13 show that whilst there was no pretest bias in the male subsamples' pretest responses, between-group variability may affect estimation of the treatment effect (Reichardt, 1979). Table D14 and Figure D14 summarise posttest data at Level 2 of the Taxonomy for the Control Male and Experimental Male subsamples.

Table D14 *Posttest data from male subsamples at Level 2*

Statistics		Subsample: Control male (n = 27)	Subsample: Experimental male (n = 6)
Median		0.00	0.50
Interquartile Range		2.00	2.00
Range	Maximum	1.00	1.00
	Minimum	-2.00	-1.00

Figure D14. Posttest responses at Level 2 from Control Male (CM) and Experimental Male (EM) subsamples



Based on median ranks, there appears to be a positive treatment effect for the Experimental Male subsample. There is evidence of the Experimental Male subsample's greater posttest within-group variability, however, suggesting a selection-maturation effect that may be influencing the true treatment effect (Cook & Campbell, 1979; Reichardt, 1979).

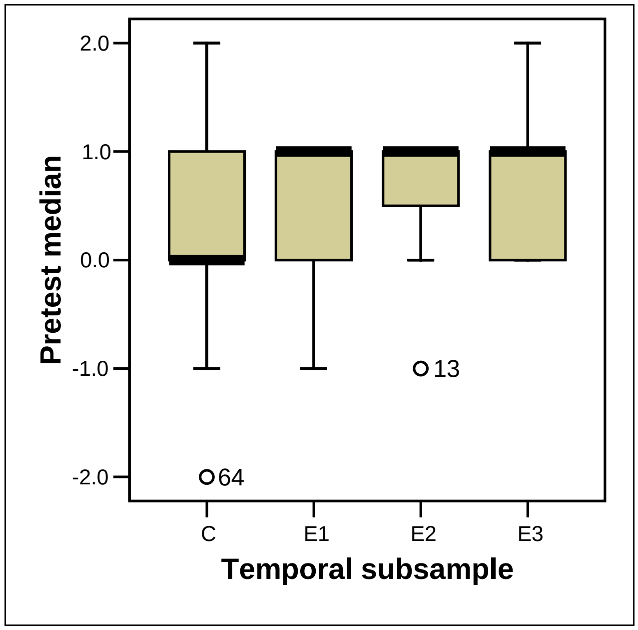
As noted in Chapter 4, temporally-disaggregated analyses addressed the timing of the treatment phases of this study. The Experimental subsample was disaggregated according to the timing of its workplace learning placement and each disaggregated subsample was designated temporally by the climatic season of its placement. Thus the first-placed Experimental subsample was designated E1 with its climatic season appended in parentheses, viz., E1 (autumn). The remaining subsamples were designated likewise: E2 (winter) and E3 (spring).

Table D15 and Figure D15 summarise pretest responses for temporally-disaggregated subsamples at Level 2 of the Taxonomy. These data are biased in favour of the three temporally-disaggregated subsamples, E1, E2, and E3.

Table D15 *Pretest data from temporally-disaggregated subsamples at Level 2*

Statistics		Subsample			
		C (n = 43)	E1 (autumn) (n = 9)	E2 (winter) (n = 7)	E3 (spring) (n = 6)
Median		0.00	1.00	1.00	1.00
Interquartile Range		1.00	1.00	1.00	1.30
Range	Maximum	2.00	1.00	1.00	2.00
	Minimum	-2.00	-1.00	1.00	0.00

Figure D15. Pretest responses at Level 2 by temporally-disaggregated subsamples

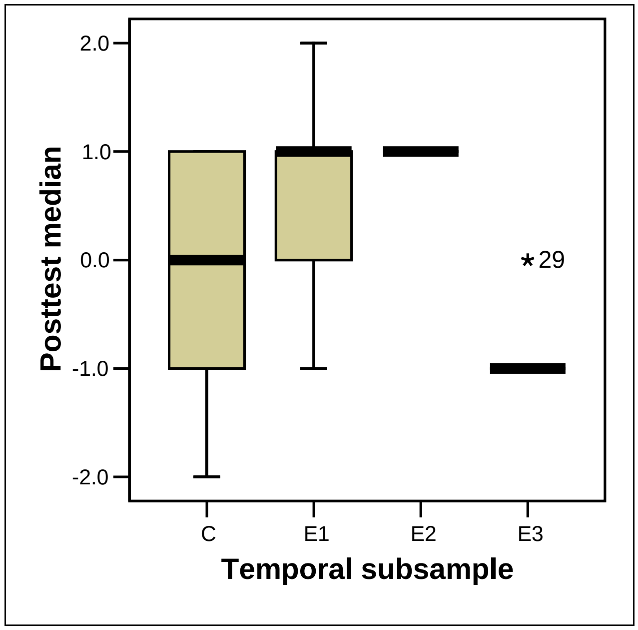


These subsamples' posttest responses are summarised in Table D16 and Figure D16.

Table D16 *Posttest data from temporally-disaggregated subsamples at Level 2*

Statistics		**Subsample**			
		C (*n* = 43)	E1 (autumn) (*n* = 9)	E2 (winter) (*n* = 7)	E3 (spring) (*n* = 6)
Median		0.00	1.00	1.00	-1.00
Interquartile Range		2.00	1.50	1.00	0.30
Range	Maximum	1.00	2.00	1.00	0.00
	Minimum	-2.00	-1.00	-1.00	-1.00

Figure D16. Posttest responses at Level 2 by temporally-disaggregated subsamples



Based on posttest median ranks there is an apparent positive treatment effect for the E2 (autumn) and E3 (winter) subsamples and an apparent negative treatment effect for the E3 (spring) subsample. However, the pretest bias noted in Table D15 and Figure D16 may be masking the true treatment effect (Reichardt, 1979). Moreover, it is noted that the within-group posttest variability for the E1 (autumn) subsample increased, suggesting a selection-maturation effect (Cook & Campbell, 1979).

Descriptive analyses of data at Level 3

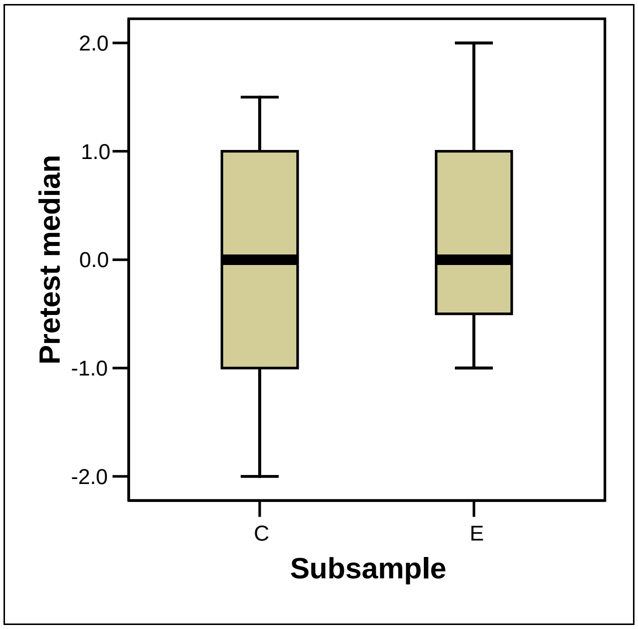
Tables and figures below summarise relevant aggregated Control and Experimental, disaggregated gender-assigned, and temporally-disaggregated pretest and posttest data. Tables summarise relevant descriptive data from pretest and posttest statistics and figures describe these data graphically in the form of box and whisker plots. As for analyses at Levels 1 and 2 of the Taxonomy these box and whisker plots are interpreted conventionally.

Table D17 and Figure D17 present pretest responses for the Control and Experimental subsamples at Level 3 of the Taxonomy. These data show an equivalence of median ranks, indicating no pretest bias. Between-group variability, however, may affect estimation of the treatment effect (Reichardt, 1979).

Table D17 *Pretest data from Control and Experimental subsamples at Level 3*

Statistics		**Subsample**	
		Control ($n = 43$)	Experimental ($n = 22$)
Median		0.00	0.00
Interquartile Range		2.00	1.50
Range	Maximum	1.50	2.00
	Minimum	-2.00	-1.00

Figure D17. Pretest responses at Level 3 from Control (C) and Experimental (E) subsamples

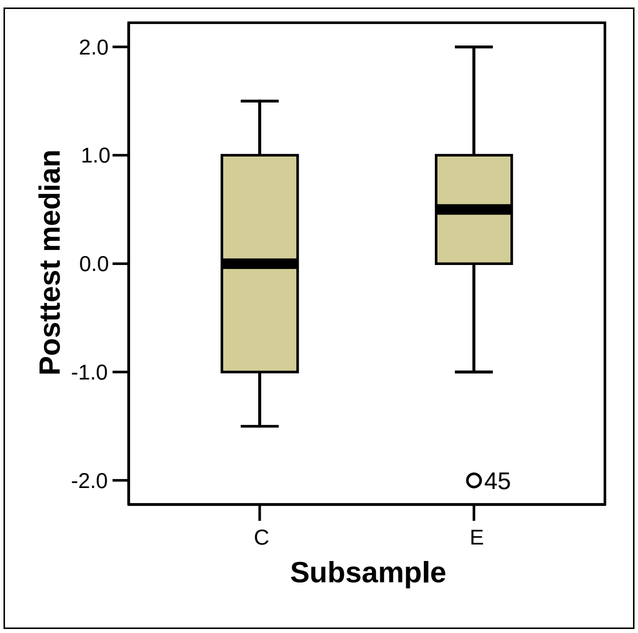


Posttest responses for the Control and Experimental subsamples are summarised in Table D18 and Figure D18.

Table D18 *Posttest data from Control and Experimental subsamples at Level 3*

Statistics		Subsample: Control (n = 43)	Subsample: Experimental (n = 22)
Median		0.00	0.50
Interquartile Range		2.00	1.10
Range	Maximum	1.50	2.00
	Minimum	-1.50	-2.00

Figure D18. Posttest responses at Level 3 from Control (C) and Experimental (E) subsamples



Data presented in Table D18 and Figure D18 show that the Experimental subsample increased its median rank from pretest to posttest, indicating an apparent positive treatment effect. Its increased range, however, indicates increased posttest within-group variability, suggesting a maturation-selection effect (Cook & Campbell, 1979) that may be masking the true treatment effect (Reichardt, 1979).

Table 4.6 and Figure 4.2, and Table 4.9 and Figure 4.3 show marked gender differences in the degree of apparent positive treatment effect at Level 3 of the Taxonomy. Therefore, gender-disaggregated subsamples were analysed descriptively to ascertain the presence of pretest bias and/or selection-maturation effects that may be influencing these differences (Reichardt, 1979). Table D19 and Figure D19 summarise pretest responses for the Control Female and Experimental Female subsamples.

Table D19 *Pretest data from female subsamples at Level 3*

Statistics		Subsample	
		Control female (n = 16)	Experimental female (n = 16)
Median		-.50	.50
Interquartile Range		1.50	1.50
Range	Maximum	1.50	2.00
	Minimum	-2.00	-1.00

Data summarised in Table D19 and Figure D19 indicated pretest bias favouring the Experimental Female subsample. Posttest responses are summarised at Table D20 and Figure D20.

Figure D19. Pretest responses at Level 3 from Control Female (CF) and Experimental Female (EF) subsamples

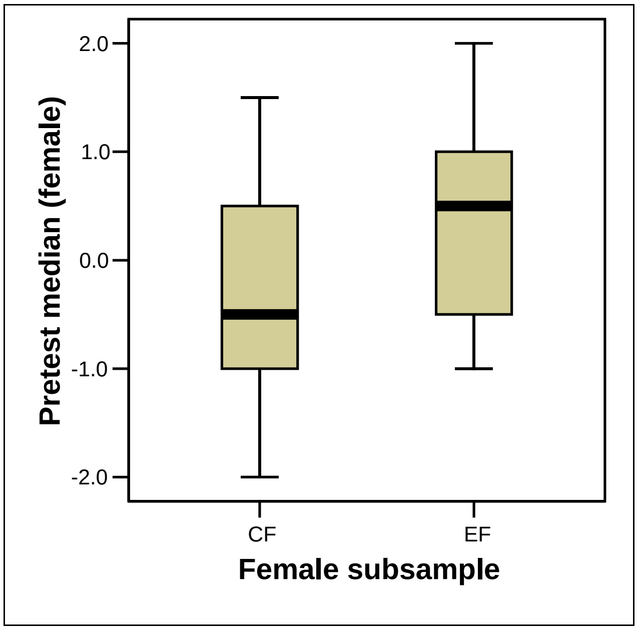
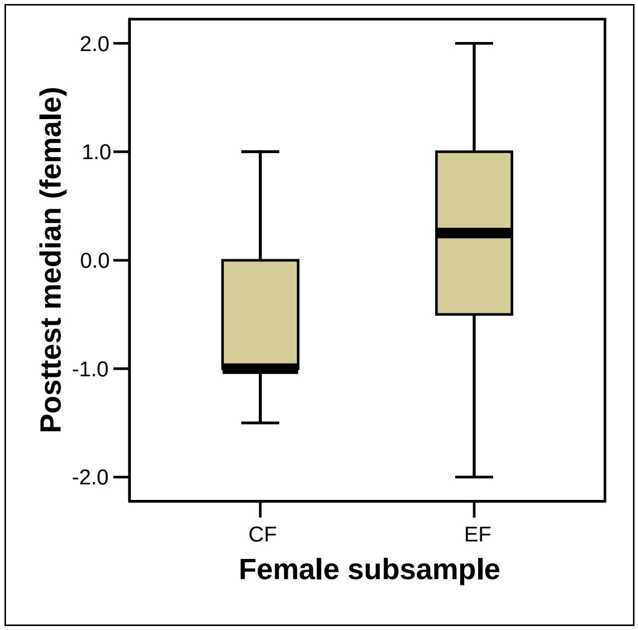


Table D20 *Posttest data from female subsamples at Level 3*

Statistics		Subsample: Control female (n = 16)	Subsample: Experimental female (n = 16)
Median		-1.00	0.25
Interquartile Range		1.00	1.80
Range	Maximum	1.00	2.00
	Minimum	-1.50	-2.00

Figure D20. Posttest responses at Level 3 from Control Female (CF) and Experimental Female (EF) subsamples



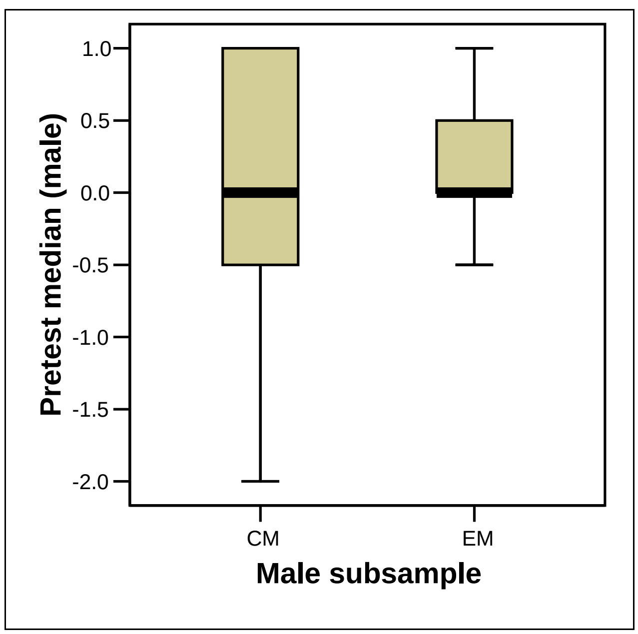
Based on median ranks there is an apparent positive treatment effect for the Experimental Female (EF) subsample, but pretest bias has not been addressed (Reichardt, 1979). Moreover, there is evidence of greater posttest within-group variability indicated by the Experimental Female (EF) subsample's broadened posttest range, suggesting a selection-maturation effect (Cook & Campbell, 1979).

Table D21 and Figure D21 summarise pretest responses from the Control Male and Experimental Male subsamples.

Table D21 *Pretest data from male subsamples at Level 3*

Statistics		Subsample: Control Male (n = 27)	Subsample: Experimental Male (n = 6)
Median		0.00	0.00
Interquartile Range		1.50	0.80
Range	Maximum	1.00	1.00
	Minimum	-2.00	-0.50

Figure D21. Pretest responses at Level 3 from Control Male (CM) and Experimental Male (EM) subsamples



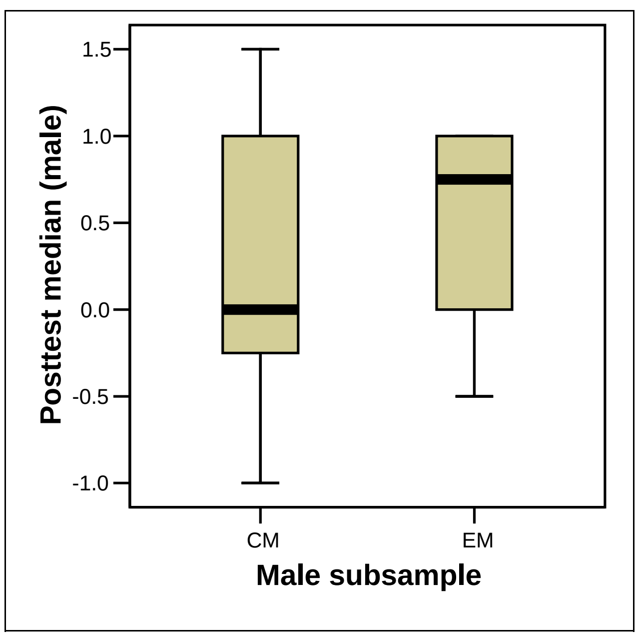
Pretest responses for Experimental Male (EM) and Control Male (CM) subsamples show identical median ranks, indicating minimal bias at the pretest stage. Between-group differences in variability may affect estimation of the treatment effect, however

(Reichardt, 1979). Table D22 and Figure D22 summarise posttest data for Control Male and Experimental Male subsamples.

Table D22 *Posttest data from male subsamples at Level 3*

Statistics		Subsample: Control Male (n = 27)	Subsample: Experimental Male (n = 6)
Median		0.00	0.75
Interquartile Range		1.50	1.10
Range	Maximum	1.50	1.00
	Minimum	-1.00	-0.50

Figure D22. Posttest responses at Level 3 from Control Male (CM) and Experimental Male (EM) subsamples



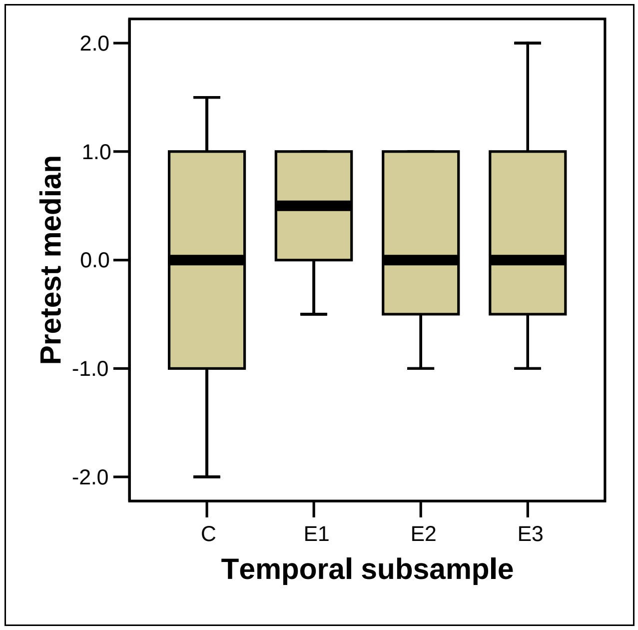
Based on median ranks, posttest data for the Experimental Male (EM) subsample shows an apparent positive treatment effect. It is noted, however, that posttest within-group variability has increased in the Experimental Male subsample and is indicative of a selection-maturation effect that may be masking the true treatment effect (Cook & Campbell, 1979; Reichardt, 1979).

As noted in Chapter 4, temporally-disaggregated analyses addressed the timing of the treatment phases of this study. The Experimental subsample was disaggregated according to the timing of its workplace learning placement and each disaggregated subsample was designated temporally by the climatic season of its placement. Thus the first-placed Experimental subsample was designated E1 with its climatic season appended in parentheses, viz., E1 (autumn). The remaining subsamples were designated likewise: E2 (winter) and E3 (spring). Pretest data at Level 3 of the Taxonomy from temporally-disaggregated subsamples is summarised in Table D23 and Figure D23.

Table D23 *Pretest data from temporally-disaggregated subsamples at Level 3*

Statistics		**Subsample**			
		C (n = 43)	E1 (autumn) (n = 9)	E2 (winter) (n = 7)	E3 (spring) (n = 6)
Median		0.00	0.50	0.00	0.00
Interquartile Range		2.00	1.30	2.00	1.90
Range	Maximum	1.50	1.00	1.00	2.00
	Minimum	-2.00	-0.50	-1.00	-1.00

Figure D23. Pretest responses at Level 3 by temporally-disaggregated subsamples



Based on median ranks there is a pretest bias favouring the E1 (autumn) subsample at the pretest analysis. Moreover, between-group differences for this subsample may affect estimation of the treatment effect (Reichardt, 1979). Posttest responses for temporally-disaggregated subsamples at Level 3 of the Taxonomy are summarised in Table D24 and Figure D24.

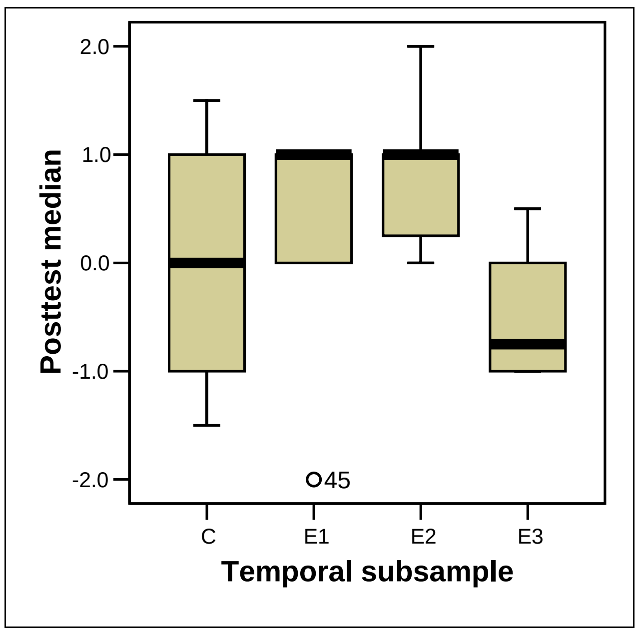
Table D24 *Posttest data from temporally-disaggregated subsamples at Level 3*

Statistics	**Subsample**			
	C (n = 43)	E1 (autumn) (*n* = 9)	E2 (winter) (*n* = 7)	E3 (spring) (*n* = 6)
Median	0.00	1.00	1.00	-0.75
Interquartile Range	2.00	1.00	1.00	1.10

Table D24 (continued)

Statistics		Subsample C (n = 43)	E1 (autumn) (*n* = 9)	E2 (winter) (*n* = 7)	E3 (spring) (*n* = 6)
Range	Maximum	1.50	1.00	2.00	0.50
	Minimum	-1.50	-2.00	0.00	-1.00

Figure D24. Posttest responses at Level 3 by temporally-disaggregated subsamples



The Control and E1 (autumn) subsamples' median ranks were unchanged from pretest to posttest and, based on posttest median ranks, there is an apparent positive treatment effect for the latter subsample, although its broadened range suggests a selection-maturation effect (Cook & Campbell, 1979). The E2 (winter) subsample's median rank rose and, based on posttest median ranks, there is an apparent positive treatment effect, seemingly unaffected by pretest bias or selection-maturation. The E3 (spring) subsample's median rank fell from pretest to posttest and, based on posttest median ranks, there is a negative treatment effect. The difference between the E2 (winter) and the E3 (spring) subsamples' posttest median ranks is large and is reflective of the statistically significant difference reported in Table 4.10.

INFERENTIAL STATISTICAL TESTING

SPSS OUTPUT FOR DATA ANALYSES REPORTED IN CHAPTER 4

Detailed output from SPSS data summarised in Chapter 4 is presented here. As indicated in Chapter 4 some inferential statistical testing was of secondary importance to the research question and in those instances statistical inference '...as the standard of proof that the phenomenon exists...' (Cohen, 1988: 2) was accepted without proceeding to formal testing of the null hypothesis. This interpretation applied to all tests for error variance.

There are three sections presented for details of inferential statistical testing in Appendix D: testing for data error variance by the Kruskal Wallis test; testing for differences between two related samples by the Wilcoxon Signed Ranks Test for matched pairs; and corroborative testing for differences between two related samples by the Sign Test. These tests were applied to aggregated samples, gender-disaggregated subsamples, and temporally-disaggregated subsamples. In the aggregated samples, subsamples were identified as Control (C) and Experimental (E), in the gender-disaggregated subsamples as Control Female (CF), Control Male (CM), Experimental Female (EF), and Experimental Male (EM), and in the temporally-disaggregated subsamples as E1 (autumn), E2 (winter) and E3 (spring).

KRUSKAL WALLIS TESTS

Details of output summarised in Tables 4.13, 4.14, and 4.15 in Chapter 4 are presented below. Statistical tests were performed with the computer software

Statistical Package for the Social Sciences (SPSS, 1999) and subsequent versions 10, 11, 11.5 and 12. In the SPSS output *Ranks* tables for the Control and Experimental subsamples testing reported below, subsamples numbered *1* and *2* in the column headed *Subsample* signify Control and Experimental groups respectively.

Table D25 *SPSS output for pretest data error variance at Level 1*

Ranks

	Subsample	N	Mean Rank
Pretest median	1	43	30.87
	2	22	37.16
	Total	65	

Test Statistics[a,b]

	Pretest median
Chi-Square	1.922
df	1
Asymp. Sig.	.166

a. Kruskal Wallis Test

b. Grouping Variable: Subsample

Explanation and interpretation of SPSS output for pretest data error variance at Level 1

The asymptotic significance value of .166 derived from the chi-square statistic of 1.922 with 1 degree of freedom is greater than the rejection region of $\alpha = .05$.

Table D26 *SPSS output for posttest data error variance at Level 1*

Ranks

	Subsample	N	Mean Rank
Posttest median	1	43	33.27
	2	22	32.48
	Total	65	

Test Statistics[a,b]

	Posttest median
Chi-Square	.030
df	1
Asymp. Sig.	.863

a. Kruskal Wallis Test

b. Grouping Variable: Subsample

Explanation and interpretation of SPSS output for posttest data error variance at Level 1

The asymptotic significance value of .863 derived from the chi-square statistic of 0.030 with 1 degree of freedom is greater than the rejection region of $\alpha = .05$.

Table D27 *SPSS output for pretest data error variance at Level 2*

Ranks

	Subsample	N	Mean Rank
Pretest median	1	43	30.22
	2	22	38.43
	Total	65	

Test Statistics[a,b]

	Pretest median
Chi-Square	3.147
df	1
Asymp. Sig.	.076

a. Kruskal Wallis Test

b. Grouping Variable: Subsample

Explanation and interpretation of SPSS output for pretest data error variance at Level 2

The asymptotic significance value of .076 derived from the chi-square statistic of 3.147 with 1 degree of freedom is greater than the rejection region of $\alpha = .05$.

Table D28 *SPSS output for posttest data error variance at Level 2*

Ranks

	Subsample	N	Mean Rank
Posttest median	1	43	30.67
	2	22	37.55
	Total	65	

Test Statistics[a,b]

	Posttest median
Chi-Square	2.152
df	1
Asymp. Sig.	.142

a. Kruskal Wallis Test

b. Grouping Variable: Subsample

Explanation and interpretation of SPSS output for posttest data error variance at Level 2

The asymptotic significance value of .142 derived from the chi-square statistic of 2.152 with 1 degree of freedom is greater than the rejection region of $\alpha = .05$.

Table D29 *SPSS output for pretest data error variance at Level 3*

Ranks

	Subsample	N	Mean Rank
Pretest median	1	43	31.03
	2	22	36.84
	Total	65	

Test Statistics[a,b]

	Pretest median
Chi-Square	1.454
df	1
Asymp. Sig.	.228

a. Kruskal Wallis Test

b. Grouping Variable: Subsample

Explanation and interpretation of SPSS output for pretest data error variance at Level 3

The asymptotic significance value of .228 derived from the chi-square statistic of 1.454 with 1 degree of freedom is greater than the rejection region of $\alpha = .05$.

Table D30 *SPSS output for posttest data error variance at Level 3*

Ranks

	Subsample	N	Mean Rank
Posttest median	1	43	30.70
	2	22	37.50
	Total	65	

Test Statistics[a,b]

	Posttest median
Chi-Square	1.996
df	1
Asymp. Sig.	.158

a. Kruskal Wallis Test

b. Grouping Variable: Subsample

Explanation and interpretation of SPSS output for posttest data error variance at Level 3

The asymptotic significance value of .158 derived from the chi-square statistic of 1.996 with 1 degree of freedom is greater than the rejection region of $\alpha = .05$.

Details of output for gender-disaggregated subsamples summarised in Tables 4.17, 4.18, and 4.19 of Chapter 4 are presented below. Statistical tests were performed with the computer software Statistical Package for the Social Sciences (SPSS, 1999). In SPSS output *Ranks* tables for gender-disaggregated testing below, subsamples numbered *1, 2, 3,* and *4* in the column headed *Gender subsample* signify

Control Female, Control Male, Experimental Female, and Experimental Male subsamples respectively.

Table D31 *SPSS output for gender-assigned subsamples' pretest data error variance at Level 1*

Ranks

	Gender subsample	N	Mean Rank
Pretest median	1	16	39.66
	2	27	25.67
	3	16	37.75
	4	6	35.58
	Total	65	

Test Statistics[a,b]

	Pretest median
Chi-Square	8.562
df	3
Asymp. Sig.	.036

a. Kruskal Wallis Test

b. Grouping Variable: Gender subsample

Interpretation of SPSS output for gender-assigned subsamples' pretest data error variance at Level 1

The asymptotic significance value of .036 derived from the chi-square statistic of 8.562 with 3 degrees of freedom is lower than the rejection region of α = .05. Therefore the statistical inference '...as the standard of proof that the phenomenon exists...' (Cohen, 1988: 2) is accepted, but the null hypothesis was not formally tested.

Table D32 *SPSS output for gender-assigned subsamples' posttest data error variance at Level 1*

Ranks

	Gender subsample	N	Mean Rank
Posttest median	1	16	32.09
	2	27	33.96
	3	16	34.59
	4	6	26.83
	Total	65	

Test Statistics[a,b]

	Posttest median
Chi-Square	1.010
df	3
Asymp. Sig.	.799

a. Kruskal Wallis Test

b. Grouping Variable: Gender subsample

Explanation and interpretation of SPSS output for gender-assigned subsamples' posttest data error variance at Level 1

The asymptotic significance value of .799 derived from the chi-square statistic of 1.010 with 3 degrees of freedom is greater than the rejection region of $\alpha = .05$.

Table D33 *SPSS output for gender-assigned subsamples' pretest data error variance at Level 2*

Ranks

	Gender subsample	N	Mean Rank
Pretest median	1	16	37.78
	2	27	25.74
	3	16	42.06
	4	6	28.75
	Total	65	

Test Statistics[a,b]

	Pretest median
Chi-Square	10.298
df	3
Asymp. Sig.	.016

a. Kruskal Wallis Test

b. Grouping Variable: Gender subsample

Explanation and interpretation of SPSS output for gender-assigned subsamples' pretest data error variance at Level 2

The asymptotic significance value of .016 derived from the chi-square statistic of 10.298 with 3 degrees of freedom is lower than the rejection region of α = .05. Therefore the statistical inference '...as the standard of proof that the phenomenon exists...' (Cohen, 1988: 2) is accepted, but the null hypothesis was not formally tested.

Table D34 *SPSS output for gender-assigned subsamples' posttest data error variance at Level 2*

Ranks

	Gender subsample	N	Mean Rank
Posttest median	1	16	31.16
	2	27	30.39
	3	16	38.22
	4	6	35.75
	Total	65	

Test Statistics[a,b]

	Posttest median
Chi-Square	2.254
df	3
Asymp. Sig.	.521

a. Kruskal Wallis Test

b. Grouping Variable: Gender subsample

Explanation and interpretation of SPSS output for gender-assigned subsamples' posttest data error variance at Level 2

The asymptotic significance value of .521 derived from the chi-square statistic of 2.254 with 3 degrees of freedom is greater than the rejection region of $\alpha = .05$.

Table D35 *SPSS output for gender-assigned subsamples' pretest data error variance at Level 3*

Ranks

	Gender subsample	N	Mean Rank
Pretest median	1	16	25.72
	2	27	34.19
	3	16	37.63
	4	6	34.75
	Total	65	

Test Statistics[a,b]

	Pretest median
Chi-Square	3.695
df	3
Asymp. Sig.	.296

a. Kruskal Wallis Test

b. Grouping Variable: Gender subsample

Explanation and interpretation of SPSS output for gender-assigned subsamples' pretest data error variance at Level 3

The asymptotic significance value of .296 derived from the chi-square statistic of 3.695 with 3 degrees of freedom is greater than the rejection region of $\alpha = .05$.

Table D36 *SPSS output for gender-assigned subsamples' posttest data error variance at Level 3*

Ranks

	Gender subsample	N	Mean Rank
Posttest median	1	16	22.69
	2	27	35.44
	3	16	35.69
	4	6	42.33
	Total	65	

Test Statistics[a,b]

	Posttest median
Chi-Square	7.413
df	3
Asymp. Sig.	.060

a. Kruskal Wallis Test

b. Grouping Variable: Gender subsample

Explanation and interpretation of SPSS output for gender-assigned subsample posttest data error variance at Level 3

The asymptotic significance value of 0.060 derived from the chi-square statistic of 7.413 with 3 degrees of freedom is greater than the rejection region of α = .05.

Details of output for temporally-disaggregated subsamples summarised in Tables 4.8, 4.9, and 4.10 of Chapter 4 are presented below. Statistical tests were performed with the computer software Statistical Package for the Social Sciences (SPSS, 1999). In SPSS output *Ranks* tables for temporally-disaggregated testing below, subsamples numbered *0, 1, 2* and *3* in the column headed *Temporal subsample* signify Control subsample, E1 (autumn) subsample, E2 (winter) subsample, and E3 (spring) subsample respectively.

Table D37 *SPSS output for temporally-disaggregated subsamples' pretest data error variance at Level 1*

Ranks

	Temporal subsample	N	Mean Rank
Pretest median	0	43	30.87
	1	9	32.50
	2	7	40.57
	3	6	40.17
	Total	65	

Test Statistics[a,b]

	Pretest median
Chi-Square	3.029
df	3
Asymp. Sig.	.387

a. Kruskal Wallis Test

b. Grouping Variable: Temporal subsample

Explanation and interpretation of SPSS output for temporally-disaggregated subsamples' pretest data error variance at Level 1

The asymptotic significance value of .387 derived from the chi-square statistic of 3.029 with 3 degrees of freedom is greater than the rejection region of $\alpha = .05$.

Table D38 *SPSS output for temporally-disaggregated subsamples' posttest data error variance at Level 1*

Ranks

	Temporal subsample	N	Mean Rank
Posttest median	0	43	33.27
	1	9	31.00
	2	7	45.07
	3	6	20.00
	Total	65	

Test Statistics[a,b]

	Posttest median
Chi-Square	6.821
df	3
Asymp. Sig.	.078

a. Kruskal Wallis Test

b. Grouping Variable: Temporal subsample

Explanation and interpretation of SPSS output for temporally-disaggregated subsamples' posttest data error variance at Level 1

The asymptotic significance value of .078 derived from the chi-square statistic of 6.821 with 3 degrees of freedom is greater than the rejection region of α = .05.

Table D39 *SPSS output for temporally-disaggregated subsamples' pretest data error variance at Level 2*

Ranks

	Temporal subsample	N	Mean Rank
Pretest median	0	43	30.22
	1	9	35.33
	2	7	38.86
	3	6	42.58
	Total	65	

Test Statistics[a,b]

	Pretest median
Chi-Square	3.759
df	3
Asymp. Sig.	.289

a. Kruskal Wallis Test

b. Grouping Variable: Temporal subsample

Explanation and interpretation of SPSS output for temporally-disaggregated subsamples' pretest data error variance at Level 2

The asymptotic significance value of .289 derived from the chi-square statistic of 3.759 with 3 degrees of freedom is greater than the rejection region of $\alpha = .05$.

Table D40 *SPSS output for temporally-disaggregated subsamples' posttest data error variance at Level 2*

Ranks

	Temporal subsample	N	Mean Rank
Posttest median	0	43	30.67
	1	9	40.44
	2	7	52.50
	3	6	15.75
	Total	65	

Test Statistics[a,b]

	Posttest median
Chi-Square	16.217
df	3
Asymp. Sig.	.001

a. Kruskal Wallis Test

b. Grouping Variable: Temporal subsample

Explanation and interpretation of SPSS output for temporally-disaggregated subsamples' posttest data error variance at Level 2

The asymptotic significance value of .001 derived from the chi-square statistic of 16.217 with 3 degrees of freedom is lower than the rejection region of $\alpha = .05$. Therefore the statistical inference '...as the standard of proof that the phenomenon exists...' (Cohen, 1988: 2) is accepted, but the null hypothesis was not formally tested.

Table D41 *SPSS output for temporally-disaggregated subsamples' pretest data error variance at Level 3*

Ranks

	Temporal subsample	N	Mean Rank
Pretest median	0	43	31.03
	1	9	39.56
	2	7	34.71
	3	6	35.25
	Total	65	

Test Statistics[a,b]

	Pretest median
Chi-Square	1.789
df	3
Asymp. Sig.	.617

a. Kruskal Wallis Test

b. Grouping Variable: Temporal subsample

Explanation and interpretation of SPSS output for temporally-disaggregated subsamples' pretest data error variance at Level 3

The asymptotic significance value of .617 derived from the chi-square statistic of 1.798 with 3 degrees of freedom is greater than the rejection region of $\alpha = .05$.

Table D42 *SPSS output for temporally-disaggregated subsamples' posttest data error variance at Level 3*

Ranks

	Temporal subsample	N	Mean Rank
Posttest median	0	43	30.70
	1	9	41.33
	2	7	46.86
	3	6	20.83
	Total	65	

Test Statistics[a,b]

	Posttest median
Chi-Square	9.145
df	3
Asymp. Sig.	.027

a. Kruskal Wallis Test

b. Grouping Variable: Temporal subsample

Explanation and interpretation of SPSS output for temporally-disaggregated subsamples' posttest data error variance at Level 3

The asymptotic significance value of .027 derived from the chi-square statistic of 9.145 with 3 degrees of freedom is lower than the rejection region of $\alpha = .05$. Therefore the statistical inference '...as the standard of proof that the phenomenon exists...' (Cohen, 1988: 2) is accepted, but the null hypothesis was not formally tested.

WILCOXON SIGNED RANKS TESTS FOR MATCHED PAIRS

Details of output summarised in Tables 4.23, 4.24, 4.25 (Level 1), 4.26, 4.27, 4.28 (Level 2), 4.29, 4.30, and 4.31 (Level 3) in Chapter 4 are presented below. Statistical tests were performed with the computer software Statistical Package for the Social Sciences (SPSS, 1999). As indicated in Chapter 4, Wilcoxon Signed Ranks Tests for matched pairs were performed for Control and Experimental subsamples, disaggregated gender subsamples, and temporally-disaggregated subsamples.

This statistical testing was of primary importance to the research question and full account was taken of statistical inference '...as the standard of proof that the phenomenon exists...' (Cohen, 1988: 2) in relation to statistical significance. Additionally Research Question 1 implies directionality to the analysis; the Experimental subsample subjects will report an *improvement* in motivation. Accordingly, all Wilcoxon Signed Ranks Tests were one-tailed (Siegel & Castellan, 1988). Thus, '...the nature of the phenomenon's existence' (Cohen, 1988: 2) in relation to the treatment effect's size, directionality, statistical significance, and statistical power (Cohen, 1988) was considered. Null hypotheses were formally tested when directionality was positive, statistical significance was in the rejection region of $\alpha = .05$ (Peers, 1996) and statistical power values were equal to or exceeded 80% (Cohen, 1988).

Table D43 *SPSS output for Wilcoxon Signed Ranks Test for Control and Experimental subsamples' matched pairs at Level 1*

Ranks

		N	Mean Rank	Sum of Ranks
Posttest pair differenc - Pretest pair differen	Negative Ranks	10[a]	7.95	79.50
	Positive Ranks	7[b]	10.50	73.50
	Ties	4[c]		
	Total	21		

a. Posttest pair difference < Pretest pair difference

b. Posttest pair difference > Pretest pair difference

c. Posttest pair difference = Pretest pair difference

Test Statistics[b]

	Posttest pair difference - Pretest pair difference
Z	-.143[a]
Asymp. Sig. (2-tailed)	.886

a. Based on positive ranks.

b. Wilcoxon Signed Ranks Test

Explanation and interpretation of SPSS output for Control and Experimental subsamples' matched pairs at Level 1

Negative ranks outnumbered positive ranks and therefore there was no positive treatment effect (Cohen, 1988). Consequently, no further analysis was warranted.

Table D44 *SPSS output for Wilcoxon Signed Ranks Test for female matched pairs at Level 1*

Ranks

		N	Mean Rank	Sum of Ranks
Posttest pair difference - Pretest pair difference	Negative Ranks	5[a]	7.30	36.50
	Positive Ranks	7[b]	5.93	41.50
	Ties	2[c]		
	Total	14		

a. Posttest pair difference < Pretest pair difference

b. Posttest pair difference > Pretest pair difference

c. Posttest pair difference = Pretest pair difference

Explanation and interpretation of SPSS output for female matched pairs at Level 1

Positive ranks outnumbered negative ranks and therefore there is a positive treatment effect (Cohen, 1988). The number of pairs (minus ties) is fewer than 15 (12 pairs), so the sum of positive ranks (T^+ value) is the relevant statistic (Siegel & Castellan, 1988). The T^+ value of 41.50 for 12 pairs of subjects yields a one-tailed critical value of .4250 (Siegel & Castellan, 1988: 333). This critical value is greater than the rejection region $\alpha = .05$ and therefore the null hypothesis was not tested formally.

Table D45 *SPSS output for Wilcoxon Signed Ranks Test for male matched pairs at Level 1*

Ranks

		N	Mean Rank	Sum of Ranks
Posttest pair difference - Pretest pair difference	Negative Ranks	1[a]	3.00	3.00
	Positive Ranks	2[b]	1.50	3.00
	Ties	3[c]		
	Total	6		

a. Posttest pair difference < Pretest pair difference

b. Posttest pair difference > Pretest pair difference

c. Posttest pair difference = Pretest pair difference

Explanation and interpretation of SPSS output for male matched pairs at Level 1
Positive ranks outnumbered negative ranks and therefore there is a positive treatment effect (Cohen, 1988). The number of pairs (minus ties) is fewer than 15 (3 pairs), so the sum of positive ranks (T^+ value) is the relevant statistic (Siegel & Castellan, 1988). The T^+ value of 3.00 for 3 pairs of subjects yields a one-tailed critical value of .6250 (Siegel & Castellan, 1988: 332). This critical value is greater than the rejection region $\alpha = .05$ and therefore the null hypothesis was not tested formally.

Table D46 *SPSS output for Wilcoxon Signed Ranks Test for temporally-disaggregated subsample E1 (autumn) at Level 1*

Ranks

		N	Mean Rank	Sum of Ranks
Posttest pair difference - Pretest pair difference	Negative Ranks	2[a]	2.00	4.00
	Positive Ranks	3[b]	3.67	11.00
	Ties	3[c]		
	Total	8		

a. Posttest pair difference < Pretest pair difference

b. Posttest pair difference > Pretest pair difference

c. Posttest pair difference = Pretest pair difference

Explanation and interpretation of SPSS output for temporally-disaggregated subsample E1 (autumn) at Level 1

Positive ranks outnumbered negative ranks and therefore there is a positive treatment effect (Cohen, 1988). The number of pairs (minus ties) is fewer than 15 (5 pairs), so the sum of positive ranks (T^+ value) is the relevant statistic (Siegel & Castellan, 1988). The T^+ value of 11.00 for 5 pairs of subjects yields a one-tailed critical value of .2188 (Siegel & Castellan, 1988: 332). This critical value is greater than the rejection region $\alpha = .05$ and therefore the null hypothesis was not tested formally.

Table D47 *SPSS output for Wilcoxon Signed Ranks Test for temporally-disaggregated subsample E2 (winter) at Level 1*

Ranks

		N	Mean Rank	Sum of Ranks
Posttest pair difference - Pretest pair difference	Negative Ranks	2[a]	2.50	5.00
	Positive Ranks	4[b]	4.00	16.00
	Ties	1[c]		
	Total	7		

a. Posttest pair difference < Pretest pair difference

b. Posttest pair difference > Pretest pair difference

c. Posttest pair difference = Pretest pair difference

Explanation and interpretation of SPSS output for temporally-disaggregated subsample E2 (winter) at Level 1

Positive ranks outnumbered negative ranks and therefore there is a positive treatment effect (Cohen, 1988). The number of pairs (minus ties) is fewer than 15 (6 pairs), so the sum of positive ranks (T^+ value) is the relevant statistic (Siegel & Castellan, 1988). The T^+ value of 16.00 for 6 pairs of subjects yields a one-tailed critical value of .1563 (Siegel & Castellan, 1988: 332). This critical value is greater than the rejection region $\alpha = .05$ and therefore the null hypothesis was not tested formally.

Table D48 *SPSS output for Wilcoxon Signed Ranks Test for Wilcoxon Signed Ranks Test for matched pairs for temporally-disaggregated subsample E3 (spring) at Level 1*

Ranks

		N	Mean Rank	Sum of Ranks
Posttest pair differenc - Pretest pair differen	Negative Rank	4[a]	2.50	10.00
	Positive Ranks	0[b]	.00	.00
	Ties	2[c]		
	Total	6		

a. Posttest pair difference < Pretest pair difference

b. Posttest pair difference > Pretest pair difference

c. Posttest pair difference = Pretest pair difference

Explanation and interpretation of SPSS output for temporally-disaggregated subsample E3 (spring) at Level 1

Negative ranks outnumbered positive ranks and therefore there is no positive treatment effect (Cohen, 1988). The number of pairs (minus ties) is fewer than 15 (4 pairs), so the sum of positive ranks (T^+ value) is the relevant statistic (Siegel & Castellan, 1988). The T^+ value of 0.00 for 5 pairs of subjects cannot be read from a table of alpha values suitable for the Wilcoxon Signed Ranks Test when T^+ is lower than 3.00 (Siegel & Castellan, 1988: 332) and therefore the critical value is greater than .6250. This critical value is greater than the rejection region α = .05 and therefore the null hypothesis was not tested formally.

Table D49 *SPSS output for Wilcoxon Signed Ranks Test for Control and Experimental subsamples' matched pairs at Level 2*

Ranks

		N	Mean Rank	Sum of Ranks
Posttest pair difference - Pretest pair difference	Negative Ranks	4[a]	11.88	47.50
	Positive Ranks	13[b]	8.12	105.50
	Ties	5[c]		
	Total	22		

a. Posttest pair difference < Pretest pair difference

b. Posttest pair difference > Pretest pair difference

c. Posttest pair difference = Pretest pair difference

Test Statistics[b]

	Posttest pair difference - Pretest pair difference
Z	-1.417[a]
Asymp. Sig. (2-tailed)	.156

a. Based on negative ranks.

b. Wilcoxon Signed Ranks Test

Explanation and interpretation of SPSS output for Control and Experimental subsamples' matched pairs at Level 2

Positive ranks outnumbered negative ranks and therefore there is a positive treatment effect (Cohen, 1988). The number of pairs (minus ties) is greater than 15 (17 pairs), so the computed *z* score is the relevant statistic (Siegel & Castellan, 1988). The *z* score of -1.417 (based on negative ranks) yields a two-tailed asymptotic significance value of .156. Since the direction of change is predicted, the test is one-tailed. Therefore the relevant *p* value is 0.08. This critical value is greater than the rejection region $\alpha = .05$ and therefore the null hypothesis was not tested formally.

Table D50 *SPSS output for Wilcoxon Signed Ranks Test for female matched pairs at Level 2*

Ranks

		N	Mean Rank	Sum of Ranks
Posttest pair difference - Pretest pair difference	Negative Ranks	2[a]	6.25	12.50
	Positive Ranks	9[b]	5.94	53.50
	Ties	2[c]		
	Total	13		

a. Posttest pair difference < Pretest pair difference

b. Posttest pair difference > Pretest pair difference

c. Posttest pair difference = Pretest pair difference

Explanation and interpretation of SPSS output for female matched pairs at Level 2

Positive ranks outnumbered negative ranks and therefore there is a positive treatment effect (Cohen, 1988). The number of pairs (minus ties) is fewer than 15 (11 pairs), so the sum of positive ranks (T^+ value) is the relevant statistic (Siegel & Castellan, 1988). The T^+ value of 54.00 for 11 pairs of subjects yields a one-tailed critical value of .0337. This critical value is lower than the rejection region $\alpha = .05$. The statistical power of this test is 60% (Cohen, 1988: 167), lower than the conventionally accepted 80% necessary to correctly reject the null hypothesis (Cohen, 1988). Therefore, the null hypothesis was not tested formally.

Table D51 *SPSS output for Wilcoxon Signed Ranks Test for male matched pairs at Level 2*

Ranks

		N	Mean Rank	Sum of Ranks
Posttest pair difference - Pretest pair difference	Negative Ranks	1[a]	3.00	3.00
	Positive Ranks	2[b]	1.50	3.00
	Ties	3[c]		
	Total	6		

a. Posttest pair difference < Pretest pair difference

b. Posttest pair difference > Pretest pair difference

c. Posttest pair difference = Pretest pair difference

Explanation and interpretation of SPSS output for male matched pairs at Level 2

Positive ranks outnumbered negative ranks and therefore there is a positive treatment effect (Cohen, 1988). The number of pairs (minus ties) is fewer than 15 (3 pairs), so the sum of positive ranks (T^+ value) is the relevant statistic (Siegel & Castellan, 1988). The T^+ value of 3.00 for 3 pairs of subjects yields a one-tailed critical value of .6250 (Siegel & Castellan, 1988: 332). This critical value is greater than the rejection region $\alpha = .05$ and therefore the null hypothesis was not tested formally.

Table D52 *SPSS output for Wilcoxon Signed Ranks Test for temporally-disaggregated subsample E1 (autumn) at Level 2*

Ranks

		N	Mean Rank	Sum of Ranks
Posttest pair differen - Pretest pair differer	Negative Rank	0[a]	.00	.00
	Positive Ranks	6[b]	3.50	21.00
	Ties	3[c]		
	Total	9		

a. Posttest pair difference < Pretest pair difference

b. Posttest pair difference > Pretest pair difference

c. Posttest pair difference = Pretest pair difference

Explanation and interpretation of SPSS output for temporally-disaggregated subsample E1 (autumn) at Level 2

Positive ranks outnumbered negative ranks and therefore there is a positive treatment effect (Cohen, 1988). The number of pairs (minus ties) is fewer than 15 (6 pairs), so the sum of positive ranks (T^+ value) is the relevant statistic (Siegel & Castellan, 1988). The T^+ value of 21.00 for 6 pairs of subjects yields a one-tailed critical value of .0156 (Siegel & Castellan, 1988: 332). This critical value is lower than the rejection region α = .05. The statistical power of this test is between 50% and 60% (Cohen, 1988: 167), lower than the conventionally accepted 80% necessary to correctly reject the null hypothesis. Therefore, the null hypothesis was not tested formally.

Table D53 *SPSS output for Wilcoxon Signed Ranks Test for temporally-disaggregated subsample E2 (winter) at Level 2*

Ranks

		N	Mean Rank	Sum of Ranks
Posttest pair differenc - Pretest pair differen	Negative Rank	0[a]	.00	.00
	Positive Ranks	5[b]	3.00	15.00
	Ties	2[c]		
	Total	7		

a. Posttest pair difference < Pretest pair difference

b. Posttest pair difference > Pretest pair difference

c. Posttest pair difference = Pretest pair difference

Explanation and interpretation of SPSS output for temporally-disaggregated subsample E2 (winter) at Level 2

Positive ranks outnumbered negative ranks and therefore there is a positive treatment effect (Cohen, 1988). The number of pairs (minus ties) is fewer than 15 (5 pairs), so the sum of positive ranks (T^+ value) is the relevant statistic (Siegel & Castellan, 1988). The T^+ value of 15.00 for 5 pairs of subjects yields a one-tailed critical value of .0313 (Siegel & Castellan, 1988: 332). This critical value is lower than the rejection region $\alpha = .05$. The statistical power of this test is between 25% and 50% (Cohen, 1988: 167), lower than the conventionally accepted 80% necessary to correctly reject the null hypothesis. Therefore, the null hypothesis was not tested formally.

Table D54 *SPSS output for Wilcoxon Signed Ranks Test for temporally-disaggregated subsample E3 (spring) at Level 2*

Ranks

		N	Mean Rank	Sum of Ranks
Posttest pair differenc - Pretest pair differenc	Negative Ranks	4[a]	3.38	13.50
	Positive Ranks	1[b]	1.50	1.50
	Ties	1[c]		
	Total	6		

a. Posttest pair difference < Pretest pair difference

b. Posttest pair difference > Pretest pair difference

c. Posttest pair difference = Pretest pair difference

Explanation and interpretation of SPSS output for temporally-disaggregated subsample E3 (spring) at Level 2

Negative ranks outnumbered positive ranks and therefore there is no positive treatment effect (Cohen, 1988). Consequently no further analysis was warranted.

Table D55 *SPSS output for Wilcoxon Signed Ranks Test for Control and Experimental subsamples' matched pairs at Level 3*

Ranks

		N	Mean Rank	Sum of Ranks
Posttest pair difference - Pretest pair difference	Negative Ranks	4[a]	10.50	42.00
	Positive Ranks	11[b]	7.09	78.00
	Ties	6[c]		
	Total	21		

a. Posttest pair difference < Pretest pair difference

b. Posttest pair difference > Pretest pair difference

c. Posttest pair difference = Pretest pair difference

Explanation and interpretation of SPSS output for Control and Experimental subsamples' matched pairs at Level 3

Positive ranks outnumbered negative ranks and therefore there is a positive treatment effect (Cohen, 1988). The number of pairs (minus ties) equals 15, so the sum of positive ranks (T^+ value) is the relevant statistic (Siegel & Castellan, 1988). The T^+ value of 78.00 for 15 pairs of subjects yields a one-tailed critical value of .1651 (Siegel & Castellan, 1988: 332). This critical value is greater than the rejection region α = .05 and therefore the null hypothesis was not tested formally.

Table D56 *SPSS output for Wilcoxon Signed Ranks Test for female matched pairs at Level 3*

Ranks

		N	Mean Rank	Sum of Ranks
Posttest pair differenc - Pretest pair differenc	Negative Ranks	0[a]	.00	.00
	Positive Ranks	9[b]	5.00	45.00
	Ties	3[c]		
	Total	12		

a. Posttest pair difference < Pretest pair difference

b. Posttest pair difference > Pretest pair difference

c. Posttest pair difference = Pretest pair difference

Explanation and interpretation of SPSS output for female matched pairs at Level 3

Positive ranks outnumbered negative ranks and therefore there is a positive treatment effect (Cohen, 1988). The number of pairs (minus ties) is fewer than 15 (9 pairs), so the sum of positive ranks (T^+ value) is the relevant statistic (Siegel & Castellan, 1988). The T^+ value of 45.00 for 9 pairs of subjects yields a one-tailed critical value of .0020 (Siegel & Castellan, 1988:332). This critical value is lower than the rejection region α = .05. The statistical power of this test is between 80% and 85% and meets the accepted conventional value of 80% necessary for correctly rejecting the null hypothesis (Cohen, 1988: 167). Formal testing of the null hypothesis is presented in Table D57 (Siegel & Castellan, 1988).

Table D57 *Wilcoxon Signed Ranks Test for female matched pairs at Level 3*

Null hypothesis. H_o: There is no posttest difference of ranks between pairs of Control Female and Experimental Female subjects in relation to their improved motivation for school learning at Level 3 of the Affective Domain Taxonomy.

Statistical test. The Wilcoxon Signed Ranks Test for matched pairs is selected because the data are difference rankings from two related samples where each Female Experimental subject is paired with a Female Control subject.

Significance level. Let $\alpha = .05$ and N is the number of paired differences minus ties.

Sampling distribution. Where $N \leq 15$ the T^+ (the sum of positive ranks) statistic will be used to determine the p value. Where $N > 15$ then the relevant p value is derived from a computed z score (Siegel & Castellan, 1988).

Rejection region. Since the direction of difference is predicted the test is one-tailed. The region of rejection consists of all values of T^+ or z which are so large that the probability of their occurrence under H_0 is less than or equal to $\alpha = .05$.

SPSS output presented in Table D56 shows that the one-tailed p value is .00, within the rejection region of $\alpha = .05$, and the statistical power value is between 80% and 85%. Therefore the null hypothesis is rejected and the alternative hypothesis, $H_{1,}$ is accepted.

After participating in school-sponsored workplace learning, *socio*-economically disadvantaged female high school students will report improved motivation for school learning at Level 3 of the Affective Domain Taxonomy.

Table D58 *SPSS output for Wilcoxon Signed Ranks Test for male matched pairs at Level 3*

Ranks

		N	Mean Rank	Sum of Ranks
Posttest pair differenc - Pretest pair differenc	Negative Ranks	0[a]	.00	.00
	Positive Ranks	4[b]	2.50	10.00
	Ties	1[c]		
	Total	5		

a. Posttest pair difference < Pretest pair difference

b. Posttest pair difference > Pretest pair difference

c. Posttest pair difference = Pretest pair difference

Explanation and interpretation of SPSS output for male matched pairs at Level 3
Positive ranks outnumbered negative ranks and therefore there is a positive treatment effect (Cohen, 1988). The number of pairs (minus ties) is fewer than 15 (4 pairs), so the sum of positive ranks (T^+ value) is the relevant statistic (Siegel & Castellan, 1988). The T^+ value of 10.00 for 4 pairs of subjects yields a one-tailed critical value of .0625 (Siegel & Castellan, 1988: 332). This critical value is greater than the rejection region $\alpha = .05$ and therefore the null hypothesis was not tested formally.

Table D59 *SPSS output for Wilcoxon Signed Ranks Test for temporally-disaggregated subsample E1 (autumn) at Level 3*

Ranks

		N	Mean Rank	Sum of Ranks
Posttest pair difference - Pretest pair difference	Negative Ranks	3[a]	3.67	11.00
	Positive Ranks	3[b]	3.33	10.00
	Ties	3[c]		
	Total	9		

a. Posttest pair difference < Pretest pair difference

b. Posttest pair difference > Pretest pair difference

c. Posttest pair difference = Pretest pair difference

Explanation and interpretation of SPSS output for temporally-disaggregated group E1 (autumn) at Level 3

Negative ranks equalled positive ranks and therefore there is no positive treatment effect (Cohen, 1988). Consequently no further analysis was warranted.

Table D60 *SPSS output for Wilcoxon Signed Ranks Test for temporally-disaggregated group E2 (winter) at Level 3*

Ranks

		N	Mean Rank	Sum of Ranks
Posttest pair difference - Pretest pair difference	Negative Ranks	0[a]	.00	.00
	Positive Ranks	6[b]	3.50	21.00
	Ties	1[c]		
	Total	7		

a. Posttest pair difference < Pretest pair difference

b. Posttest pair difference > Pretest pair difference

c. Posttest pair difference = Pretest pair difference

Explanation and interpretation of SPSS output for temporally-disaggregated group E2 (winter) at Level 3

Positive ranks outnumbered negative ranks and therefore there is a positive treatment effect (Cohen, 1988). The number of pairs (minus ties) is fewer than 15 (6 pairs), so the sum of positive ranks (T^+ value) is the relevant statistic (Siegel & Castellan, 1988). The T^+ value of 21.00 for 6 pairs of subjects yields a one-tailed critical value of .0156 (Siegel & Castellan, 1988: 332). This critical value is lower than the rejection region $\alpha = .05$. The statistical power of this test is between 50% and 60% (Cohen, 1988: 167), lower than the conventionally accepted value of 80% necessary for correctly rejecting the null hypothesis. Therefore, the null hypothesis was not tested formally.

Table D61 *SPSS output for Wilcoxon Signed Ranks Test for matched pairs for temporally-disaggregated subsample E3 (spring) at Level 3*

Ranks

		N	Mean Rank	Sum of Ranks
Posttest pair differenc - Pretest pair differenc	Negative Ranks	3[a]	2.67	8.00
	Positive Ranks	1[b]	2.00	2.00
	Ties	2[c]		
	Total	6		

a. Posttest pair difference < Pretest pair difference

b. Posttest pair difference > Pretest pair difference

c. Posttest pair difference = Pretest pair difference

Explanation and interpretation of SPSS output for temporally-disaggregated group E3 (spring) at Level 3

Negative ranks outnumbered positive ranks and therefore there is no positive treatment effect (Cohen, 1988). Consequently, no further analysis was warranted.

SIGN TESTS

Details of output summarised in Tables 4.23, 4.24, 4.25 (Level 1), 4.26, 4.27, 4.28 (Level 2), 4.29, 4.30, and 4.31 (Level 3) in Chapter 4 are presented below. Statistical tests were performed with the computer software Statistical Package for the Social Sciences (SPSS, 1999). As indicated in Chapter 4, Sign Tests provided an opportunity to calculate effect size and statistical power (Cohen, 1988). Sign Tests for matched pairs were performed for Control and Experimental subsamples, disaggregated gender subsamples, and temporally-disaggregated subsamples.

This statistical testing was of primary importance to the research question and full account was taken of statistical inference '...as the standard of proof that the phenomenon exists...' (Cohen, 1988: 2) in relation to statistical significance. Additionally Research Question 1 implies directionality to the analysis; the Experimental subsample subjects will report an *improvement* in motivation. Accordingly, all Sign Tests were one-tailed (Siegel & Castellan, 1988). Thus, '...the nature of the phenomenon's existence' (Cohen, 1988: 2) in relation to the treatment effect's size, directionality, statistical significance, and statistical power (Cohen, 1988) was considered. Null hypotheses were formally tested when directionality was positive, statistical significance was in the rejection region of $\alpha = .05$ (Peers, 1996) and statistical power values were equal to or exceeded 80% (Cohen, 1988).

Table D62 *SPSS output for Sign Test for Control and Experimental subsamples' matched pairs at Level 1*

Frequencies

		N
Posttest pair difference - Pretest pair difference	Negative Differences[a]	10
	Positive Differences[b]	7
	Ties[c]	4
	Total	21

a. Posttest pair difference < Pretest pair difference

b. Posttest pair difference > Pretest pair difference

c. Posttest pair difference = Pretest pair difference

Explanation and interpretation of SPSS output for Control and Experimental subsamples' matched pairs at Level 1

Effect size, calculated from the binomial distribution $p = q = ½$ (P = .50) is 10:7 = 0.59:0.41 = 0.41-0.50 = -0.09 (Cohen, 1988: 147). Therefore the treatment effect size is -0.09 and is defined operationally as a medium negative effect size (Cohen, 1988). Given this negative treatment effect, no further analysis was warranted.

Table D63 *SPSS output for Sign Test for female matched pairs at Level 1*

Frequencies

		N
Posttest pair difference - Pretest pair difference	Negative Differences[a]	5
	Positive Differences[b]	7
	Ties[c]	2
	Total	14

a. Posttest pair difference < Pretest pair difference

b. Posttest pair difference > Pretest pair difference

c. Posttest pair difference = Pretest pair difference

Explanation and interpretation of SPSS output for female matched pairs at Level 1

Effect size, calculated from the binomial distribution $p = q = ½$ (P = .50) is 5:7 = 0.42:0.58 = 0.58-0.50 = 0.08 (Cohen, 1988: 147). Therefore the treatment effect size is 0.08 and is defined operationally as a medium positive effect size (Cohen, 1988). The number of pairs (minus ties) is less than 35 (N = 12), so the number of fewer signs (x) is the relevant statistic (Siegel & Castellan, 1988). The one-tailed x value for 5 when N = 12 is .387 (negative signs) (Siegel & Castellan, 1988: 324). This critical value is greater than the rejection region α = .05 and therefore the null hypothesis was not tested formally.

Table D64 *SPSS output for Sign Test for male matched pairs at Level 1*

Frequencies

		N
Posttest pair difference - Pretest pair difference	Negative Differences[a]	1
	Positive Differences[b]	2
	Ties[c]	3
	Total	6

a. Posttest pair difference < Pretest pair difference

b. Posttest pair difference > Pretest pair difference

c. Posttest pair difference = Pretest pair difference

Explanation and interpretation of SPSS output for male subsamples' matched pairs at Level 1

Effect size, calculated from the binomial distribution $p = q = ½$ (P = .50) is 1:2 = 0.33:0.67 = 0.67-0.50 = 0.17 (Cohen, 1988: 147). Therefore, the treatment effect size is 0.17 and is defined operationally as a medium positive effect size (Cohen, 1988). The number of pairs (minus ties) is less than 35 (N = 3), so the number of fewer signs (x) is the relevant statistic (Siegel & Castellan, 1988). The one-tailed x value for 1 cannot be read from a table of alpha values suitable for the Sign Test when N < 4 (Siegel & Castellan, 1988: 324) and therefore is greater than .312. This critical value is greater than the rejection region $\alpha = .05$ and therefore the null hypothesis was not tested formally.

Table D65 *SPSS output for Sign Test for temporally-disaggregated subsample E1 (autumn) at Level 1*

Frequencies

		N
Posttest pair difference - Pretest pair difference	Negative Differences[a]	2
	Positive Differences[b]	3
	Ties[c]	3
	Total	8

a. Posttest pair difference < Pretest pair difference

b. Posttest pair difference > Pretest pair difference

c. Posttest pair difference = Pretest pair difference

Explanation and interpretation of SPSS output for temporally-disaggregated subsample E1 (autumn) at Level 1

Effect size, calculated from the binomial distribution $p = q = ½$ (P = .50) is 2:3 = 0.40:0.60 = 0.60-0.50 = 0.10 (Cohen, 1988: 147). Therefore, the treatment effect size is 0.10 and is defined operationally as a small positive effect size (Cohen, 1988). The number of pairs (minus ties) is less than 35 (N = 5), so the number of fewer signs (*x*) is the relevant statistic (Siegel & Castellan, 1988). The one-tailed *x* value for 2 when N = 5 is .500 (Siegel & Castellan, 1988: 324). This critical value is greater than the rejection region α = .05 and therefore the null hypothesis was not tested formally.

Table D66 *SPSS output for Sign Test for temporally-disaggregated subsample E2 (winter) at Level 1*

Frequencies

		N
Posttest pair difference - Pretest pair difference	Negative Differences[a]	2
	Positive Differences[b]	4
	Ties[c]	1
	Total	7

a. Posttest pair difference < Pretest pair difference

b. Posttest pair difference > Pretest pair difference

c. Posttest pair difference = Pretest pair difference

Explanation and interpretation of SPSS output for temporally-disaggregated subsample E2 (winter) at Level 1

Effect size, calculated from the binomial distribution $p = q = ½$ (P = .50) is 2:4 = 0.33:0.67 = 0.67-0.50 = 0.17 (Cohen, 1988: 147). Therefore, the treatment effect size is 0.17 and is defined operationally as a medium positive effect size (Cohen, 1988). The number of pairs (minus ties) is less than 35 (N = 6), so the number of fewer signs (x) is the relevant statistic (Siegel & Castellan, 1988). The one-tailed x value for 2 when N = 6 is .344 (Siegel & Castellan, 1988: 324). This critical value is greater than the rejection region α = .05 and therefore the null hypothesis was not tested formally.

Table D67 *SPSS output for Sign Test for temporally-disaggregated subsample E3 (spring) at Level 1*

Frequencies

		N
Posttest pair difference - Pretest pair difference	Negative Differences[a]	4
	Positive Differences[b]	0
	Ties[c]	2
	Total	6

a. Posttest pair difference < Pretest pair difference

b. Posttest pair difference > Pretest pair difference

c. Posttest pair difference = Pretest pair difference

Explanation and interpretation of SPSS output for temporally-disaggregated subsample E3 (spring) at Level 1

Effect size, calculated from the binomial distribution $p = q = ½$ (P = .50) is 4:0 = 1.00:0.00 = 0.00-0.50 = -0.50 (Cohen, 1988: 147). Therefore, the treatment effect size is -0.50 and is defined operationally as a large negative effect size (Cohen, 1988). Given this negative treatment effect, no further analysis was warranted.

Table D68 *SPSS output for Sign Test for Control and Experimental subsamples' matched pairs at Level 2*

Frequencies

		N
Posttest pair difference - Pretest pair difference	Negative Differences[a]	4
	Positive Differences[b]	13
	Ties[c]	5
	Total	22

a. Posttest pair difference < Pretest pair difference

b. Posttest pair difference > Pretest pair difference

c. Posttest pair difference = Pretest pair difference

Explanation and interpretation of SPSS output for Control and Experimental subsamples' matched pairs at Level 2

Effect size, calculated from the binomial distribution $p = q = ½$ (P = .50) is 4:13 = 0.24:0.76 = 0.76-0.50 = 0.26 (Cohen, 1988: 147). Therefore, the treatment effect size is 0.26 and is defined operationally as a large positive effect size (Cohen, 1988). The number of pairs (minus ties) is less than 35 (N = 17), so the number of fewer signs (x) is the relevant statistic (Siegel & Castellan, 1988). The one-tailed x value for 4 when N = 17 is .025 (Siegel & Castellan, 1988: 324). This critical value is lower than the rejection region $\alpha = .05$. The statistical power of this test is between 60% and 67% (Cohen, 1988: 167) and is lower than the conventionally accepted value of 80% for correctly rejecting the null hypothesis. Therefore, the null hypothesis was not tested formally.

Table D69 *SPSS output for Sign Test for female matched pairs at Level 2*

Frequencies

		N
Posttest pair difference - Pretest pair difference	Negative Differences[a]	2
	Positive Differences[b]	9
	Ties[c]	2
	Total	13

a. Posttest pair difference < Pretest pair difference

b. Posttest pair difference > Pretest pair difference

c. Posttest pair difference = Pretest pair difference

Explanation and interpretation of SPSS output for female matched pairs at Level 2

Effect size, calculated from the binomial distribution $p = q = ½$ (P = .50) is 2:9 = 0.18:0.82 = 0.82-0.50 = 0.32 (Cohen, 1988: 147). Therefore, the treatment effect size is 0.32 and is defined operationally as a large positive effect size (Cohen, 1988). The number of pairs (minus ties) is less than 35 (n = 11), so the number of fewer signs (x) is the relevant statistic (Siegel & Castellan, 1988). The one-tailed x value for 2 when N = 11 is .033 (Siegel & Castellan, 1988: 324). This critical value is lower than the rejection region $\alpha = .05$. The statistical power of this test is between 60% and 67% (Cohen, 1988: 167) and is lower than the conventionally accepted value of 80% necessary for correctly rejecting the null hypothesis. Therefore, the null hypothesis was not tested formally.

Table D70 *SPSS output for Sign Test for male matched pairs at Level 2*

Frequencies

		N
Posttest pair difference - Pretest pair difference	Negative Differences[a]	1
	Positive Differences[b]	2
	Ties[c]	3
	Total	6

a. Posttest pair difference < Pretest pair difference

b. Posttest pair difference > Pretest pair difference

c. Posttest pair difference = Pretest pair difference

Explanation and interpretation of SPSS output for male matched pairs at Level 2

Effect size, calculated from the binomial distribution $p = q = ½$ (P = .50) is 1:2 = 0.33:0.67 = 0.67-0.50 = 0.17 (Cohen, 1988: 147). Therefore, the treatment effect size is 0.17 and is defined operationally as a medium positive effect size (Cohen, 1988). The number of pairs (minus ties) is less than 35 (N = 3), so the number of fewer signs

(x) is the relevant statistic (Siegel & Castellan, 1988). The one-tailed x value for 1 cannot be read from a table of alpha values suitable for the Sign Test when N < 4 (Siegel & Castellan, 1988: 324) and therefore is greater than .312. This critical value is greater than the rejection region α = .05 and therefore the null hypothesis was not tested formally.

Table D71 *SPSS output for Sign Test for temporally-disaggregated subsample E1 (autumn) at Level 2*

Frequencies

		N
Posttest pair difference - Pretest pair difference	Negative Differences[a]	0
	Positive Differences[b]	7
	Ties[c]	2
	Total	9

a. Posttest pair difference < Pretest pair difference

b. Posttest pair difference > Pretest pair difference

c. Posttest pair difference = Pretest pair difference

Explanation and interpretation of SPSS output for temporally-disaggregated subsample E1 (autumn) at Level 2

Effect size, calculated from the binomial distribution $p = q = ½$ (P = .50) is 0:7 = 0.00:1.00 = 1.00-0.50 = 0.50 (Cohen, 1988: 147). Therefore, the treatment effect size is 0.50 and is defined operationally as a large positive effect size (Cohen, 1988). The number of pairs (minus ties) is less than 35 (N = 7), so the number of fewer signs (x) is the relevant statistic (Siegel & Castellan, 1988). The one-tailed x value for 0 when N = 7 is .008 (Siegel & Castellan, 1988: 324). This critical value is lower than the rejection region α = .05. The statistical power of this test is between 50% and 60% (Cohen, 1988: 167) and is lower than the conventionally accepted value of 80%

necessary for correctly rejecting the null hypothesis. Therefore, the null hypothesis was not tested formally.

Table D72 *SPSS output for Sign Test for temporally-disaggregated subsample E2 (winter) at Level 2*

Frequencies

		N
Posttest pair difference - Pretest pair difference	Negative Differences[a]	0
	Positive Differences[b]	5
	Ties[c]	2
	Total	7

a. Posttest pair difference < Pretest pair difference

b. Posttest pair difference > Pretest pair difference

c. Posttest pair difference = Pretest pair difference

Explanation and interpretation of SPSS output for temporally-disaggregated subsample E2 (winter) at Level 2

Effect size, calculated from the binomial distribution $p = q = ½$ (P = .50) is 0:5 = 0.00:1.00 = 1.00-0.50 = 0.50 (Cohen, 1988: 147). Therefore, the treatment effect size is 0.50 and is defined operationally as a large positive effect size (Cohen, 1988). The number of pairs (minus ties) is less than 35 (N = 5), so the number of fewer signs (x) is the relevant statistic (Siegel & Castellan, 1988). The one-tailed x value for 0 when N = 5 is .031 (Siegel & Castellan, 1988: 324). This critical value is lower than the rejection region $\alpha = .05$. The statistical power of this test is between 50% and 60% (Cohen, 1988: 167) and is lower than the conventionally accepted value of 80% necessary for correctly rejecting the null hypothesis. Therefore, the null hypothesis was not tested formally.

Table D73 *SPSS output for Sign Test for Explanation and interpretation of SPSS output for temporally-disaggregated subsample E3 (spring) at Level 2*

Frequencies

		N
Posttest pair difference - Pretest pair difference	Negative Differences[a]	4
	Positive Differences[b]	1
	Ties[c]	1
	Total	6

a. Posttest pair difference < Pretest pair difference

b. Posttest pair difference > Pretest pair difference

c. Posttest pair difference = Pretest pair difference

Explanation and interpretation of SPSS output for temporally-disaggregated subsample E3 (spring) at Level 2

Effect size, calculated from the binomial distribution $p = q = ½$ (P = .50) is 4:1 = 0.80:0.20 = 0.20-0.50 = -0.30 (Cohen, 1988: 147). Therefore, the treatment effect size is -0.30 and is defined operationally as a large negative effect size (Cohen, 1988). Given this negative effect, no further analysis was warranted..

Table D74 *SPSS output for Sign Test for Control and Experimental subsamples' matched pairs at Level 3*

Frequencies

		N
Posttest pair difference - Pretest pair difference	Negative Differences[a]	4
	Positive Differences[b]	11
	Ties[c]	6
	Total	21

a. Posttest pair difference < Pretest pair difference

b. Posttest pair difference > Pretest pair difference

c. Posttest pair difference = Pretest pair difference

Explanation and interpretation of SPSS output for Control and Experimental subsamples' matched pairs at Level 3

Effect size, calculated from the binomial distribution $p = q = ½$ (P = .50) is 4:11 = 0.27:0.73 = 0.73-0.50 = 0.23 (Cohen, 1988: 147). Therefore, the treatment effect size is 0.23 and is defined operationally as a medium positive effect size (Cohen, 1988). The number of pairs (minus ties) is less than 35 (N = 15), so the number of fewer signs (x) is the relevant statistic (Siegel & Castellan, 1988). The one-tailed x value for 4 when N = 15 is .059 (Siegel & Castellan, 1988: 324). This critical value is greater than the rejection region α = .05 and therefore the null hypothesis was not tested formally.

Table D75 *SPSS output for Sign Test for female matched pairs at Level 3*

Frequencies

		N
Posttest pair difference - Pretest pair difference	Negative Differences[a]	0
	Positive Differences[b]	9
	Ties[c]	3
	Total	12

a. Posttest pair difference < Pretest pair difference

b. Posttest pair difference > Pretest pair difference

c. Posttest pair difference = Pretest pair difference

Explanation and interpretation of SPSS output for female matched pairs at Level 3

Effect size, calculated from the binomial distribution $p = q = ½$ (P = .50) is 0:9 = 0.00:1.00 = 1.00-0.50 = .50 (Cohen, 1988: 147). Therefore, the treatment effect size is .50 and is defined operationally as a large positive effect size (Cohen, 1988). The number of pairs (minus ties) is less than 35 (N = 9), so the number of fewer signs (x) is the relevant statistic (Siegel & Castellan, 1988). The one-tailed x value for 0 when

N = 9 is .002 (Siegel & Castellan, 1988: 324). The statistical power of this test is between 80% and 85% (Cohen, 1988: 167) and conforms to the conventionally accepted value of 80% for correctly rejecting the null hypothesis. Formal testing of the null hypothesis is presented in Table D76 (Siegel & Castellan, 1988).

Table D76 *Sign Test for female matched pairs at Level 3*

Null hypothesis. H_o: There is no posttest difference of signs between pairs of Control Female and Experimental Female subjects in relation to their improved motivation for school learning at Level 3 of the Affective Domain Taxonomy.

Statistical test. The Sign Test for matched pairs is selected because the data are continuously distributed and each Female Experimental subject is paired with a Female Control subject.

Significance level. Let $\alpha = .05$ and N is the number of paired subjects minus ties.

Sampling distribution. Where N ≤ 35 the associated probability of occurrence of values as large as x is given by the binomial distribution for $p = q = ½$.

Rejection region. Since the direction of difference is predicted the test is one-tailed. The region of rejection consists of all values of x (where x is the number of pluses), for which the probability of their occurrence under H_o is less than or equal to $\alpha = .05$.

The Sign Test for matched pairs was performed with the computer program Statistical Package for the Social Sciences (SPSS). SPSS output presented in Table D75 shows that the one-tailed p value is .00, within the rejection region of $\alpha = .05$, and the statistical power value is between 80% and 85%. Therefore, the null hypothesis is rejected and the alternative hypothesis, H_1, is accepted:

> After participating in school-sponsored workplace learning, socio-economically disadvantaged female high school students will report improved motivation for school learning at Level 3 of the Affective Domain Taxonomy.

Table D77 *SPSS output for Sign Test for male matched pairs at Level 3*

Frequencies

		N
Posttest pair difference - Pretest pair difference	Negative Differences[a]	0
	Positive Differences[b]	4
	Ties[c]	1
	Total	5

a. Posttest pair difference < Pretest pair difference

b. Posttest pair difference > Pretest pair difference

c. Posttest pair difference = Pretest pair difference

Explanation and interpretation of SPSS output for male matched pairs at Level 3

Effect size, calculated from the binomial distribution $p = q = ½$ (P = .50) is 0:4 = 0.00:1.00 = 1.00-0.50 = 0.50 (Cohen, 1988: 147). Therefore, the treatment effect size is 0.50 and is defined operationally as a large positive effect size (Cohen, 1988). The number of pairs (minus ties) is less than 35 (N = 4), so the number of fewer signs (x) is the relevant statistic (Siegel & Castellan, 1988). The one-tailed x value for 0 when N = 4 is .062 (Siegel & Castellan, 1988: 324). This critical value is greater than the rejection region $\alpha = .05$.

Table D78 *SPSS output for Sign Test for temporally-disaggregated subsample E1 (autumn) at Level 3*

Frequencies

		N
Posttest pair difference - Pretest pair difference	Negative Differences[a]	3
	Positive Differences[b]	3
	Ties[c]	3
	Total	9

a. Posttest pair difference < Pretest pair difference

b. Posttest pair difference > Pretest pair difference

c. Posttest pair difference = Pretest pair difference

Explanation and interpretation of SPSS output for temporally-disaggregated subsample E1 (autumn) at Level 3

Effect size, calculated from the binomial distribution $p = q = ½$ (P = .50) is 3:3 = 0.50:0.50 = 0.50-0.50 = 0.00 (Cohen, 1988: 147). Therefore, the treatment effect size is 0.00 and is defined operationally as a neutral effect (Cohen, 1988). Given this neutral effect no further analysis was warranted.

Table D79 *SPSS output for Sign Test for temporally-disaggregated subsample E2 (winter) at Level 3*

Frequencies

		N
Posttest pair difference - Pretest pair difference	Negative Differences[a]	0
	Positive Differences[b]	6
	Ties[c]	1
	Total	7

a. Posttest pair difference < Pretest pair difference

b. Posttest pair difference > Pretest pair difference

c. Posttest pair difference = Pretest pair difference

Explanation and interpretation of SPSS output for temporally-disaggregated subsample E2 (winter) at Level 3

Effect size, calculated from the binomial distribution $p = q = ½$ (P = .50) is 0:6 = 0.00:1.00 = 1.00-0.50 = 0.50 (Cohen, 1988: 147). Therefore, the treatment effect size is 0.50 and is defined operationally as a large positive effect size (Cohen, 1988). The number of pairs (minus ties) is less than 35 (N = 6), so the number of fewer signs (x) is the relevant statistic (Siegel & Castellan, 1988). The one-tailed x value for 0 when N = 6 is .016 (Siegel & Castellan, 1988: 324). This critical value is greater than the rejection region $\alpha = .05$. The statistical power of this test is between 50% and 60% (Cohen, 1988: 167) and is lower than the conventionally accepted value of 80% necessary for correctly rejecting the null hypothesis. Therefore, the null hypothesis was not tested formally.

Table D80 *SPSS output for Sign Test for Explanation and interpretation of SPSS output for temporally-disaggregated subsample E3 (spring) at Level 3*

Frequencies

		N
Posttest pair difference - Pretest pair difference	Negative Differences[a]	3
	Positive Differences[b]	1
	Ties[c]	2
	Total	6

a. Posttest pair difference < Pretest pair difference

b. Posttest pair difference > Pretest pair difference

c. Posttest pair difference = Pretest pair difference

Explanation and interpretation of SPSS output for temporally-disaggregated subsample E3 (spring) at Level 3

Effect size, calculated from the binomial distribution $p = q = ½$ (P = .50) is 3:1 = 0.75:0.25 = 0.25-0.50 = -0.25 (Cohen, 1988: 147). Therefore, the treatment effect size is -0.25 and is defined operationally as a large negative effect size (Cohen, 1988). Given this negative treatment effect, no further analysis was warranted.

APPENDIX E

OUTPUT FROM KRUSKAL WALLIS TESTS FOR DATA ERROR VARIANCE REPORTED IN CHAPTER 5

As indicated in Chapter 5, survey questionnaire data collected in respect of workplace context layers (O'Connor, 1994b) was tested for error variance by way of the Kruskal Wallis test for ordinal data to determine the homogeneity or otherwise of data collected in a number of different work sites. In common with action taken elsewhere in this study, statistical inference '...as the standard of proof that the phenomenon exists...' (Cohen, 1988: 2) was accepted without proceeding to formal testing of the null hypothesis. This level of statistical proof was applied to all tests for error variance. An alpha level of .05 was used for all statistical tests.

Table E1 *SPSS output for error variance between four host workplace learning sites at the individual workers workplace context layer*

Ranks

	Work site	N	Mean Rank
Q3	1	5	15.20
	2	9	19.11
	3	5	12.00
	4	13	16.92
	Total	32	
Q7	1	5	12.40
	2	9	18.22
	3	4	15.00
	4	13	16.15
	Total	31	
Q9	1	5	12.50
	2	9	16.83
	3	5	17.90
	4	13	17.27
	Total	32	

Table E1 (continued)

Test Statistics[a,b]

	Q3	Q7	Q9
Chi-Square	3.246	2.899	1.798
df	3	3	3
Asymp. Sig.	.355	.407	.615

a. Kruskal Wallis Test

b. Grouping Variable: Work site

Explanation and interpretation of SPSS output for data error variance test at the individual workers' workplace context layer

One subject from Work Site 3 failed to respond to questionnaire item 7. This omission led to his/her exclusion and is indicated where four subjects from Work Site 3 are included in the count for item 7 (Q7). The mean ranks of all three component survey items (Q3, Q7, and Q9) showed a general uniformity of response across the range 12.00 to 19.11, indicating that the variation is probably due to chance as confirmed by the test statistics (Peers, 1996).

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Table E2 *SPSS output for error variance between four host workplace learning sites at the work teams' or groups' context layer*

Ranks

	Work site	N	Mean Rank
Q1	1	5	15.10
	2	9	15.44
	3	5	16.00
	4	13	17.96
	Total	32	
Q4	1	5	18.80
	2	9	16.39
	3	5	7.80
	4	13	19.04
	Total	32	
Q5	1	5	14.80
	2	9	19.11
	3	5	13.60
	4	13	16.46
	Total	32	

Test Statistics[a,b]

	Q1	Q4	Q5
Chi-Square	.807	7.188	1.773
df	3	3	3
Asymp. Sig.	.848	.066	.621

a. Kruskal Wallis Test

b. Grouping Variable: Work site

Explanation and interpretation of SPSS output for data error variance at the work teams' or groups' context layer

All subjects' responses were included in this analysis. Mean ranks ranged from 7.80 to 19.11. The lower mean rank of 7.80 for Questionnaire item Q4 for Work Site 3 was atypical of the general pattern of mean ranks, being markedly less than its nearest mean rank, 13.60. The remaining mean ranks ranged from 13.60 to 19.11, a similar range to that for the individual workers workplace context layer. Notwithstanding the relatively low value of the lesser mean rank of 7.80, none of the survey items comprising work teams or groups returned a chi-square statistic sufficiently large to reach statistical significance.

Table E3 *SPSS output for error variance between four host workplace learning sites at the work section or department workplace context layer*

Ranks

	Work site	N	Mean Rank
Q2	1	5	18.60
	2	9	19.67
	3	5	9.00
	4	13	16.38
	Total	32	
Q8	1	5	12.70
	2	9	21.44
	3	5	12.40
	4	13	16.12
	Total	32	

Test Statistics[a,b]

	Q2	Q8
Chi-Square	5.983	6.911
df	3	3
Asymp. Sig.	.112	.075

a. Kruskal Wallis Test

b. Grouping Variable: Work site

Explanation and interpretation of SPSS output for data error variance at the work section or department workplace context layer

All subjects' responses were included in this analysis. Mean ranks ranged from 9.00 to 21.44. The mean rank marking the lower boundary of the range was atypical of the general pattern as demonstrated by its distance from nearest greater mean rank of 12.40. The range 12.40 to 21.44 was similar to that reported for the individual workers workplace context layer and indicates that these differences are probably due to chance. Consideration of the chi-square statistic confirms this for the entire range, however, as no value of the chi-square statistic is sufficiently great as to reach statistical significance.

Table E4 *SPSS output for error variance between four host workplace learning sites at the enterprise workplace context layer*

Ranks

	Work site	N	Mean Rank
Q6	1	5	11.40
	2	9	19.22
	3	5	17.80
	4	13	16.08
	Total	32	
Q10	1	5	11.00
	2	9	21.67
	3	5	14.20
	4	13	15.92
	Total	32	

Test Statistics[a,b]

	Q6	Q10
Chi-Square	3.885	7.084
df	3	3
Asymp. Sig.	.274	.069

a. Kruskal Wallis Test

b. Grouping Variable: Work site

Explanation and interpretation of SPSS output for data error variance at the enterprise workplace context layer

All subjects' responses were included in this analysis. The range of mean ranks is from 11.00 to 21.67. Whilst this range is generally uniform it is a broader range than that observed in the individual workers workplace context layer. Nevertheless, consideration of the chi-square statistic reveals that none is sufficiently large so as to reach statistical significance. Therefore, the variation is assumed to be due to chance.

As indicated in Chapter 5, interview respondents' survey questionnaire data collected in respect of gender and workplace context layers (O'Connor, 1994b) was tested for error variance by way of the Kruskal Wallis test for ordinal data to determine the homogeneity or otherwise of data collected for both genders. Results of these tests are summarised in Table 5.7 in Chapter 5. Output from the Computer software Statistical Package for the Social Sciences (SPSS, 1999) is presented in Tables C5 to C8 inclusive, where female gender = 1, and male gender = 2.

Table E5 *SPSS output for data error variance between genders of interview respondents in relation to the individual workers workplace context layer*

Ranks

	Gender	N	Mean Rank
Q3	1	4	4.00
	2	4	5.00
	Total	8	
Q7	1	4	3.50
	2	4	5.50
	Total	8	
Q9	1	4	4.00
	2	4	5.00
	Total	8	

Table E5 (continued)

Test Statistics[a,b]

	Q3	Q7	Q9
Chi-Square	.467	2.333	1.000
df	1	1	1
Asymp. Sig.	.495	.127	.317

a. Kruskal Wallis Test

b. Grouping Variable: Gender

Explanation and interpretation of SPSS output for data error variance between genders of interview respondents in relation to the individual workers workplace context layer

The mean ranks of all three component survey items (Q3, Q7, and Q9) showed a general uniformity of response across the range 3.50 to 5.50, indicating that the variation is probably due to chance (Peers, 1996). This relative homogeneity resulted in none of the survey items returning a chi-square statistic sufficiently large to reach statistical significance.

Table E6 *SPSS output for data error variance between genders of interview respondents in relation to the work teams or groups workplace context layer*

Ranks

	Gender	N	Mean Rank
Q1	1	4	5.13
	2	4	3.88
	Total	8	
Q4	1	4	4.25
	2	4	4.75
	Total	8	
Q5	1	4	4.00
	2	4	5.00
	Total	8	

Table E6 (continued)

Test Statistics[a,b]

	Q1	Q4	Q5
Chi-Square	.625	.100	.467
df	1	1	1
Asymp. Sig.	.429	.752	.495

a. Kruskal Wallis Test

b. Grouping Variable: Gender

Explanation and interpretation of SPSS output for data error variance between genders of interview respondents in relation to the work teams or groups workplace context layer

The mean ranks of all three component survey items (Q1, Q4, and Q5) showed a general uniformity of response across the range 3.88 to 5.13, indicating that the variation is probably due to chance (Peers, 1996). This relative homogeneity resulted in none of the survey items returning a chi-square statistic sufficiently large to reach statistical significance.

Table E7 *SPSS output for data error variance between genders of interview respondents in relation to the work section or department workplace context layer*

Ranks

	Gender	N	Mean Rank
Q2	1	4	4.00
	2	4	5.00
	Total	8	
Q8	1	4	3.25
	2	4	5.75
	Total	8	

Table E7 (continued)

Test Statistics[a,b]

	Q2	Q8
Chi-Square	.467	2.778
df	1	1
Asymp. Sig.	.495	.096

a. Kruskal Wallis Test

b. Grouping Variable: Gender

Explanation and interpretation of SPSS output for data error variance between genders of interview respondents in relation to the work section or department workplace context layer

The mean ranks of all three component survey items (Q2 and Q8) showed a general uniformity of response across the range 3.25 to 5.75, indicating that the variation is probably due to chance (Peers, 1996). This relative homogeneity resulted in none of the survey items returning a chi-square statistic sufficiently large to reach statistical significance.

Table E8 *SPSS output for data error variance between genders of interview respondents in relation to the enterprise workplace context layer*

Ranks

	Gender	N	Mean Rank
Q6	1	4	4.50
	2	4	4.50
	Total	8	
Q10	1	4	4.00
	2	4	5.00
	Total	8	

Table E8 (continued)

Test Statistics[a,b]

	Q6	Q10
Chi-Square	.000	.467
df	1	1
Asymp. Sig.	1.000	.495

a. Kruskal Wallis Test

b. Grouping Variable: Gender

Explanation and interpretation of SPSS output for data error variance between genders of interview respondents in relation to the enterprise workplace context layer

The mean ranks of all three component survey items (Q6 and Q10) showed a general uniformity of response across the range 4.00 to 5.00, indicating that the variation is probably due to chance (Peers, 1996). This relative homogeneity resulted in none of the survey items returning a chi-square statistic sufficiently large to reach statistical significance.