
Richard J. Holigrocki

University of Windsor

Follow this and additional works at: https://scholar.uwindsor.ca/etd

Recommended Citation
https://scholar.uwindsor.ca/etd/2015
NOTICE

The quality of this microform is heavily dependent upon the quality of the original thesis submitted for microfilming. Every effort has been made to ensure the highest quality of reproduction possible.

If pages are missing, contact the university which granted the degree.

Some pages may have indistinct print especially if the original pages were typed with a poor typewriter ribbon or if the university sent us an inferior photocopy.

Reproduction in full or in part of this microform is governed by the Canadian Copyright Act, R.S.C. 1970, c. C-30, and subsequent amendments.

AVIS

La qualité de cette microforme dépend grandement de la qualité de la thèse soumise au microfilmage. Nous avons tout fait pour assurer une qualité supérieure de reproduction.

S'il manque des pages, veuillez communiquer avec l'université qui a conféré le grade.

La qualité d'impression de certaines pages peut laisser à désirer, surtout si les pages originales ont été dactylographiées à l'aide d'un ruban usé ou si l'université nous a fait parvenir une photocopy de qualité inférieure.

La reproduction, même partielle, de cette microforme est soumise à la Loi canadienne sur le droit d'auteur, SRC 1970, c. C-30, et ses amendements subséquents.
EXPERIENTIAL EPISTEMOLOGY:
DESIGN, IMPLEMENTATION, AND EVALUATION OF
A SYSTEMIC-CONSTRUCTIVIST INSTRUCTIONAL METHOD

Richard J. Holigrocki

B.A. (Hons.) York University, Canada, 1988
M.A. University of Windsor, Canada, 1990

A Dissertation
Submitted to the Faculty of Graduate Studies and Research
through the Department of Psychology in
Partial Fulfilment of the Requirements
for the Degree of Doctor of Philosophy
at the University of Windsor
Windsor, Ontario, Canada
1995
The author has granted an irrevocable non-exclusive licence allowing the National Library of Canada to reproduce, loan, distribute or sell copies of his/her thesis by any means and in any form or format, making this thesis available to interested persons.

The author retains ownership of the copyright in his/her thesis. Neither the thesis nor substantial extracts from it may be printed or otherwise reproduced without his/her permission.

L'auteur a accordé une licence irrévocable et non exclusive permettant à la Bibliothèque nationale du Canada de reproduire, prêter, distribuer ou vendre des copies de sa thèse de quelque manière et sous quelque forme que ce soit pour mettre des exemplaires de cette thèse à la disposition des personnes intéressées.

L'auteur conserve la propriété du droit d'auteur qui protège sa thèse. Ni la thèse ni des extraits substantiels de celle-ci ne doivent être imprimés ou autrement reproduits sans son autorisation.

ISBN 0-612-11000-1
**Subject Categories**

**THE HUMANITIES AND SOCIAL SCIENCES**

<table>
<thead>
<tr>
<th>Category</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Architecture</td>
<td>0729</td>
</tr>
<tr>
<td>Art History</td>
<td>0377</td>
</tr>
<tr>
<td>Cinema</td>
<td>0378</td>
</tr>
<tr>
<td>Dance</td>
<td>0378</td>
</tr>
<tr>
<td>Fine Arts</td>
<td>0378</td>
</tr>
<tr>
<td>Information Science</td>
<td>0182</td>
</tr>
<tr>
<td>Journalism</td>
<td>0391</td>
</tr>
<tr>
<td>Library Science</td>
<td>0399</td>
</tr>
<tr>
<td>Mass Communications</td>
<td>0708</td>
</tr>
<tr>
<td>Music</td>
<td>0413</td>
</tr>
<tr>
<td>Speech Communication</td>
<td>0439</td>
</tr>
<tr>
<td>Theater</td>
<td>0469</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Language, Literature and Linguistics</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language</td>
<td>0679</td>
</tr>
<tr>
<td>Applied Linguistics</td>
<td>0689</td>
</tr>
<tr>
<td>Linguistics</td>
<td>0590</td>
</tr>
<tr>
<td>Literature</td>
<td>0601</td>
</tr>
<tr>
<td>Classical</td>
<td>0294</td>
</tr>
<tr>
<td>Comparative</td>
<td>0295</td>
</tr>
<tr>
<td>Medieval</td>
<td>0297</td>
</tr>
<tr>
<td>Modern</td>
<td>0298</td>
</tr>
<tr>
<td>African</td>
<td>0316</td>
</tr>
<tr>
<td>American</td>
<td>0391</td>
</tr>
<tr>
<td>American English</td>
<td>0325</td>
</tr>
<tr>
<td>Canadian (English)</td>
<td>0332</td>
</tr>
<tr>
<td>Canadian (French)</td>
<td>0333</td>
</tr>
<tr>
<td>English</td>
<td>0334</td>
</tr>
<tr>
<td>Germanic</td>
<td>0311</td>
</tr>
<tr>
<td>Latin American</td>
<td>0312</td>
</tr>
<tr>
<td>Mediterranean</td>
<td>0313</td>
</tr>
<tr>
<td>Romance</td>
<td>0314</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Philosophy, Religion and Theology</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Philosophy</td>
<td>0422</td>
</tr>
<tr>
<td>Religion</td>
<td>0423</td>
</tr>
<tr>
<td>General</td>
<td>0318</td>
</tr>
<tr>
<td>Biblical Studies</td>
<td>0321</td>
</tr>
<tr>
<td>Church</td>
<td>0319</td>
</tr>
<tr>
<td>History of Philosophy</td>
<td>0220</td>
</tr>
<tr>
<td>History</td>
<td>0222</td>
</tr>
<tr>
<td>Philosophy</td>
<td>0224</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Social Sciences</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Studies</td>
<td>0233</td>
</tr>
<tr>
<td>Anthropology</td>
<td>0234</td>
</tr>
<tr>
<td>Cultural</td>
<td>0235</td>
</tr>
<tr>
<td>Physical</td>
<td>0236</td>
</tr>
<tr>
<td>Business Administration</td>
<td>0230</td>
</tr>
<tr>
<td>General Accounting</td>
<td>0231</td>
</tr>
<tr>
<td>Banking</td>
<td>0232</td>
</tr>
<tr>
<td>Management</td>
<td>0234</td>
</tr>
<tr>
<td>Marketing</td>
<td>0235</td>
</tr>
<tr>
<td>Canadian Studies</td>
<td>0385</td>
</tr>
<tr>
<td>Economics</td>
<td>0501</td>
</tr>
<tr>
<td>Agricultural</td>
<td>0503</td>
</tr>
<tr>
<td>Business Management</td>
<td>0504</td>
</tr>
<tr>
<td>History of Humanity</td>
<td>0509</td>
</tr>
<tr>
<td>Labor</td>
<td>0510</td>
</tr>
<tr>
<td>Education</td>
<td>0511</td>
</tr>
<tr>
<td>Folklore</td>
<td>0336</td>
</tr>
<tr>
<td>Geography</td>
<td>0314</td>
</tr>
<tr>
<td>History of Eastern Europe</td>
<td>0315</td>
</tr>
<tr>
<td>History of Slavic and East European</td>
<td>0314</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>THE SCIENCES AND ENGINEERING</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geology</td>
<td>0270</td>
</tr>
<tr>
<td>Geology</td>
<td>0271</td>
</tr>
<tr>
<td>Hydrology</td>
<td>0388</td>
</tr>
<tr>
<td>Mineralogy</td>
<td>0411</td>
</tr>
<tr>
<td>Paleobotany</td>
<td>0475</td>
</tr>
<tr>
<td>Paleocology</td>
<td>0475</td>
</tr>
<tr>
<td>Paleontology</td>
<td>0475</td>
</tr>
<tr>
<td>Paleontology</td>
<td>0475</td>
</tr>
<tr>
<td>Paleography</td>
<td>0475</td>
</tr>
<tr>
<td>Physical Oceanography</td>
<td>0324</td>
</tr>
<tr>
<td>Physical Oceanography</td>
<td>0415</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Health and Environmental Sciences</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Sciences</td>
<td>0258</td>
</tr>
<tr>
<td>Health Sciences</td>
<td>0259</td>
</tr>
<tr>
<td>General</td>
<td>0566</td>
</tr>
<tr>
<td>Radiology</td>
<td>0200</td>
</tr>
<tr>
<td>Chemistry</td>
<td>0300</td>
</tr>
<tr>
<td>Dental</td>
<td>0567</td>
</tr>
<tr>
<td>Education</td>
<td>0590</td>
</tr>
<tr>
<td>Hospital Management</td>
<td>0390</td>
</tr>
<tr>
<td>Human Development</td>
<td>0591</td>
</tr>
<tr>
<td>Immunology</td>
<td>0592</td>
</tr>
<tr>
<td>Marine Biology</td>
<td>0593</td>
</tr>
<tr>
<td>Mental Health</td>
<td>0594</td>
</tr>
<tr>
<td>Nursing</td>
<td>0595</td>
</tr>
<tr>
<td>Occupational Health and Safety</td>
<td>0596</td>
</tr>
<tr>
<td>Otolaryngology</td>
<td>0597</td>
</tr>
<tr>
<td>Biochemistry</td>
<td>0598</td>
</tr>
<tr>
<td>Biotechnology</td>
<td>0622</td>
</tr>
<tr>
<td>Biomedical Research</td>
<td>0772</td>
</tr>
<tr>
<td>Veterinary Science</td>
<td>0776</td>
</tr>
<tr>
<td>Zoology</td>
<td>0781</td>
</tr>
<tr>
<td>Behavioral Sciences</td>
<td>0784</td>
</tr>
<tr>
<td>Medical</td>
<td>0788</td>
</tr>
<tr>
<td>EARTH SCIENCES</td>
<td>Code</td>
</tr>
<tr>
<td>Biochemistry</td>
<td>0425</td>
</tr>
<tr>
<td>Geochemistry</td>
<td>0996</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SPEECH PATHOLOGY</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speech Pathology</td>
<td>0360</td>
</tr>
<tr>
<td>Textualism</td>
<td>0361</td>
</tr>
</tbody>
</table>

**PHYSICAL SCIENCES**

<table>
<thead>
<tr>
<th>PURE SCIENCES</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>General</td>
<td>0585</td>
</tr>
<tr>
<td>Agricultural</td>
<td>0585</td>
</tr>
<tr>
<td>Automotive</td>
<td>0586</td>
</tr>
<tr>
<td>Biomedical Research</td>
<td>0587</td>
</tr>
<tr>
<td>Chemical</td>
<td>0588</td>
</tr>
<tr>
<td>Civil</td>
<td>0589</td>
</tr>
<tr>
<td>Electrical and Electronic</td>
<td>0590</td>
</tr>
<tr>
<td>Heat and Thermodynamics</td>
<td>0591</td>
</tr>
<tr>
<td>Mechanical</td>
<td>0592</td>
</tr>
<tr>
<td>Industrial Engineering</td>
<td>0593</td>
</tr>
<tr>
<td>Marine</td>
<td>0594</td>
</tr>
<tr>
<td>Materials Science</td>
<td>0595</td>
</tr>
<tr>
<td>Mechanical</td>
<td>0596</td>
</tr>
<tr>
<td>Metallurgy</td>
<td>0597</td>
</tr>
<tr>
<td>Mining</td>
<td>0598</td>
</tr>
<tr>
<td>Nuclear</td>
<td>0599</td>
</tr>
<tr>
<td>Packaging</td>
<td>0600</td>
</tr>
<tr>
<td>Petroleum</td>
<td>0601</td>
</tr>
<tr>
<td>Sanitary and Municipal</td>
<td>0602</td>
</tr>
<tr>
<td>System Science</td>
<td>0603</td>
</tr>
<tr>
<td>Geotechnology</td>
<td>0621</td>
</tr>
<tr>
<td>Operations Research</td>
<td>0786</td>
</tr>
<tr>
<td>Plastics Technology</td>
<td>0787</td>
</tr>
<tr>
<td>Textile Technology</td>
<td>0788</td>
</tr>
</tbody>
</table>

**PSYCHOLOGY**

| General                               | 0211 |
| Behavior                              | 0384 |
| Development                           | 0623 |
| Developmental                         | 0624 |
| Experimental                          | 0625 |
| Experimental                          | 0626 |
| Personality                            | 0627 |
| Psychological                          | 0628 |
| Psychology                             | 0385 |
| Psychodynamics                         | 0386 |
| Psychometrics                          | 0387 |
| Social                                 | 0631 |
| Social                                 | 0451 |
ABSTRACT

A systemic-constructivist theory is developed and an experiential instructional method that is coherent with the theory is designed, implemented, and evaluated. Systemic-constructivist theory is based upon general systems theory and constructivist theory. Individuals are viewed as actively involved in understanding their world through psychological structures that are continually being revised in the context of experience. From this perspective, experiential transactions with the world are viewed as the core referents of both language and conceptual abstractive processes. The systemic-constructivist theory provides the structure from which experiential instructional method is derived.

A pilot study and two experiments were carried out to evaluate the systemic-constructivist instructional method. In the pilot study, data were obtained for the purpose of refining the instructional method and developing scoring criteria for the two experiments.

In Experiment 1, experiential exercises were utilised to teach the systemic-constructivist constructs to professionals and graduate students. In a pretest, posttest, and follow-up test, participants were asked to define the systemic-constructivist constructs and apply the systemic-constructivist constructs to four written interpersonal scenarios. Two scenarios were presented at pretest; two scenarios were presented at posttest; and one of the pretest scenarios was utilised again at follow-up. The
interpersonal scenarios were presented in reversed order for half the participants to
insure against the possibility that one set of scenarios was more difficult than the other
set of scenarios. Kappa and intraclass coefficients provided interjudge reliabilities for
the ratings of two judges. Judges were blind to whether they were rating pretest or
posttest data. Paired t-tests were used to evaluate learning.

In Experiment 2, a sample of undergraduate students was randomly assigned to
four instructional conditions — an experiential condition, lecture condition, reading
condition, and a no-instruction control condition. The instructional conditions were
matched for curriculum content, duration, time of day, and practice exercises. The
same questionnaires, scenarios, and procedures that were used in Experiment 1 were
used in the instructional conditions of Experiment 2. The experiential instruction
condition of Experiment 2 matched the experiential instructional method used in
Experiment 1. Two judges blind to whether they were rating pretests or posttests, and
also blind to instructional condition, rated the test data. Pretest, posttest, and follow-up
test data were analysed using repeated measures ANOVAs, one-way ANOVAs,
planned comparison tests, and Scheffe post hoc comparison tests.

Systemic-constructivist constructs were learned by participants instructed by the
experiential instructional method. However, in a between-condition comparison of
pretest to posttest improvement, the reading condition demonstrated greater
improvement than either the experiential condition or the lecture condition. It is
proposed that the superiority of the reading condition was due to the experiential
congruence between the instructional method (reading) and the dependent measure (written test). "Experiential congruence" is a term that is proposed to refer to the degree of experiential similarity between the method of teaching a skill and the measure for assessing whether the skill has been learned.

The findings of Experiment 1 and Experiment 2 were compared with the findings from previous experiential instruction studies. In a review of previous studies that compared the efficacy of experiential instruction versus traditional instruction, neither method of instruction was shown to be clearly superior. The concept of experiential congruence helps to explain some of the divergent findings in the experiential instruction literature. Previous studies varied in the experiential congruence between their instructional methods and dependent measures. In general, studies that used written dependent measures found no difference between experiential and traditional instruction. Studies that used experiential dependent measures, however, found experiential instruction to be more effective than traditional instruction. The efficacy of an experiential instructional method over traditional instructional methods may be best illustrated in experiential studies that use experientially congruent dependent measures. It is recommended that future experiential instructional studies take into account the degree of experiential congruence between instructional method and dependent measure.
ACKNOWLEDGEMENTS

I would like to thank Dr. Raymond M. Daly and Dr. Michael J. Kral for their mentoring and friendship throughout my graduate program at the University of Windsor. I would also like to thank my committee members, Dr. Vito Signorile, Dr. John J. Berek, and Dr. David L. Rennie—their enthusiasm and support of this project have helped me to develop this dissertation into what it is today.

Lori Yersh, McGill University, and Dr. Todd Jackson, University of Windsor, have both contributed much time and energy to this work. Dr. Jo Wood, Carleton University; Robyn Nease, University of Windsor; and Dr. David Nichols, SPSS; all provided statistical consultation. Vivian Lewin provided editorial assistance.

I would also like to acknowledge the help of the many participants who came to the experiential laboratories to learn about epistemology. They have taught me much about being a teacher.
# TABLE OF CONTENTS

- **ABSTRACT** ........................................................................................................ iv
- **ACKNOWLEDGEMENTS** ..................................................................................... vii
- **LIST OF TABLES** .............................................................................................. x
- **LIST OF FIGURES** ........................................................................................... xi
- **INTRODUCTION** ............................................................................................... 1
  - **PHILOSOPHICAL ORIGIN OF CONSTRUCTIVIST PSYCHOLOGY** ..................... 3
  - **CONCEPTUAL CORE OF THE CONSTRUCTIVIST DISCOURSE** ..................... 11
    - Creating Meaning ......................................................................................... 11
    - Hierarchical Structures ............................................................................... 13
    - Self-Organising Development ..................................................................... 14
    - Constructing Reality ............................................................................... 15
  - **SYSTEMIC-CONSTRUCTIVIST THEORY** ....................................................... 18
    - System and Environment ........................................................................... 19
    - Experience ............................................................................................... 20
    - Structuring ............................................................................................... 21
    - Structured Activity .................................................................................... 23
    - Context, Pattern, and Meaning .................................................................. 24
    - Dialectical Process ..................................................................................... 26
    - Communication .......................................................................................... 28
    - Language ................................................................................................... 29
  - **INSTRUCTIONAL IMPLICATIONS** ................................................................. 32
    - Traditional Instruction .............................................................................. 32
    - Non-Traditional Instruction ....................................................................... 35
    - Experiential Instruction: Theory ............................................................... 36
LIST OF TABLES

1. Demographic Characteristics of Pilot and Experiment 1 ........................................ 54
2. Counterbalancing of Scenarios and Questionnaires.................................................. 57
3. Matched Spill and Mats Scenarios and Apply-1 Questions ..................................... 58
4. Matched Book and Game Scenarios and Apply-2 Questions .................................... 59
5. Demographic Characteristics of Experiential, Reading, Lecture, and Control Conditions .................................................. 69
6. Interrater Reliability Coefficients for Pretest, Posttest, and Follow-Up Test Variables .................................................. 76
7. Descriptive Statistics for Experiment 1 Pretest and Posttest Variables ..................... 81
8. Descriptive Statistics for Experiment 2 Pretest, Posttest, and Follow-Up Variables .................. 83
9. Descriptive Statistics for Experiment 2 Gain score Variables .................................. 84
10. Mean Levels of Apply and Define Pretest Scores by Instructional Condition ............ 86
11. Paired t-test Comparisons of Experiment 1 Pretest and Posttest Means ................. 89
12. Pretest and Posttest Mean Comparisons Across All Instructional Conditions (Hypothesis 1 and 2) .................................................. 90
13. Pretest and Posttest Mean Comparisons by Each Instructional Condition ................ 91
14. Pretest and Posttest Means for Each Instructional Condition ................................. 92
15. Mean Levels of Apply Pretest to Posttest Gain scores by Instructional Condition (Hypothesis 3) .................................................. 95
16. Mean Levels of Apply Posttest to Follow-Up Gain scores by Instructional Condition (Hypothesis 4) .................................................. 95
17. Mean Levels of Define Pretest to Posttest Gain scores by Instructional Condition (Hypothesis 5) .................................................. 98
18. Mean Levels of Define Posttest to Follow-Up Gain scores by Instructional Condition (Hypothesis 6) .................................................. 98
LIST OF FIGURES

1. Pretest Mean Comparisons by Instructional Conditions for the Define Variable ........................................ 87
2. Pretest Mean Comparisons by Instructional Conditions for the Apply Variable ........................................ 87
3. Experiment 1 Pretest and Posttest Scores for Define and Apply Variables ................................................. 89
4. Pretest and Posttest Mean Comparisons by Instructional Condition for the Define Variable ......................... 95
5. Pretest and Posttest Mean Comparisons by Instructional Condition for the Apply Variable .......................... 95
6. Gain in Apply Scores Between Pretest, Posttest, and Follow-Up Tests for Instructional Conditions ........... 96
7. Gain in Define Scores Between Pretest, Posttest, and Follow-Up Tests for Instructional Conditions ........... 99

xi
INTRODUCTION

The purpose of the dissertation is to describe a systemic-constructivist theory and design, implement, and evaluate a systemic-constructivist instructional method for teaching the theory. The systemic-constructivist theory examines the process of acquiring preconceptual knowledge about the world. Preconceptual knowledge is the knowledge of direct experience that is produced from the continuous bodily interaction with the physical, biological, and social environment. Conceptual knowledge is founded upon the preconceptual experiences that are the fundamental ways of organising the world (Bateson, 1972; Bruner, 1973; Dewey, 1938/1963; Lakoff, 1987; Lewin, 1951; Piaget, 1970).

The challenge of learning to swim provides a useful metaphor for learning the systemic-constructivist theory. A person cannot learn how to swim by reading a book about swimming. People who know how to swim have a preconceptual knowledge of the activity of swimming, that is, a knowledge of bodily action and configuration that is experienced. To teach someone to swim, the teacher knows that the learner must practice moving in the water in the ways that swimmers move in the water. Similarly, to teach a discourse about preconceptual knowledge, one requires a method for teaching that emphasises the preconceptual or experiential aspects of what is being taught. An experiential instructional method should impart knowledge about preconceptual knowing better than traditional methods of instruction such as reading and lecture.
If the experiential instructional method is more efficacious in teaching systemic-constructivist theory to participants than the traditional methods, one would predict that the experiential participants would learn the systemic-constructivist constructs at least as well as people who are taught the constructs by traditional methods of instruction. More specifically, experiential instruction in a comparison with traditional instruction should have the upper-hand when it comes to teaching participants to apply the constructs. There should be no difference, however, between the groups in their ability to define the constructs, and if there were a difference, it would be expected that the reading and lecture groups would be superior to the experiential group in defining the constructs.

A pilot study and two experiments were conducted to aid in the design and evaluation of the experiential method. In the pilot study, a two-day experiment was conducted in which participants were taught the systemic-constructivist approach by way of a series of experiential exercises. Within the experiment, experiential exercises provided each participant with experiences that were discussed in terms of the systemic-constructivist discourse. The purpose was to provide the participants with experiential referents for the core systemic-constructivist constructs and have the participants learn to apply the constructs to a number of scenarios taken from every-day life. Pretest, posttest, and participant feedback data were collected. The tests asked the participants to define the systemic-constructivist constructs and apply the constructs to a pair of
written scenarios. The data were used to refine the experiential instructional method and to develop scoring criteria for the judges who would be rating the responses of participants in Experiment 1 and Experiment 2.

In Experiment 1, data were obtained from pretest, posttest, and follow-up tests that were administered to the participants during the first day of the two-day experiment. Two judges, working independently and blind to whether they were rating the pretest or posttest data, scored the questionnaires. The scoring criteria paralleled the instructional criteria that was designed a priori.

In Experiment 2, the experiential instructional method was compared with a reading instruction condition, a lecture instruction condition, and a no-instruction control condition. Undergraduate students were randomly assigned to one of the four instructional conditions. Data were obtained from the participants' responses to "define" and "apply" questions on a pretest, a posttest, and a follow-up test. Two judges blind to whether they were rating pretests or posttests, and also blind to instructional condition, scored the tests. Instructional conditions were matched for curriculum content, duration, time of day, and practice exercises.

Philosophical Origin of Constructivist Psychology

During the last ten years, psychologists in North America have been paying increasing attention to the constructivist perspective. Constructivism is a model for understanding phenomena that provides an alternative perspective to the objectivist
model. In this section, the objectivist model and constructivist model will be described with focus on the historical roots and current applications of the constructivist model.

Objectivist and systemic-constructivist models are, often tacit, clusters of assumptions and principles that organise the thinking of scientists. Scientific models determine what is scientifically knowable and how phenomena can be known, because the questions any scientist asks, the methods he or she selects to answer those questions, and how results are interpreted, are all organised by the model. Rychlak (1994) defines a model as "a distinctive conceptual pattern. used in the study of some topic as a standard to generate, organise, and communicate knowledge." (p. 3)

The objectivist model in psychology is a development of a cluster of philosophical ideas. Together, the ideas of mechanism, empiricism, logical positivism, and so forth, form the underlying structure of what psychology is for many current researchers and clinicians. At the core of objectivist psychology is the belief that there exists a world of objects or things that are external to the beliefs of the person knowing them (Lakoff, 1987). From this objectivist core emerges a theoretical system that is implicitly held by many psychologists today.

Instead of an external world that enters into an observer’s mind through the senses, constructivist scientists (Bateson, 1980; Efran, M. D. Lukens & R. J. Lukens, 1990; Guidano, 1995; Kelly, 1955; Mahoney, 1991; Maturana, 1980; Neimeyer, 1995; Rychlak, 1994; Varela, 1984; Watzlawick, Beavin, & Jackson, 1967; Wilden; 1972)
have emphasised the self-organising and proactive role that a person takes in constructing the world to which they relate. Constructivism can be traced back to Giambattista Vico and Immanuel Kant and was extended in the 19th and 20th centuries by Hans Vaihinger, Wilhelm Wundt’s volkerpsychologie, Jean Piaget’s genetic epistemology, George Kelly’s personal construct theory, Michael Mahoney’s structural-developmental theory, Joseph Rychlak’s logical learning theory, narrative theory, and constructive family therapies. This group of people and theories is a sample of the major forces that have contributed to the development of constructivist theory and application.

Giambattista Vico (1668-1744) has been credited as the founder of constructivism (Mahoney, 1991). His philosophy is regarded as the first organised presentation on the study of perception, imagination, and knowing as constructive processes (von Glaserfeld, 1979). In his book Scienza Nuova, published in 1725, Vico emphasised how humans project familiar categories onto unfamiliar particulars. Vico claimed that “to know” is “to make.” (Mahoney, 1991).

Immanuel Kant (1724-1804) provided the next major organised presentation of constructivist ideas. His work, Critique of Pure Reason, published in 1781, was the result of years of contemplation about the problem of how we know what we know. From Kant’s perspective, the human mind imposed its own inherent structure on the particulars of perception and conception. Kant questioned the presupposition that
knowledge of facts can be directly acquired only through sense-perception. For Kant, sensation preceded the operations of thought, however, sensation was immediately moulded by the cognitive categories that constrained knowing. "Categories" were inherent mental forms or principles of organisation through which one experienced the world. The thing-in-itself (ding-an-sich) or "noumena" could never be experienced (Harris, 1987; Mahoney, 1988).

Another important constructivist was Hans Vaihinger (1852-1933). He was a Kantian scholar whose writings influenced the theories and therapies of Alfred Adler and George Kelly. According to Vaihinger, human mentation served a purposive, organic function, and consciousness was not passive. Vaihinger viewed consciousness as actively moulding external stimuli according to its nature. The mind was thought to be an "organic formative force" that changes what has been appropriated and adapts foreign elements to itself. Furthermore, Vaihinger emphasised the instrumental and functional importance of cognitive processes for the biological activity and survival of the individual. Vaihinger maintained that a person's constructions of the world may not portray reality, however, the constructions assist a person with finding his or her way in the world (Mahoney, 1988, 1991).

Wilhelm Wundt (1832-1920) is best known for his experimental physiological psychology. Wundt, however, also developed a cultural/constructivist psychology that he published in Völkerpsychologie. In this set of books, Wundt documents his study of
human myth, custom, and languages, all of which were influenced by the active process of "apperception." Apperception refers to the active volitional ordering function of the mind.

Wundt viewed an individual's personality and actions as being largely determined by the self. To him, the self was both self-determining and developed from the influence of external socialising factors (e.g., culture, language). Social and cultural influences provide the individual with habits, inclinations, and modes of perception and cognition. These cultural influences are mediated by internal principles and laws of thought. Thus, mind is active and directed by will, with each of its activities influenced by its entire history (Robinson, 1982)

Jean Piaget (1896-1980) was averse to pure empiricism and the sensory origin of knowledge. In The Construction of Reality in the Child (1954) Piaget set out to understand how the child constructs the external world. Knowledge was viewed by Piaget as deriving from an active constructive process.

Piaget's developmental model, as presented in The Equilibrium of Cognitive Structures (1975/1985), is similar to Prigogine's model of dissipative structures (Prigogine & Stengers, 1984). From Piaget's perspective, the person's world is organised in terms of the active process of knowing through dynamic structures. These dynamic structures are formed from the person's ongoing exchanges with the environment. Structures function in a similar manner to the functioning of an organism
— both involve closed cycles of activity that are open to informational exchanges with the environment. The openness to the environment is maintained through the processes of assimilation and accommodation. Assimilation refers to the cognitive system’s incorporation of external elements that are compatible with it and the simultaneous accommodation to the elements it assimilates (Chapman, 1988).

George Kelly (1955, 1969) is known for his constructivist theory of clinical practice. The core of Kelly’s approach is expressed in his statement “Man looks at his world through transparent patterns or templates which he creates and then attempts to fit over the realities of which the world is composed...Let us give the name constructs to these patterns that are tentatively tried on for size. They are ways of construing the world.” (1955, pp. 8-9)

In 1955, Kelly wrote the *Psychology of Personal Constructs*, a comprehensive theory of personality and clinical practice. Kelly focused primarily on methods for conceptualising, eliciting, and modifying the content and structure of clients’ ideographic construct systems. Kelly’s method integrated features of Alfred Korzybski’s (1933) general semantics which emphasised the reality-defining role of language, Jacob Moreno’s (1937) psychodrama, and John Dewey’s (1938/1963) interest in active perceptual processes. Kelly’s therapeutic approach involved attempting to change how clients used their constructs to conceptualise problems. To do so, Kelly helped clients develop plausible alternative identities. Clients would enact
the roles so as to change how they constructed their experiences. Later, clients would discuss with their therapist what they learned from this immersion in a hypothetical world. The role-play activities were intended to make clients more aware of how they construct, and how they can reconstruct, their experiences (Stewart & Barry, 1991).

Michael Mahoney's constructivist work has been described as a structural-developmental cognitive theory (Neimeyer, 1995). Structural-developmental theory places emphasis on the unique development that shapes each person's knowledge of self and world. As a result of childhood experiences, a person develops assumptions about his or her self that are continually elaborated upon. These tacit assumptions influence the person's entire knowledge organisation. The rules that govern the assimilation of experience and the procedures by which a person attempts to solve problems are all generated by these assumptions. Core ordering processes provide a person with a stable psychological reality, govern the sense of self-identity, define the emotional valence of events, and influence how the person directs his or her life (Mahoney, 1991; Mahoney, Miller, & Arciero, 1995). Core ordering processes have been referred to by several names, such as frames (Goffman, 1974; Minsky, 1975, 1985), scripts (Abelson, 1976, 1981; Schank & Abelson, 1977), and schemas (Bobrow & Norman, 1975; Rumelhart, 1975; Rumelhart & Ortony, 1977; Turk & Speers, 1983; McClelland & Rumelhart, 1986; Markus, 1977).

Joseph Rychlak's (1988, 1994) logical learning theory is an introspective
account of behaviour that is founded upon past work by Kant and Kelly. The theory explains the processes by which individuals extend their personal meanings to the world. Rychlak emphasises the dialectical nature of reasoning whereby people reason bipolarly, contradictorily, and negatively. People are viewed as always affirming one of two contrary possibilities, then directing their meaning and action toward one end. For example, affirming "That person can be trusted." will have implications regarding how one acts towards the person. Affirming "That person cannot be trusted," however, will lead to quite a different way of relating with the person. Rychlak also views people as having an innate capacity to evaluate their experiences in terms of likes and dislikes. Evaluations of experience are referred to as affective assessments. Once an affective assessment has been made, the person will act toward the world as framed by that assessment.

Narrative reconstruction assumes that the structure of human lives is narrative in form. People constitute, and are also constituted by, the stories that they live and tell. People are viewed as seeking therapy at points when their stories become ineffective, in need of editing, elaboration, or major "rebiographing" (Howard, 1990). Constructivist therapists working within this tradition self-reflexively apply their theories. They view their own understandings of their clients as narratives needing ongoing revision and reconstruction (Viney, 1990).

Constructivist family therapies share a particular concern with how families
negotiate a common reality. Family systems are often viewed as being closed to direct intervention by the therapist. The family, as an organised system, interprets the therapist's words in terms of its usual way of constructing experience. The therapist's role becomes one of changing the organisation to enable the family to understand itself and others using different assumptions and to act accordingly with new ways of understanding (Efran, et al., 1990).

Conceptual Core of the Constructivist Discourse

The constructivist approach posits that people (a) are involved in the creation of meaning in their world, (b) are organised in terms of a hierarchical structure, (c) are continually involved in self-organisational processes, and (d) only have access to a constructed reality.

Creating Meaning

Constructivism is based upon the premise that meaning is created by the individual in interaction with the world. People actively interpret experience, seek purpose, and seek significance in the events that surround them. As Bruner (1990, p. 345) states, "The major activity of all human beings everywhere is to extract meaning from their encounters with the world. What is crucial about this process of creating meanings is that it affects what we do, what we believe, even how we feel." The process of continually creating significance and purpose from elements of experience is
the cornerstone of constructivist thinking (Neimeyer & Neimeyer, 1993).

Kelly (1955) gave the name “personal constructs” to the meaningful categories and distinctions that people create. Personal constructs are oppositional distinctions (high-low, top-bottom, good-bad) that serve to organise anticipations, perceptions, and actions. Bateson (1972) viewed the act of creating distinctions as identical with bringing events into existence for the person. As stated by Efran et al. (1990, p. 36), “To say something exists simply means that it has been discriminated from a background.”

Central to constructivist inquiry is the question, “How do humans introduce structure and organisation into the flow of experience?” (Neimeyer & Neimeyer, 1993). Some researchers (Lakoff, 1987; Lakoff & Johnson, 1980) have focused on the process of metaphorical representation as one such way of bringing order to experience.

Metaphorical knowing is the basis of “cognitive linguistics,” a constructivist discipline that studies human understanding. Lakoff and Johnson state “the essence of metaphor is understanding and experiencing one kind of thing in terms of another” (1980, p. 5). The two key arguments of cognitive linguistics are that meaning emerges from interactions with the world and that meaning is mediated by metaphors.

The metaphors used to give meaning to the world are rooted in people’s direct physical and inseparable relationship with their physical environment. For example, people directly experience themselves and objects in their environment as bounded
entities that stand out from a background. Lakoff and Johnson consider this direct experience a "naturally emergent dimension of our experience" (1980, p. 177). Other aspects of experience, such as human emotions, abstract concepts, mental activity, social behaviour, and so forth, may be experienced directly but cannot be fully comprehended on their own terms. Instead, these aspects of experience are understood as structured by other entities and experiences. For example, when a person speaks of time intervals or the future as lying ahead, time is being understood in terms of a spatial metaphor (Jones, 1982).

Hierarchical Structures

Constructivist theory views the mind as organised in a hierarchical structure. Core nonconscious processes are both protected from change and are able to constrain and organise conscious processes. All conscious activity is viewed as a product of processes that are unavailable to awareness (Brockman, 1970; Mahoney, 1991; Mucchielli, 1970; Wilden, 1972). As Mahoney suggests (1991, 1995), the relationship between the nonconscious and the conscious is similar to Chomsky’s distinction between deep structure and surface structure in language. Deep structures are abstract ordering rules that constrain and facilitate surface structure expressions.

Mucchielli (1970) provides an example of the relationship between nonconscious and conscious structures:

Jealousy...is a structure that structures vigilant perception and that gives
meaning to everything that can be grasped by that perception in the facts of existence. A structure of this type "patterns"—that is, it actively models, fashions, shapes—the facts in its information...by "taking them in a certain way" that is characteristic of being jealous. Moreover, ... a form of this type is capable not only of assimilating virtually any fact...but also of structuring behaviour, of "patterning" action and reactions, [it is] like a categorical constant with variable and indefinite content. We ... have here a perceptive-affective-behavioural structure...[this structure] dynamically and unconsciously organises the world of perception and the subject's conduct and to which all speech and describable reaction relate (pp. xii-xiii).

Self-Organising Development

Constructivists embrace a perspective that emphasises the dynamic and changing nature of people and the world of which people are a part. A person's constructions are always in a state of flux, opening up new possibilities, constraining others. Current and past events are continually reconstructed in reference to the present dynamic state.

Yet, where there is change there is also stability. Once a preconceptual or conceptual structure is in place, the organism will actively construct its environment in a manner that is both constrained by the structure and open to information in its environment. While structures are never absolute or permanent, they are constrained
and facilitated by their inherent organisation (which is to some degree open to some
degree to change over time).

Mahoney (1991) describes core ordering processes as resistant to change and
also capable of influencing a person’s experience of reality, self, value, and control.
To maintain the integrity of the organism, these core organising principles are not
themselves so as to protect and perpetuate their integrity.”

From a systemic-constructivist perspective, living systems (except in exceptional
circumstances) function to maintain their viability. That is, the ways that any living
system constructs its world and acts towards its world are all founded upon the primary
necessity of keeping the system functioning. While the purpose of maintaining the
viability of the system is rarely altered, change is common in the ways the organism
constructs and acts in relation to that goal.

**Constructing Reality**

Kelly (1955, p. 12) states, “Man creates his own ways of seeing the world in
which he lives, the world does not create them for him.” Kelly’s statement summarises
the essence of the constructivist position. The person is placed at the centre of an
active process of organising the world in which he or she is embedded. Mahoney’s
(1991) constructivist theory is congruent with Kelly’s constructivist perspective:

All cognitive phenomena—from perception and memory to problem
solving and consciousness—entail active and proactive processes....The organism is an active participant in its own experiences as in learning....Rather than just being a passive repository of sensory experience or a mechanical way station for information processing, the organism is portrayed as an active, anticipatory “embodied theory.” (p. 100)

In studies of sensation, the active construing role of the individual is evident. As Kelly suggested in the quote above, the traditional notion that one's sensory receptors constitute one's contact with the outside world is incorrect. A stimulus does not cause neurochemical activity. Instead, a stimulus joins the ongoing pattern of activity that is continually being generated within the system, the majority of which is self-referential (i.e., recursive) (Coren, 1986; Eccles, 1977; Houk and Lehman, 1987; Pribram, 1971; Varela and Singer, 1987; and Weimer, 1977).

Optical illusions provide excellent examples of how the perceiver's role contributes to the visual perceptual process. Research on optical phenomena by scientists such as Deregowksi (1972, 1980, 1984) provides repeated examples of the person's active role of organising his or her world in terms of perceptive and conceptual structures that are developed and modified by both the biological and interpersonal/cultural realms. The activity of a person's constructive perceptual processes can be illustrated in drawings such as wire-frame cubes (Necker cube). The
Necker cube is ambiguous as it seems to be facing either upwards or downwards depending on how it is viewed. The person viewing the cube can visually organise the cube so that it faces one way or the other, never both at the same time (Mahoney, 1991). Deregowski has shown that children and adults in some African tribes find it difficult to perceive depth in pictorial material such as the Necker cube. Rather than perceive the depth, they perceive a flat array of lines. From the examination of numerous cross-cultural studies of pattern perception, Deregowski has illustrated the tremendous variability in how people of different ages and cultures perceptually organise what they are visually perceiving.

Allport and Pettigrew (1955) made use of the rotating trapezoidal window (Ames, 1951) to study the cross-cultural perception of motion. The window is so proportioned that as it rotates, the longer edge is always longer on the retina than the shorter edge (even when the shorter edge is physically nearer to the observer). The observer tends to perceive the rotation as a back-and-forth sway in an arc of 90 to 180 degrees. The researchers found that experience with western culture made it more likely that the window would seem to be swaying under sub-optimal (monocular) conditions. During better conditions (binocular), or with African subjects who reported preference for circular rather than angular figures, the illusion was not maintained and the window appeared to be rotating. These participants were not “fooled” by a nonconscious structure of rectangular windows.
Evidence of our active role in constructing experience challenges conceptions of subject-object dualism and the alleged boundary between what is viewed as "internal" and "external." As asserted by many scholars (Polanyi, 1966; Lauden, 1990; Polkinghorne, 1988; Neimeyer & Neimeyer, 1993) the observers "internal" models and theories will influence how the "external" world is known. The subjective is not distinct from the objective.

Mahoney (1991) describes two camps of constructivists, radical and critical constructivists. Radical constructivists tend toward the extreme of philosophical idealism. They assert that all order is self-generated and organismically recursive (e.g., von Foerster, 1984; von Glaserfeld, 1984; Maturana, 1980; Varela, 1984; Watzlawick, 1984). Critical constructivists, however, acknowledge that the organism's constructions are constrained by the physical and social world to which it relates (e.g., Guidano, 1995; Hayek, 1982; Kelly, 1955; Mahoney, 1991; Mahoney et al., 1995; Piaget, 1985; Weimer, 1977). The systemic-constructivist theory, a critical constructivist perspective, is described below.

**Systemic-Constructivist Theory**

Systemic-constructivist theory consists of interrelated constructs drawn from fields as wide ranging as general systems theory, cybernetics, information theory, linguistics, and semiotics. The focus of the theory is how people come to know or give meaning to their experiences.
The core constructs of the systemic-constructivist theory are: system, environment, experience, structuring, structured activity, context, pattern, meaning, dialectical process, and communication. Below, the theory is explicated and discussed in terms of its application to an instructional method.

**System and Environment**

In the systemic-constructivist theory, system and environment are basic organisational principles that are used to consider and define the phenomena that are studied. To view a person as a system involves construing the person as a self-organising unity that is functionally organised to maintain his or her viability. The self-organising process is the recursive pattern through which people create order from the order they have created. The term “environment” refers to varying degrees and kinds of order, invariance, and pattern that may or may not be knowable to the person.

People act in relation to the multiplicity of patterns that compose their environment. Patterns are forms, objects, physical configurations that are assumed to exist in the world. The person’s organisation of these patterns is restricted by both the inherent bio-informational-psycho-social constraints in the system and the constraints in the pattern itself. Wilden states (1987):

> A constraint is not a cause, like a physical force, nor a positive control, like steering, that makes something happen. Constraints are limits, like grammar, conscious or not, that define the conditions of what
is not allowed or not supposed to happen (p. 77).

All patterns in the environment restrict (i.e., constrain) the person’s organisation of them to varying degrees. Patterns of the physical environment are more constraining to the person’s organisation of them than are patterns of the social environment. For example, the constraints inherent in the physical and social environment can be demonstrated by the impossibility of a person walking through a brick wall. The physical pattern of the wall obstructs a body from passing through the wall. The physical-pattern aspect of the wall is more constraining than the socially constructed idea that one should not climb over a wall because it is the boundary around someone’s property.

Experience

Experiences are produced by the person’s organisation of the environment. They are distinctions that stand out for the person and stand for the relationship between the person and his or her environment. The meaning of an experience is always in relation to the goals that the person is attempting to attain.

Any difference that makes a difference to the system can be referred to as an experience. Experiences are diverse; some examples are a person’s experience of pain, edges, tones, food, geometric patterns, and so forth.

Different people will have different experiences of the patterns in the environment. The extent and nature of these differences depend upon the
organisational structure of the people and the constraining nature of the patterns that are being organised. Some patterns, of course, will not be meaningful to people. A person may not possess or may not be using, the capabilities necessary to organise the pattern into an experience.

Information is defined as the difference that makes a difference to an observer. All that is considered information is relational and exists only as known. Phenomena "are" only to the degree that they have meaning-for-the-knower. While the systemic-constructivist theory assumes that patterns exist apart from the knower's organisation of them, such patterns are not information until they are organised by a knower. As for any tree that may be falling in Sioux Lookout, the systemic-constructivist theory assumes that events such as these occur apart from one's awareness of them. However, concepts such as "trees," "falling," and bio-environmental phenomena such as sound, that identify and distinguish aspects of a continuity or pattern, are created only in the mind of a knower.

**Structur(ing)**

The term "structur(ing)" is used to describe the system's informational patterning from both a synchronic and diachronic perspective. "Structure" refers to the organisational process when viewed synchronically (stopping it in time) and "structuring" when viewing the organisational process diachronically (watching it unfold over time).
A structure or context is a self-generated pattern that is a map of the system’s environment. Mucchielli (1970) states:

A structure of meaning is that in relation to which an element in the world acquires a significance to a subject … The structure of meaning supposes and implies an essential and existential relation between the subject and his universe, and the structure is a constant dynamic form of that relation (pp. xi-xii).

The utility of the meaning structure depends upon how well the structure enables the person to achieve his or her goals. The person acts in relation to the structure as if the structure were separate and independent from the person. That is, for all intents and purposes, people treat their maps (i.e., constructions) as if they were the territory (i.e., reality).

The ongoing organised informational patterning of a living system can be called the system’s structuring. Structuring involves the system’s digitalizing, punctuating, bounding, or making distinct some aspects of the environment. The distinctions are created through the application of a principle(s) of organisation. Structur(ing) is continually altered as structures produced via this structur(ing) become incorporated into the structur(ing). In this sense, systems are self-organising.

Structur(ing) is a non-conscious, non-experienced process. A person cannot know of his or her structur(ing) as the structur(ing) is occurring. All information
known to the person is produced because of the structur(ing). A person's attempt to be conscious of his or her structur(ing) is analogous to trying to see one's own eyes without the aid of a reflective device. Similar non-conscious structuring processes have been described by Polanyi's (1966) tacit knowing, Brockman's (1969) invisible, Mahoney's (1991) core ordering processes, and Bruner and Postman's (1949) concept of expectancies that condition the receptivity of the organism.

Although a person cannot experience his or her own structur(ing), it is possible to experience some aspects of functioning. The mind is the informational collective of the person's experiences of his or her relations to the environment. All that the person knows is known in relation to these experiences. The experiences of mind are always productions of the structur(ing) of the person.

**Structured Activity**

In the previous paragraphs, the discussion of the concept of structur(ing) has been limited to the process through which an organism informationally organises the environment. Knowing or cognition is only one aspect of that which is structured and that which structures. Structured activity refers to the behavioural component of structur(ing). The activity is called "structured" because it is the consequence or production of the system's structur(ing).

Structured activity is the continuously produced, patterned doings of a person. All such activity is a manifestation of the present non-linear structuring processes and is
organised purposively. That is, the person's activity is directed toward simultaneously attaining goals that are implicit in all levels of the system. For example, when a person walks around a chair to get to the chalkboard, the chair is immediately nonconsciously organised as an obstacle in relation to the goal of getting to the chalkboard. The act of walking around the chair (as is the act of knowing the chair as an obstacle) is produced in relation to the goal that the person is intending towards.

The action itself can be considered on a number of motoric levels. Walking around the chair involves maintaining balance, making fine and gross motoric adjustments, perhaps even doing so while carrying on a conversation. Any one aspect of the activity, if isolated for study, can stand for all the lower-level motoric-informational processes involved as well as the higher-level goals that the system is intending toward. Written responses, speech, movement — all are examples of observable phenomena that stand for a person's structuring in relation to the environment. The meaning of acts, whether behaviours or thoughts, are considered to be related to the goals to which the person is intending. The goals are implicit in the activity itself.

.Context, Pattern, and Meaning

Bruner (1990) uses the term "folk psychology" to describe "what people take for granted about the nature, the causes, and the expectable results of human mental activity" (p. 346). For example, people have folk psychology explanations for every-
day situations such as what happens in a post office or what is done in a restaurant. When an event occurs that is unexpected, such as a person waving a flag in a post office, people will find a story that will give the exceptional behaviour meaning.

A context is like one of these stories that Bruner describes; however, unlike what is commonly understood as a story, a context does not need to be mediated through language. A context (or a structure) is an informational pattern that extends meaning and integration to one’s experiences. Throughout a lifetime of active interaction with physical and social environments, people form contexts that anticipate a diversity of environmental patterns (Laughlin, McManus, & d’Aquili, 1990). Once the context is formed, a person only needs to experience a part of the context for the whole context to be elicited.

Experiences have meaning in relation to the active context. For example, consider the cluster of experiences related to thirst. The context of thirst may be composed of the sensory experience of thirst, an image of a water fountain, the kinaesthetic and tactile gestalts of bending over a fountain and drinking, the concept of thirst, and so forth. If a part of this pattern is experienced, the environment will be known in terms of the whole context. The sensation of thirst, will set the person to know of the environment in terms of thirst-related and thirst-unrelated. If a person is thirsty and notices a water fountain, the water fountain is meaningful as a way of eliminating an unpleasant physiological state. However, if a person has just finished
drinking from a fountain, the fountain will be known in a different manner. The context of an experience is implicit in the meaning of an experience for the system. A system functions to set itself in relation to its experiences as organised by and embedded within a context.

**Dialectical Process**

In the systemic-constructivist theory, dialectical process refers to two phenomena. The first one is the dynamic the relationship between two elements that mutually influence and define each other. For example, the activity of a living system influences its environment. These changes in the environment are information for the system. The information is incorporated into the structure to which the continuing activity is referenced. In so doing, the system’s actions are co-ordinated with its representation of its environment. The system is defined, in part, by the results of its own causal influence upon its environment (as known to it). The system maintains a meaning system (i.e., context) that is largely unyielding to disturbances from outside the dialectical process.

Second, dialectical process is a logic of internal development — a teleological logic in which the later totality is implicit in the earlier forms. Systems are viewed as composed of an unfolding structure of developing forms, each a more adequate exposition of the principle of organisation of the whole (Harris, 1993). Hegel’s conception of system is composed of such forms. Each phase of the dialectic is a unity
of opposites and a provisional expression of the Absolute. The system is composed of a progressive scale of graduated forms, each a specific example of the universal principle of the dialectic. Harris (1993) uses the term “polyphasic unity” to describe this process. A polyphasic unity is:

A scale of forms progressively realising with continuous increase of adequacy the principle immanent in whole and part. It is a continuum of activity or process issuing in such a scale, the forms, or phases, of which are mutually related (i) as degrees of realisation of the principle, (ii) as distinct specifications of its generic nature, (iii) as mutual opposites and (iv) as the reconciliation of oppositions lower in the scale. Each sublates the lower phases, all of which are carried up into and preserved in mutual interdependence in the higher phase that supersedes them (p. 485).

A polyphasic unity is sustained throughout the physical, biotic, and noetic worlds. The physical world is described as a scale of forms from radiant energy to crystals. The biotic world has an analogous scale of forms from bacteria to self-conscious organisms. The forms of the noetic sphere begin with primitive sentience through to explicit thinking. Each form, and the whole series of forms, are totalities that are continuous with their preceding and succeeding forms (Harris, 1993).

The logic of a developmental process in which potentialities are progressively
more fully realised is a theme within the writings of many philosophers. Some examples of the developmental process are Piaget's genetic epistemology (1970); Polanyi and Prosch's concept of embryological and evolutionary development (1975); and Bateson's (1972) and Wilden's (1972) insights into epistemology.

**Communication**

The systemic-constructivist theory of communication has as the unit of analysis both relations and patterns. The essence of communication is arrangement, pattern, and the meshing of forms.

At this fundamental level, non-living and living systems can be understood as sharing an underlying communicative structure. To demonstrate this communicative structure, consider both the simple example of a lock-key interaction and the more complex example of human communication. When a key is turned and a lock is opened, a simple form of communication has occurred. The relationship between the two configurations produces a difference. The physical constraints of lock and key together resulted in the lock opening. Neither the key alone, lock alone, nor person alone efficiently caused the lock to open. Causation, here, is best described as a formal cause. The lock that opens is not separate from the lock-key-person system. The communication is the configurational interaction between the lock and key.

Human communication is in some ways similar to the lock and key example. The key can open the lock because the key and lock's structural organisation provides
them with the readiness to receive one another. A human listener has physical structures and meaning structures that provide the person with a readiness to understand another person.

Hermeneutic conceptualisations of communication emphasise the role of the listener or reader as an active part of any dialogue. Mucchielli (1970, p. 11) sees the listener’s role as paramount: "The disseminator of information wishes to denote something, but the meaning of what he says will be what is perceived by the recipient."

A person is a configuration of physical, biological, preconceptual, and conceptual complexities involved in continual communicative exchanges with the environment. Biophysical organisational processes are the basis by which a person is able to structure the environment visually, auditorially, tactilely, and so forth. The complexity of these sensory systems provide for greater freedom than the simple lock-key system. Preconceptual and conceptual constraints are the web of abstractions, constructs, and assumptions that one implicitly and explicitly holds about relationships with the environment. The meshing of this multifarious structure with the structuring processes of a listener, is the essence and form of the communicative transaction. The content of communication is the derivative of the structural transaction.

Language

The systemic-constructivist perspective shares the conception of language that has been suggested by linguists Lakoff and Johnson (Lakoff & Johnson, 1980; Johnson,
1987; Lakoff, 1987). Lakoff and Johnson’s perspective on language posits that the meanings of words is to be found in the underlying structure of communication and not outside of experience. That is, the meaning of words are referenced to the knower’s experience in the world. For example, imagine a child at a dinner table who is playing with a salt-shaker by moving the shaker around the table as if it were a vehicle. The father says, “Stop playing with that and eat your dinner.” The activity of the child became information to the father (a difference between eating and not eating), and the activity was given the name “play.” For the child, “play” is the abstraction standing for the experience of the child’s bodily state when his father spoke to him. The child’s bodily experience is multi-levelled, involving as components: vestibular, kinaesthetic, visual, tactile sensations, objects and configurations, relationships between these objects, and consciously, the child’s symbols for what he is doing.

Information has to be transformed in many ways before it is represented as a word. Described linearly, physiological sensations are transformed into perceptions, which are further transformed into objects, then relations between objects, then symbols for these objects and relations, which are combined based on syntactic rules for language. On this level of high order transformations we can symbolically communicate with one another (Powers, 1973). As Bateson (1972, 1980) reminds us, the name is certainly not the thing named.

Thinking of words may evoke the experiential referents that the words have
been associated with, however, there is no one-to-one correspondence between referents and words. Most experiential referents do not have linguistic analogues. Words or concepts are only applied to a subset of our experiences. For example, consider how few words people have to describe the combinations of sensations they are experiencing at any one time. Conversely, words can stand for many different experiential referents and will evoke different referents depending upon the present context.

The referents of words are always embodied in the speaker or listener. The sentence, "I kicked the football," may not mean to the listener what was intended by the speaker. The meaning depends upon the experiential referents of the words. For instance, a person born without legs would not understand the word "kick" as a person with legs understands the word. Implied in a person's use of the word "kick" is a whole bodily organisation involving vestibular, kinaesthetic, visual, and tactile sensations that are always referenced to the person using the word. Similarly, a person who has been blind from birth may say that blue is his or her favourite colour but the experiential referent for blue could not be the same as that of a person who could see. "My favourite colour is blue," may be a grammatically correct proposition, or a communication that the blind person can imagine colours; however, it need not be "true" in any other sense. In work in artificial intelligence, a computer can be programmed to display grammatically correct sentences. The sentences, however, have
no experiential referent until they are read by a person.

Instructional Implications

Traditional Instruction

Traditionally, students have been taught by way of lecture and books. The learning process involved a teacher or a professor who through writing, lecture, or assigned readings passed knowledge on to the student. Past training of instructors tended to emphasise how curriculum could be best arranged for the student to be able to grasp the content of the lesson. That is, the emphasis has been on what Dewey (1938/1963) described as the “objective conditions.”

Dewey (1938/1963), in discussing the state of traditional instructional methods, used the term “objective conditions” to describe the activities and setting of the classroom and the ways that the activities are performed and arranged. The equipment, books, toys, games materials, social set-up, are all parts of the objective conditions in a classroom. Traditional instructors believed that the objective conditions were the sufficient conditions for learning. Teaching methods were not adapted to the needs of the individual students. If the material was not learned by the student, the fault was thought to lie in the student not in the subject-matter or the way in which the subjects were taught.

During the last half of this century, the constructivist research program has
permeated every aspect of educational research. Researchers have applied the
constructivist theories to understanding curriculum design, theory, and evaluation.
With this perspective has come a growing body of research on the relationship between
the student and the instructional materials. From the constructivist perspective,
students are viewed as actively interpreting both the materials in the classroom and the
message that the professor is imparting.

Constructivist oriented instructional scientists (Bruner, 1971; DeVoss, 1982;
Eisner, 1979) have suggested metaphors that offer a reconceptualization of the learning
process. These constructivist metaphors reframe some of the past objectivist
conceptualisations of learning by placing an emphasis on the student and the student's
way of actively bringing meaning to the subject matter. As Bruner stated (1971, p.
72):

A curriculum reflects not only the nature of knowledge itself but also the
nature of the knower and of the knowledge-getting process. It is the
enterprise par excellence where the line between subject matter and
method grows necessarily indistinct. A body of knowledge, enshrined in
a university faculty and embodied in a series of authoritative volumes, is
the result of much prior intellectual activity. To instruct someone in
these disciplines is not a matter of getting him to commit results to mind.
Rather, it is to teach him to participate in the process that makes
possible the establishment of knowledge.\ldots\text{Knowing is a process not a product.}

From Bruner's constructivist perspective, the "objective conditions" of books and classrooms cannot be considered apart from the interpretative processes of the student and teacher.

Another example of the constructivist conception of learning comes from Eisner (1979) and DeVoss (1982), who both use the metaphor in which the class is an orchestra and the teacher is a conductor. This metaphor opens further ideas for consideration. The "tempo" of learning must be mutually established. If the tempo is too fast, the musicians cannot play their parts; if too slow, they may lose count and fail to come in at the appropriate time. The conductor must monitor how the musicians respond and how harmonious the music sounds as they play their separate parts. Like a symphony, a classroom lesson requires active interpretation of the "score" by both teachers and students. Communication is the vehicle for this interpretative process.

The symphony metaphor conveys a message similar to what Dewey (1938/1963) meant by the concepts of "environment" and of "interaction":

An experience is always what it is because of a transaction taking place between an individual and what, at the time, constitutes his environment, whether the latter consists of persons with whom he is talking \ldots, the subject talked about \ldots, or the toys with which he is playing, the book
he is reading, or the materials of an experiment he is performing. The environment, in other words, is whatever conditions interact with personal needs, desires, purposes, and capacities to create the experience which is had. (pp. 43 - 44)

Non-Traditional Instruction

The two traditional instructional methods, reading and lecture, are based on the assumption that the learner already has the experiential referents that are necessary to understand the topic as the writer or speaker intends. Bruner (1973) noted that classroom discussions and textbooks describe conclusions in fields of intellectual inquiry rather than focusing on the inquiry itself. "Approached in this way, high school physics often looks very little like physics, social studies are removed from the issues of life and society as usually discussed, and school mathematics too often has lost contact with what is at the heart of the subject, the idea of order." (p. 14)

Teachers and educational researchers who have come to value the constructivist view of teaching have sought to improve upon the instructional methods that they use to teach their students. A number of non-traditional methods have been used as a way of supplementing the traditional teaching methods of reading and lecture. These non-traditional instructional methods include the use of games and simulations (DeCoster & Prater, 1973; Klein & Freitag, 1991; Klein, 1992), case-studies (Anthony, 1974; Watson, 1975), and self-paced instruction (Battista, 1978; Dupree, 1974).
Although the above studies all involve teaching that employs experiences of one sort or another, they do not use "experiential" instructional methods. The essence of the participants' experiences remains that of listening to a speaker, answering questions, or having participants read a text. For example, the instructional game that Klein and Feitag (1991) used in their study consisted of teaching a lesson about an information processing model by having students quiz each other using flash cards. Although the game involves manipulating concrete objects, the game is not "experiential" as the term has been used in this work. If Klein and Freitag wanted to compare their instructional game to an experiential instructional method, they would have to create experiential exercises for the concepts that they were teaching. For example, if Klein and Freitag wanted to experientially illustrate short-term memory, the students could be asked to memorise and recall a list of numbers varying in length to illustrate the commonly found 7 ± 2 pattern. The short-term memory experience could then be discussed in terms of the information processing construct that was being taught.

**Experiential Instruction: Theory**

Dewey, Lewin, Piaget, and Bruner are the key scholars who have influenced the development of experiential learning theory. The contemporary applications of experiential learning theory to social policy, competence-based education, lifelong
learning and career development, curriculum development, and experiential education have all been influenced by the teachings of one or more of these people (Kolb. 1984).

A brief overview of each of these scholars' contributions to experiential learning will be presented. The overview will be followed by a review of studies that have compared the experiential instructional method with traditional instructional methods.

Dewey. Pragmatists such as John Dewey, Charles Peirce, William James, and George Herbert Mead believed that philosophy should be applied to solving human problems. In contrast to the objectivist belief in truth as prior to and independent of human experience, the pragmatists contended that truth was an assertion derived from human experience. Ideas were to be judged on their consequences when acted upon. Truth was based upon the application of hypotheses to solving problems (Gutek, 1988). The problem John Dewy addressed was how to improve an educational system that was split between two conflicting models.

Dewey wrote Experience and Education in an attempt to understand the conflict between traditional models and newer models of instruction. His intention was not to find a compromise between opposed schools of thought, nor was his intention to eclectically combine points from both schools. Rather, the task of Dewey's philosophy of education involved the "necessity of the introduction of a new order of conceptions leading to new modes of practice" (Dewey, 1938/1963, p.5).

Dewey conceived of learning as a dialectical process integrating experience and
concepts, observation, and action. He was interested in learning as a developmental process that transformed the impulses, feelings, and desires of concrete experience into purposeful action (Kolb, 1984).

During the last fifty years, Dewey's experiential ideas have influenced traditional educational programs as well as apprenticeships, internships, work-study programs, co-operative education, studio arts, laboratory studies, and field projects (Kolb, 1984). Learning was experiential in the sense that the learner was directly connected with the realities being studied. The student had a direct encounter with the phenomenon being studied rather than just thinking about the encounter or considering the possibility of having an encounter with the phenomenon (Keeton and Tate, 1978).

Lewin. Lewin developed an experiential learning theory and applied the theory to individuals and organisations. Lewin's experiential method involved the observation of a participant's here-and-now experiences. The observations were shared with the participant who was encouraged to modify his or her behaviour. Overall, Lewin's theory studied the relationship between immediate concrete experience, observation, formation of abstract concepts, and the testing of the abstract concepts in new situations (Kolb, 1984).

Lewin applied the theory to leadership and management styles, group dynamics, and training methodology. The theory developed into the laboratory training method known as Training Groups. Training groups were composed of a variety of tasks,
structured exercises, simulations, cases, games, observation tools, role plays, and skill-practice routines. The activities were simulated situations designed to create personal experiences for learners. Training groups have been used to instil change in small groups, large organisations, and community systems.

**Piaget.** Piaget's work examined the reasoning processes of children. He and his colleagues studied how a child's intelligence is shaped through an interaction between the child and the environment. The child's early experiences of exploring and coping with the immediate concrete environment provided an experiential foundation for the child. The experiential foundation was necessary for the development within the child of abstract reasoning and symbol manipulation.

Piaget viewed the development of the child's intelligence in terms of four successive stages — the sensorimotor period, the preoperatory representation period, concrete operations, and formal operations (Piaget, 1979). (1) In the sensorimotor period, knowledge is represented in concrete actions and knowledge is inseparable from the experience itself. For example, during the first two years of life, representation is based on action. The child's world is known as the world is acted upon by the child. (2) In the preoperatory representation period, the child's knowledge is represented in images that have a status increasingly autonomous from the represented experiences. The child is somewhat free of immersion in immediate experience, that is, the child can manipulate images of the world (Flavell, 1963). In the higher stages of concrete and
formal knowledge, knowledge is represented in symbolic terms. Symbols can be manipulated internally and are completely independent of experiential reality. (3) In the stage of concrete operations, the child uses logical inference but the child’s inferences are always based upon real or imagined manipulations of objects. The child can rely on concepts and theories to give shape to experiences. (4) In the final stage of Piaget’s theory, formal operations, the adolescent moves from using symbolic processes based on concrete operations, to using those symbolic processes of representational logic (Flavell, 1963, Kolb, 1984; Piaget, 1979).

Bruner. Bruner, in his contrasts between the learning patterns of students in contemporary schools and those of !Kung children, noted how in films of the !Kung one rarely sees an instance of “teaching” occurring apart from where the behaviour to be learned is relevant. The !Kung have neither schools, formal lessons, nor teaching by verbal instruction. Instruction consisted of demonstrating the skill to the learner. Through play, !Kung children learn the skills, rituals, myths, obligations, and rights of their culture. In literate societies, however, children are often taught by “telling” out of context instead of “showing” in context. The practice of “telling” out of context has become institutionalised in the literate societies’ schools and teachers (Bruner, 1971).

Bruner’s and Piaget’s work in experiential education focuses on the translation of abstract symbolic principles into representations that could be grasped by people at more concrete stages of development. The translation of symbolic structures to
concrete structures involved the use of concrete objects that could be manipulated and experimented with by the learner as an aid to understanding the scientific principles involved.

Bruner maintained that through an understanding of cognitive developmental stages it should be possible to design a curriculum in any field so that any academic subject could be taught to learners at any age or stage of cognitive development. His work was the impetus for a new movement in curriculum development, a movement focused on the design and implementation of experience-based educational programs. In particular, Bruner’s and Piaget’s writings have had a large impact on elementary and secondary school science and mathematics curricula (Posner, Strike, Hewson & Gertzon, 1982; Ward & Herron, 1980).

**Experiential Instruction: Research and Practice**

In this section, six studies will be presented to illustrate the diverse findings encountered by experiential instruction researchers. Next, two experiments will be proposed in order to (a) test the efficacy of an experiential approach of teaching systemic-constructivism and (b) address some of the discrepancies in the findings of the past experiential instruction literature.

The experiential work begun by Dewey, Lewin, Piaget, and Bruner continues today. Experiential instructional models are applied to the training of students in many disciplines. Blake (1990) notes that authors of textbooks on organisational behaviour
have recently begun recommending the use of experiential exercises in addition to more
traditional methods of instruction (e.g., Luthans, 1989; Ritchie & Thompson, 1988;
Marcic, 1989; Kolb, 1995). Few researchers, however, have conducted studies that
compare experiential instruction with other instructional methods (P. H. Specht, 1989).
In an examination of the studies that have been completed, neither experiential learning
nor traditional learning seems clearly superior (Clements, 1995). Six studies will be
presented that illustrate the diversity of findings in this field of research.

In a comparison between experiential instruction and traditional instruction,
Blake (1990) and Clements (1995) found no instructional method clearly superior, L.
B. Specht and Sandlin (1991) found the experiential method showed positive effects
only during a follow-up test, and P. H. Specht (1985) and Willis and Gueldenpfenning
(1981) found the experiential method to be superior to traditional methods of
instruction. Each study will be described in turn.

Blake (1990) compared two groups of undergraduate students who had received
supplementary instruction following a lecture on organisational behaviour. One group
took part in case studies, the other group in experiential exercises. Blake used multiple
choice exams that students completed over the semester as the dependent measure. No
significant differences were found between the learning of these two groups.

Clements (1995) taught undergraduate developmental psychology students using
one of two methods of instruction. Four classes of students were taught using a lecture
method combined with a field experience component and four groups were taught using a lecture method combined with an out of class observation assignment. Students were graded on three multiple choice exams taken throughout the semester, a typed summary of an exercise involving the student observing a child, and attendance, punctuality, and class participation. There was no significant difference between these groups on achievement.

L. B. Specht and Sandlin (1991) compared two groups of undergraduate accounting students. Both groups received a 50-minute lecture on the topic of financial statement analysis. One group participated in an experiential exercise related to making a lending decision that was supported by an appropriate analysis of financial information. The second group received a lecture on the instructor’s analysis of the financial information and the lending decision that the instructor deemed appropriate. Students were given posttests and follow-up tests in the form of written quizzes. The quizzes consisted of two parts. Part A was to test memory of specific concepts and their application. Part B was to test the memory of general concepts. No significant differences between groups were found on the general and specific concepts at posttest. On the follow-up test, however, the lecture group showed a significant decrease in general concept learning over the 6-week period while the experiential group retained their general concept learning. The two groups did not differ on the specific concepts at the follow-up test.
P. H. Specht (1985) compared two groups of undergraduate business students who were learning a lesson on organisational communication. One group learned the material through a discussion and lecture and another group took part in the discussion and experiential exercises. Students were given a combination of essay questions and multiple choice questions two weeks following the instruction and a short answer question five weeks following the instruction. The group which was taught using the experiential learning exercise performed significantly better than the lecture group on both the two week posttest and the five week follow-up test.

Willis and Gueldenpfennig (1981) compared three groups of college student volunteers who were being taught seven skills related to remedial reading tutoring. The students were assigned to one of the following three instructional conditions: 1) handouts and lecture, 2) handouts and observational learning, and 3) handouts, practising the skills, and receiving feedback. To assess the students' learning of the tutoring skills, the students were videotaped for five-minutes after each remedial skill lesson. The videotaping was of the students tutoring a confederate student who was played by one of the experimenters. One-minute long videotape excerpts were randomly chosen for each of eight sessions. Students who received the practice showed the greatest learning. Students who observed the tutoring showed the second-most learning. Students who attended the lecture showed the least learning.

Watson (1975) compared the case-study method with the lecture method.
Although Watson's research does not include an experiential condition, the measures used in the study and the results of the study are relevant to experiential investigations.

Watson compared three groups of undergraduate management students. The first two groups were taught management principles using assigned readings and the case-study method and the third group was taught management principles using assigned readings and the lecture method. Two types of learning were measured: (a) knowledge and understanding and (b) ability to apply. "Knowledge and understanding" was demonstrated by having the students define, describe, and explain the management principles during the midterm examination and the final examination. "Ability to apply" was demonstrated on the final examination by having learners read a description of a particular situation and then having them describe, in writing, how they would handle the situation. Watson found that the performance of students in the case study condition and the lecture condition did not significantly differ for the majority of concepts on the knowledge and understanding questions. Those in the case study condition, however, scored significantly higher than the lecture condition on the application questions. Although definition-type and application-type questions are commonly used to assess learning (Hamilton, 1989), measures that distinguish between these two types of questions have not been used in comparisons of experiential instruction with other forms of instruction.

To contribute to the experiential literature base, two experiments were
conducted. Hypotheses were proposed that were congruent with the systemic-constructivist theory described earlier in this work and relevant to the findings of the above mentioned studies.

In Experiment 1, participants who received experiential instruction on the systemic-constructivist theory were given a pretest, posttest, and follow-up test to measure whether learning occurred. In Experiment 2, a comparison was made between four groups of undergraduate psychology student volunteers who were being taught the systemic-constructivist theory. The students were randomly assigned to one of the following four instructional conditions: (a) experiential condition, (b) reading condition, (c) lecture condition, and (d) no-instruction control condition. To assess the students’ learning of the systemic-constructivist principles, the students were given a written short-answer pretest, posttest, and follow-up test; these tests were then independently rated by two judges blind to the participants’ instructional condition. Two types of learning were measured: (a) ability to define the principles and (b) ability to apply the principles. The “define” and “apply” questions, also used by Watson (1975), were used to differentiate between participants who gained declarative knowledge of the constructs (i.e., the facts a person knows) and participants who had gained procedural knowledge of the constructs (i.e., the skills a person knows how to perform) (Anderson, 1980).

As with the P. H. Specht (1985) study, the general hypothesis was that students
in the experiential condition would outperform students who received traditional
instruction. Finer discriminations in the hypotheses were made regarding Watson’s
(1975) finding that groups exposed to traditional vs. non-traditional instructional
methods differed most on the application-type questions. The relationship that L. B.
Specht and Sandlin (1991) found regarding the experiential group’s superior retention
of learning was also considered.

Overview

Statement of the Problem

Objectivism, a common philosophical model, maintains that words and actions
are meaningful and independent of the person who is understanding them. From this
perspective, information exists in the environment surrounding a person and it is
through the reception of this information that one comes to understand the surrounding
world. The referents of words and actions are the objects and events that exist external
and independent of oneself. Systemic-constructivism is an alternative perspective; it
maintains that an individual actively imparts meaning to the world. The knower,
instead of being a passive recipient of knowledge, understands the world through an
active biological and conceptual process that is not consciously accessible to the
knower. Furthermore, the systemic-constructivist theory emphasises that experiential
understandings are the basis of all conceptual knowledge. The referents of words and
actions are the personal experiences that are created through one's relation with the world.

Teaching the systemic-constructivist approach is a challenging endeavour. The systemic-constructivist approach is a paradigm with which students are generally unfamiliar. Following the internal logic of the systemic-constructivist approach, words alone cannot convey new meanings to a person. The words used when describing a constructivist approach, such as non-linear causality, context, structure, order, pattern, constructivism, do not convey the constructivist structure. Each of these words is a sign that has meaning as organised by the reader of the words. As is the case with all signs, the words are known in terms of the conceptual framework of the knower.

If a person is to learn the systemic-constructivist approach, the experiential referents of the words will have to be communicated to the person. The conventional methods of imparting knowledge, such as reading and lecturing, may not be sufficient for communicating the systemic-constructivist approach to a person who is unfamiliar with the theory. The theory may be best communicated through an instructional method that teaches by providing experiential referents for the constructs that are being conveyed and then discussing the experiences in terms of the systemic-constructivist principles. That is, a series of exercises designed to teach the systemic-constructivist theory in a manner that is experientially congruent with the message being taught, should be more successful in conveying the principles to students than instructional
methods that are less experientially congruent.

The superiority of the experiential method compared with other instructional methods, however, has only modest support in the literature (P. H. Specht, 1985; Willis & Gueldenpfeenning, 1981). Other experimenters have noted that the experiential approach was beneficial only at follow-up (L. B. Specht & Sandlin, 1990) and some found the experiential method to provide no benefits to learning compared with traditional approaches (Blake 1990; Clements, 1995). Clearly, further investigation into these issues is warranted.

Summary of Research Design

A pilot study and two experiments utilised a demographic questionnaire, six written interpersonal scenarios, and pretest, posttest, and follow-up tests as measures to assess participants’ learning of four systemic-constructivist constructs. The dependent measures followed Watson’s (1975) procedure of distinguishing between definition-type and application-type questions. Participants were asked to define the systemic-constructivist constructs they were taught and to apply the constructs to interpersonal scenarios.

In the pilot study, a two-day experiential laboratory was designed to teach professionals the systemic-constructivist constructs. Data were collected for the purpose of refining the exercises and questionnaires, and creating a rating system for judges.
In Experiment 1, a two-day experiential laboratory was conducted for professionals and non-professionals in the community. Pretest, posttest, and follow-up data were obtained from the participants.

In Experiment 2, undergraduate participants were randomly assigned to one of four instructional conditions. Four one-day systemic-constructivist seminars were taught using experiential, reading, lecture, and no-instruction methods. Pretest, posttest, and follow-up data were obtained for all conditions.

Research Hypotheses

On the basis of the systemic-constructivist theory and the literature reviewed in this chapter, the following hypotheses were proposed:

Experiment 1

Hypothesis 1: It was predicted that participants would improve in their ability to define and apply the systemic-constructivist constructs. The hypothesis will be corroborated if the means of the Define and Apply scores on the posttest and follow-up tests are significantly greater than the means of pretest scores.

Experiment 2

Hypothesis 1: It was predicted that participants in the instructional conditions (experiential, reading, lecture) would improve in their ability to define the systemic-constructivist constructs and apply the systemic-constructivist constructs to the
interpersonal scenarios. The hypothesis will be corroborated if the means of the experiential, reading, and lecture conditions' Define and Apply scores on the posttest are significantly greater than their means on the pretest.

**Hypothesis 2:** It was predicted that participants in the control condition (no instruction condition) would neither improve in their ability to define the systemic-constructivist constructs nor improve in their ability to apply the systemic-constructivist constructs to the interpersonal scenarios. The hypothesis will be corroborated if the means of the Define and Apply scores on the control condition's follow-up test are not significantly different than the means of the control condition's pretest scores.

**Hypothesis 3:** It was predicted that participants in the experiential condition would show greater improvement of learning to apply systemic-constructivist constructs to the interpersonal scenarios than either the reading, lecture, or control conditions. The hypothesis will be corroborated if the experiential group's pretest to posttest gain score for the Apply variable is significantly greater than the other group's pretest to posttest gain scores for the Apply variable.

**Hypothesis 4:** It was predicted that participants in the experiential condition would show greater retention of learning to apply the systemic-constructivist constructs to the interpersonal scenarios than either the reading, lecture, or control conditions. The hypothesis will be corroborated if the experiential condition's posttest to follow-up gain score for the Apply variable is significantly greater than reading, lecture, and
control conditions' posttest to follow-up gain scores for the Apply variable.

**Hypothesis 5:** It was predicted that participants in the experiential condition would show no difference in learning to define the systemic-constructivist constructs to interpersonal scenarios than either the reading or lecture conditions. The hypothesis will be corroborated if the experiential group's pretest to posttest gain score for the Define variable is not significantly different than the other group's pretest to posttest gain scores for the Define variable.

**Hypothesis 6:** It was predicted that participants in the experiential condition would show less retention of the definitions of the systemic-constructivist constructs than either the reading or lecture conditions. The hypothesis will be corroborated if the experiential group's posttest to follow-up gain score for the Define variable is significantly less than the reading or lecture conditions' posttest to follow-up gain scores for the Define variable.
METHODOLOGY

In this section, the methodologies of the Pilot Study, Experiment 1, and Experiment 2 are described. The Pilot Study served to refine the experiential epistemology exercises and served to develop both the questionnaires and the questionnaire scoring criteria. Experiment 1 applied the experiential instructional method to teach participants the systemic-constructivist constructs. Experiment 2 compared four instructional methods of teaching the systemic-constructivist constructs.

Pilot Study

Participants

Eight professionals, graduate students, and undergraduate students paid a $10.00 lunch-and-beverage fee to participate in a weekend-long experiment on experiential epistemology. Demographic, pretest, and posttest data were obtained from six participants. (Demographic data are presented in Table 1.) One participant, the expert participant, had prior experience with the systemic-constructivist perspective and had extensive experience in curriculum design and implementation. The expert participant was consulted regarding improving the implementation of the experiential exercises.

A brochure that described the experiment was used to recruit participants for the pilot study and Experiment 1. The brochure was distributed to universities, bookstores, counselling centres and stores in the Windsor-Detroit area. Participants registered for
Table 1

Demographic Characteristics of Pilot and Experiment 1

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pilot*</th>
<th>Experiment 1*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N (%)</td>
<td>N (%)</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>0 (0.0)</td>
<td>4 (40.0)</td>
</tr>
<tr>
<td>Female</td>
<td>6 (100.0)</td>
<td>6 (60.0)</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M (SD)</td>
<td>31.3 (11.7)</td>
<td>39.3 (13.9)</td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>3 (50.0)</td>
<td>2 (20.0)</td>
</tr>
<tr>
<td>Cohabitng</td>
<td>1 (16.7)</td>
<td>2 (20.0)</td>
</tr>
<tr>
<td>Married</td>
<td>1 (16.7)</td>
<td>5 (50.0)</td>
</tr>
<tr>
<td>Divorced</td>
<td>1 (16.7)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Widowed</td>
<td>0 (0.0)</td>
<td>1 (10.0)</td>
</tr>
<tr>
<td>Educational Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Student</td>
<td>0 (0.0)</td>
<td>4 (40.0)</td>
</tr>
<tr>
<td>Part-Time</td>
<td>3 (50.0)</td>
<td>2 (20.0)</td>
</tr>
<tr>
<td>Full-Time</td>
<td>3 (50.0)</td>
<td>4 (40.0)</td>
</tr>
<tr>
<td>Years of Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M (SD)</td>
<td>15.8 (6.3)</td>
<td>17.4 (2.01)</td>
</tr>
<tr>
<td>Program</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N/A</td>
<td>0 (0.0)</td>
<td>4 (40.0)</td>
</tr>
<tr>
<td>Soc. Sci.</td>
<td>6 (100.0)</td>
<td>5 (50.0)</td>
</tr>
<tr>
<td>Humanities</td>
<td>0 (0.0)</td>
<td>1 (10.0)</td>
</tr>
<tr>
<td>Employment Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemployed</td>
<td>2 (33.3)</td>
<td>5 (50.0)</td>
</tr>
<tr>
<td>Part-Time</td>
<td>2 (33.3)</td>
<td>2 (20.0)</td>
</tr>
<tr>
<td>Full-Time</td>
<td>2 (33.3)</td>
<td>3 (30.0)</td>
</tr>
<tr>
<td>Income</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$0-$9,999</td>
<td>2 (33.3)</td>
<td>1 (10.0)</td>
</tr>
<tr>
<td>&gt;$10,000</td>
<td>2 (33.3)</td>
<td>2 (20.0)</td>
</tr>
<tr>
<td>&gt;$20,000</td>
<td>0 (0.0)</td>
<td>2 (20.0)</td>
</tr>
<tr>
<td>&gt;$30,000</td>
<td>0 (0.0)</td>
<td>1 (10.0)</td>
</tr>
<tr>
<td>&gt;$40,000</td>
<td>1 (16.7)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>&gt;$50,000</td>
<td>1 (16.7)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>&gt;$60,000</td>
<td>0 (0.0)</td>
<td>1 (10.0)</td>
</tr>
<tr>
<td>&gt;$90,000</td>
<td>0 (0.0)</td>
<td>3 (30.0)</td>
</tr>
<tr>
<td>First Language</td>
<td></td>
<td></td>
</tr>
<tr>
<td>English</td>
<td>5 (83.3)</td>
<td>9 (90.0)</td>
</tr>
<tr>
<td>Polish</td>
<td>1 (16.7)</td>
<td>1 (10.0)</td>
</tr>
</tbody>
</table>

Note. *Pilot n = 6. **Experiment 1 n = 10.
the experiment by telephone or by submitting the form printed on the brochure. Forms were mailed to the facilitator or placed in his university mailbox.

Participants in the pilot, Experiment 1, and Experiment 2 were treated in accordance with the "Ethical Principles of Psychologists and Code of Conduct" (American Psychological Association, 1992) and the University of Windsor's ethical guidelines. Consent forms were signed that described the research and reminded participants of their right to withdraw from the research without explanation or penalty (Appendix 1). Participants who volunteered to complete the follow-up test, signed a second consent form that requested their name, address, and phone number. They were each mailed a questionnaire with a pre-stamped return envelope three weeks after they completed the experiment. Phone calls were made to encourage participants to return the questionnaires.

Setting and Materials

The pilot study took place in a conference room. The room was large enough to seat 20 people comfortably with enough space to carry out the experiential exercises.

Participants completed the experiential exercises that are described below in the Procedures section. Materials required for the exercises were a flip chart, overhead projector, twenty toy human and animal figures, ten pairs of scissors, 100 tiddlywinks, 50 wooden blocks, 20 balls, a box of paper-clips, 10 cups, 15 pens, 10 photographs, and 12 exercise sheets.
Stimuli and Questionnaires

Scenarios. The scenarios used in the Pilot, Experiment 1, and Experiment 2 were short written descriptions of simple interpersonal interactions. Three pairs of scenarios were designed for use as stimuli for the participants.

The first pair of scenarios was “Spilling the Drink” (Spill) and “Reading a Book” (Book). The second pair of scenarios was “Placemats on the Table” (Mats) and “Watching the Game” (Game). The third pair of scenarios was “Pen in the Eye” (Pen) and “Plate on the Table” (Plate).

The Spill/Book pair and the Mats/Game pair were used for the pretest and posttest. These four scenarios were presented in reversed-order for half the participants (Table 2). These scenarios differed in content but were matched in having two people engaging in simple interpersonal interactions. The Spill scenario was matched with the Mats scenario (top of Table 3) and the Book scenario was matched with the Game scenario (top of Table 4). The four scenarios were on average 78 words long ± 13 words. The scenarios’ Bormuth Grade Level ranged between grade 7.5 and grade 8.2 in reading difficulty. The Bormuth Grade Level uses word length in characters and sentence length in words to determine a grade level.

The other pair of scenarios, Pen/Plate, was used as stimuli for the exercises that the participants worked on in the pilot and Experiment 1. These scenarios also differed in content and were matched in having two people engage in an interpersonal
Table 2

**Counterbalancing of Scenarios and Questionnaires**

<table>
<thead>
<tr>
<th>Test</th>
<th>Order A</th>
<th>Order B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest</td>
<td>Spill</td>
<td>Mats</td>
</tr>
<tr>
<td></td>
<td>Book</td>
<td>Game</td>
</tr>
<tr>
<td>Posttest</td>
<td>Mats</td>
<td>Spill</td>
</tr>
<tr>
<td></td>
<td>Game</td>
<td>Book</td>
</tr>
<tr>
<td>Follow-Up*</td>
<td>Spill</td>
<td>Mats</td>
</tr>
</tbody>
</table>

*Note. All participants read the Spill, Book, Mats, and Game scenarios and applied the systemic constructivist constructs to interpreting the scenarios. For half of the participants, the scenarios were presented in reversed order. There was no statistically significant difference between the scores of participants who were given the scenarios in order A or order B.

* Follow-up data was collected for Experiment 1 and Experiment 2 but not for the pilot study.
Table 3

Matched Spill and Mats Scenarios and Apply-1 Questions

<table>
<thead>
<tr>
<th>Scenarios</th>
<th>Spilling the Drink Scenario (Spill)</th>
<th>Placemats on the Table Scenario (Mats)</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Julie,” said Wendy, “the bowl, please.” Julie reached around the candle, picked up the bowl of salad, and passed it to Wendy. “Here you are, Wendy,” said Julie. As Wendy was serving the salad onto her plate, she brushed against Julie’s glass of wine. “Sorry,” said Wendy. Wendy got up out of her chair, walked to the sink to get a cloth, wiped up the spill, then sat back down. “I broke a glass just yesterday,” said Julie.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>“Sandra,” said Bill, “it’s six now, could you help me?” Sandra put the cat on the floor, went to cupboard, and took out four placemats. “Should I put these on the table?” she asked. “That’s right,” replied her father. “just set them down around the table.” Sandra walked over to the table and put the placemats on the table. “Remember,” said Bill. “Katey will be late today.” Sandra took one of the placemats off the table and went into the kitchen. “I put them on the table,” she said to her father who was carrying the plates and cutlery. “Thank you,” said her father.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Construct</th>
<th>Spill Questions</th>
<th>Mats Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Context</td>
<td>Using the concept of context, explain why Wendy said “sorry.”</td>
<td>Using the concept of context, explain why Sandra’s father said “thank you.”</td>
</tr>
<tr>
<td>Sign</td>
<td>Using the concept of sign, discuss the meaning of “the bowl, please.”</td>
<td>Using the concept of sign, discuss the meaning of “six.”</td>
</tr>
<tr>
<td>Purposivity</td>
<td>Using the concept of purposivity, explain what the candle may have meant to Julie.</td>
<td>Using the concept of purposivity, explain what the cat may have meant to Sandra.</td>
</tr>
<tr>
<td>Difference-Object</td>
<td>(a.) Discuss the salad bowl using the concepts of difference and object.</td>
<td>(a.) Discuss the placemats using the concepts of difference and object.</td>
</tr>
<tr>
<td></td>
<td>(b.) Using the concepts of difference and object, explain why Julie and Wendy appear to understand each other.</td>
<td>(b.) Using the concepts of difference and object, explain why the father and daughter appear to understand each other.</td>
</tr>
</tbody>
</table>

Note. Scenario and questions in the first column were matched with the scenario and questions in the second column.
Table 4

Matched Book and Game Scenarios and Apply-2 Questions

<table>
<thead>
<tr>
<th>Reading a Book Scenario (Book)</th>
<th>Watching the Game Scenario (Game)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cindy was sitting on the porch reading a book.</td>
<td>Lisa heard the front door being unlocked.</td>
</tr>
<tr>
<td>She heard the screen door open and saw Florence, her mother, come out of the house holding</td>
<td>John walked into the room and stood behind Lisa who was reading a book.</td>
</tr>
<tr>
<td>&quot;Cindy, we need more orange juice. Could you go to the store for me?&quot; asked Florence.</td>
<td>&quot;Hi,&quot; said Lisa.</td>
</tr>
<tr>
<td>Cindy turned away and continued reading her book.</td>
<td>&quot;I was out with the guys,&quot; said John.</td>
</tr>
<tr>
<td>&quot;Could you go to the store?&quot; asked Florence, louder. &quot;Didn't you hear me?&quot; Florence turned</td>
<td>&quot;Sure,&quot; said Lisa.</td>
</tr>
<tr>
<td>around and went back into the house.</td>
<td>&quot;Really,&quot; said John, &quot;we were just watching the game.&quot;</td>
</tr>
<tr>
<td>A tear fell from Cindy's eye and landed on her book.</td>
<td>&quot;I didn't say you weren't with them,&quot; said Lisa with her eyes on her book.</td>
</tr>
<tr>
<td></td>
<td>&quot;Don't give me that,&quot; said John, &quot;you can call them if you want.&quot;</td>
</tr>
<tr>
<td></td>
<td>&quot;I know what they will probably say,&quot; said Lisa.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Construct</th>
<th>Book Questions</th>
<th>Game Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Context</td>
<td>Using the concept of context, what might be a possible explanation of Cindy's</td>
<td>Using the concept of context, what might be a possible explanation of Lisa's behaviour towards John?</td>
</tr>
<tr>
<td></td>
<td>behaviour toward Florence?</td>
<td></td>
</tr>
<tr>
<td>Sign</td>
<td>Using the concept of sign, explain Cindy's reaction to Florence.</td>
<td>Using the concept of sign, explain Lisa's reaction to John's absence.</td>
</tr>
<tr>
<td>Purposivity</td>
<td>Using the concept of purposivity, explain what Cindy's reading may have meant</td>
<td>Using the concept of purposivity, explain what Lisa's looking at her book may have meant to John.</td>
</tr>
<tr>
<td></td>
<td>to Florence.</td>
<td></td>
</tr>
<tr>
<td>Difference-Object</td>
<td>Using the concepts of difference and object, discuss Cindy's knowledge that</td>
<td>Using the concepts of difference and object, discuss Lisa's knowledge that John was home.</td>
</tr>
<tr>
<td></td>
<td>Florence was on the porch.</td>
<td></td>
</tr>
</tbody>
</table>

Note. Scenario and questions in the first column were matched with the scenario and questions in the second column.
interaction. The scenarios were 138 words and 191 words-long. The scenarios’ Bormuth Grade Level was grade 7.5 for the Pen scenario and 7.8 for the Plate scenario.

Measures. Two types of measures were used. A demographic measure (Appendix 2) and a measure of construct learning. Demographic information was obtained about each participant: gender, age, marital status, education (highest level of education attained, number of years of education, part or full-time educational status, major, year in program), employment status and description of occupation, household income, and first language.

The questionnaire assessing construct learning was divided into seven sections related to the systemic-constructivist constructs of context, sign, purposivity, difference-object, causality, nonconscious structuring, and self-ordering. Each of the seven construct sections contained three questions. The first question was a definition question. The definition question asked the participant to define the construct, for example, “Define context.” The second and third questions were application questions. Application questions asked the participant to apply the construct by interpreting the scenarios. For example, “Using the concept of context, explain why Wendy said ‘sorry.’”

The three pairs of scenarios were written so that the questions about the scenarios and answers to the questions were identical except for minor changes regarding the content of the scenarios. For example, the Spill question, “Using the
concept of context, explain why Wendy said “sorry” was matched with the Mats question “Using the concept of context, explain why Sandra’s father said “thank you.” Likewise, the Book question, “Using the concept of purposivity, explain what Cindy’s reading may have meant to Florence,” is matched with the Game question, “Using the concept of purposivity, explain what Lisa’s looking at her book may have meant to John” (see bottom of Table 3 and bottom of Table 4).

Procedure

Participants registered for the pilot in the manner described in the Subjects section. All participants were sent a confirmation of registration (Appendix 3).

Participants arrived at the pilot at 8:30 a.m. The facilitator began with a brief introduction to experiential epistemology and provided an overview of the weekend’s activities and schedule (Appendix 4). The introduction was followed by the administration of the consent form, pretest, and demographic information form.

Over the course of the two days, the participants were introduced to the concepts of context, signification, causality, difference-object, nonconscious structuring, purposivity, and self-ordering. An experiential method was used to teach each construct to the participants.

For example, for each construct, participants worked in small groups and carried out several experiential exercises related to the construct (Appendix 5). Each experiential exercise was followed by a discussion about how the exercise demonstrated
the construct. Next, participants read over the Pen and Plate scenarios and were asked to apply the construct to these scenarios. Finally, participants discussed their answers to the questions with the larger group. After a construct was discussed, a break was given.

At the end of the second day, each of the participants was given a posttest and a feedback form. Participants worked independently on these tasks.

Design

Pilot participants were given pretests, posttests, and feedback forms. Data from the pretests and posttests was used to refine the questionnaires, design the scoring criteria, and decide upon which of the seven concepts to include in Experiment 1 and Experiment 2. The procedures that were followed in Experiment 1 were modified based upon participant feedback and consultation with the expert participant. The modified procedures are described in the following Procedure section. Other than descriptive statistics of the demographic data, no statistical analyses were performed on the pilot study data.

Experiment 1

The purpose of Experiment 1 was to show that the experiential instructional method can be used to teach participants the systemic-constructivist constructs.
Participants

Twelve professionals, graduate students, undergraduate students, and a non-student paid a $10.00 lunch-and-beverage fee to participate in a weekend-long experiment. (The fee covered the cost of beverages and lunch.) Pretest and post data were obtained from 10 of the participants. Of the 4 participants who did not complete the experiment, 1 participant was ill, 1 participant had expected the content to be more directly related to psychotherapy than to epistemology in every-day life, and 2 participants did not provide reasons for discontinuing. Follow-up data were obtained from 5 participants. (Demographic data are presented in Table 1.)

Setting and Materials

Experiment 1 took place in same location as the pilot study. Materials required for the exercises were also identical. Please refer to the Materials section of the pilot study for a description of the materials used in Experiment 1.

Questionnaires

The questionnaires used for Experiment 1 were shortened and modified versions of the questionnaires used in the pilot study. Questions were asked about only four of the seven constructs: context, sign, purposivity, and difference-object (see following Procedure subsection and Appendix 6). These four constructs were deemed to be both the most diverse and representative of the systemic-constructivist constructs taught in the pilot study.
**Questionnaire Scoring**

All questionnaires were scored by two judges who were blind to whether they were judging pretest or posttest data and also blind to the instructional condition assignment of the ratees (see Experiment 2). Judges were clinical psychologists who have read numerous books and articles related to the systemic-constructivist theory and who have applied this theory to their own theoretical and clinical endeavours.

Answers to the questions were scored following the WAIS-R Comprehension Subtest procedure. The procedure is described by Wechsler (1981) as follows:

Each item is scored 2, 1, or 0, depending on the degree of understanding expressed and the quality of the response. In scoring each item, the examiner should match the subject's response against the general criteria and the sample answers given below for each question. Undoubtedly, some subjects will give unusual responses which are not typified by the sample answers. In such instances, the score should be determined by the examiner's own judgement. Most of the 0-point examples given typify marginal responses....Particular care should be exercised in scoring items which require two correct responses for full credit (these items are indicated by an asterisk preceding the item number). In order to receive full credit, the subject must express at least two of the general
ideas which are indicated. Full credit cannot be given if the subject
gives two answers, both of which express the same idea. (p. 125)

The judges, who were already trained in WAIS-R Comprehension scoring
procedures, received 3 hours of training in the rating of the scenarios. Two examples
drawn from the data in the study were used in the training. These training examples
were excluded from the calculations of interrater reliability.

Judges were provided with (a) photocopies of the completed pretest, posttest,
and follow-up tests, (b) copies of the four scenarios, (c) scoring criteria, (d) scoring
sheets, (e) and a copy of the readings that were given to the reading condition in
Experiment 2. (Scoring criteria are presented in Appendix 7.)

Procedure

Participants arrived at the laboratory at 8:30 a.m. The procedures followed
were identical to the procedures utilised in the pilot study, with some minor
modifications based upon the feedback from the pilot study (Day’s schedule: Appendix
4: Exercises: Appendix 5).

The following procedural modifications were made in Experiment 1 based upon
the feedback forms completed by the pilot study participants and based upon
consultation with the expert participant.

1. Pilot participants found it too difficult and time consuming to provide definitions and
scenario analyses for seven constructs. To minimise the time of the task, without sacrificing the integrity of the data, four concepts were chosen for data analysis that were deemed to provide the broadest representation of the systemic-constructivist theory. The constructs chosen were context, sign, purposivity, and difference-object. All of the data were collected on the first day, leaving the second day to discuss the remaining constructs of causality, nonconscious structuring, and self-ordering.

2. Several experiential epistemology exercises were modified and a few were added so that each construct would fit into a one-hour time period.

3. A group task that involved having participants discuss the Pen/Plate scenarios was eliminated. For this task participants had been expected to decide upon an answer that the members agreed upon. Group members had difficulty finding an effective strategy for arriving at a group consensus in the time allotted.

4. The name of the concept “signification” was changed to “sign” because the group members thought the term made the concept sound more complicated than necessary.

5. The length of time of the experiment was shortened by a half-hour each day.

6. A consent form was created asking for permission to contact the participants at a later date for follow-up data (Appendix 8).
Design

A within-subjects design was used in Experiment 1. Time was the within-subjects factor and comprised two repeated measurements — pretest and posttest. Two measurements were taken at each time interval, whereby the participants were asked to define the constructs and apply the constructs to interpersonal scenarios.

Experiment 2: Instructional Conditions

The purpose of Experiment 2 was to compare four instructional methods of teaching the systemic-constructivist constructs. The instructional conditions were an experiential condition (EC), reading condition (RC), lecture condition (LC), and no-instruction control condition (CC).

Participants

Sixty undergraduate students in a Social Psychology course volunteered to participate in the day-long experiment in exchange for three course credit points. Fifty-six of these students could be reached by telephone and confirmed their intention to attend the experiment. Although the experimenter's intention was to have between 8-12 participants per group, 14 students were called for each group to insure against poor attendance. Students were randomly assigned to three instructional-method conditions and a no-instruction control condition.

Complete pretest and posttest data were obtained from 10 EC participants, 9 LC
participants, 10 RC participants, and 12 CC participants. Follow-up data were obtained from 9 EC participants, 7 RC participants, 9 LC participants, and 9 CC participants (Table 5).

Setting and Materials

The setting was a conference room in the Department of Psychology. The room was approximately the same size as the conference room used in Experiment 1.

Materials required for Experiment 2 varied depending upon the instructional method employed. For the EC, the materials used were identical to the materials used in the pilot and Experiment 1. Refer to the Pilot Study section and Setting and Materials subsections for a description of the materials used in this condition.

For the RC, each participant was provided with a self-study manual (Appendix 9). The manual was an 18-page bound document. The manual was divided into five sections. The first four sections were about (a) context, (b) sign, (c) purposivity, and (d) difference-object. Each of these four sections introduced one systemic-constructivist construct, provided examples of the construct applied to everyday situations that matched the experiential exercises, and presented the Pen/Plate scenarios and the corresponding questions. (e) The fifth section provided complete answers to all the Pen/Plate questions.

No materials were required for the LC or CC. In the LC, exercises were described to the participants as examples, so that participants were not involved with
## Table 5

Demographic Characteristics of Experiential, Reading, Lecture, and Control Conditions

<table>
<thead>
<tr>
<th>Variable</th>
<th>Experiential</th>
<th>Reading</th>
<th>Lecture</th>
<th>Control</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>N (2)</td>
<td>3 (23.3)</td>
<td>3 (24.2)</td>
<td>1 (11.1)</td>
<td>1 (11.1)</td>
</tr>
<tr>
<td>Female</td>
<td>N (4)</td>
<td>6 (66.7)</td>
<td>4 (57.1)</td>
<td>8 (88.9)</td>
<td>8 (88.9)</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td>M (SD)</td>
<td>23.3 (4.1)</td>
<td>22.1 (0.7)</td>
<td>24.2 (6.8)</td>
<td>23.2 (6.0)</td>
</tr>
<tr>
<td><strong>Marital Status</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>N (1)</td>
<td>8 (88.9)</td>
<td>7 (100.0)</td>
<td>7 (77.3)</td>
<td>8 (88.9)</td>
</tr>
<tr>
<td>Cohabiting</td>
<td>N (1)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>1 (11.1)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Married</td>
<td>N (1)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>1 (11.1)</td>
<td>1 (11.1)</td>
</tr>
<tr>
<td>Divorced</td>
<td>N (1)</td>
<td>1 (11.1)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td><strong>Educational Status</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Part-Time</td>
<td>N (1)</td>
<td>3 (33.3)</td>
<td>0 (0.0)</td>
<td>2 (22.2)</td>
<td>1 (11.1)</td>
</tr>
<tr>
<td>Full-Time</td>
<td>N (1)</td>
<td>6 (66.7)</td>
<td>7 (100.0)</td>
<td>7 (77.8)</td>
<td>8 (88.9)</td>
</tr>
<tr>
<td><strong>Years of Education</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M (SD)</td>
<td>15.8 (1.1)</td>
<td>15.7 (1.4)</td>
<td>16.2 (1.7)</td>
<td>16.1 (1.1)</td>
<td>16.0 (1.3)</td>
</tr>
<tr>
<td><strong>Program</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soc. Sci.</td>
<td>N (1)</td>
<td>5 (55.6)</td>
<td>3 (42.9)</td>
<td>8 (88.9)</td>
<td>6 (66.7)</td>
</tr>
<tr>
<td>Humanities</td>
<td>N (1)</td>
<td>1 (11.1)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>1 (11.1)</td>
</tr>
<tr>
<td>Phy. Sci.</td>
<td>N (1)</td>
<td>3 (33.3)</td>
<td>4 (57.1)</td>
<td>1 (11.1)</td>
<td>1 (11.1)</td>
</tr>
<tr>
<td><strong>Employment Status</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemployed</td>
<td>N (1)</td>
<td>4 (44.4)</td>
<td>6 (66.6)</td>
<td>3 (33.3)</td>
<td>17 (50.0)</td>
</tr>
<tr>
<td>Part-Time</td>
<td>N (1)</td>
<td>3 (33.3)</td>
<td>3 (42.9)</td>
<td>6 (66.6)</td>
<td>15 (44.1)</td>
</tr>
<tr>
<td>Full-Time</td>
<td>N (1)</td>
<td>2 (22.2)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td><strong>Income</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$0-$9,999</td>
<td>N (1)</td>
<td>6 (66.7)</td>
<td>3 (42.9)</td>
<td>3 (33.3)</td>
<td>1 (11.1)</td>
</tr>
<tr>
<td>&gt;$10,000</td>
<td>N (1)</td>
<td>1 (11.1)</td>
<td>1 (14.3)</td>
<td>2 (22.2)</td>
<td>1 (11.1)</td>
</tr>
<tr>
<td>&gt;$20,000</td>
<td>N (1)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>2 (22.2)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>&gt;$30,000</td>
<td>N (1)</td>
<td>2 (22.2)</td>
<td>1 (14.3)</td>
<td>3 (11.1)</td>
<td>1 (11.1)</td>
</tr>
<tr>
<td>&gt;$40,000</td>
<td>N (1)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>1 (11.1)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>&gt;$50,000</td>
<td>N (1)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>2 (22.2)</td>
<td>2 (22.2)</td>
</tr>
<tr>
<td>&gt;$60,000</td>
<td>N (1)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>1 (11.1)</td>
</tr>
<tr>
<td>&gt;$70,000</td>
<td>N (1)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>&gt;$80,000</td>
<td>N (1)</td>
<td>0 (0.0)</td>
<td>1 (11.1)</td>
<td>0 (0.0)</td>
<td>2 (22.2)</td>
</tr>
<tr>
<td>&gt;$90,000</td>
<td>N (1)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>1 (11.1)</td>
</tr>
<tr>
<td><strong>First Language</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>English</td>
<td>N (1)</td>
<td>7 (77.8)</td>
<td>5 (71.4)</td>
<td>8 (88.9)</td>
<td>8 (88.9)</td>
</tr>
<tr>
<td>Chinese</td>
<td>N (1)</td>
<td>2 (22.2)</td>
<td>1 (14.3)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>French</td>
<td>N (1)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>1 (11.1)</td>
</tr>
<tr>
<td>Hungarian</td>
<td>N (1)</td>
<td>0 (0.0)</td>
<td>1 (14.3)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Italian</td>
<td>N (1)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>1 (11.1)</td>
</tr>
</tbody>
</table>

*Total N = 34. Soc. Sci = social science; Phy. Sci = physical science.
any physical manipulation of materials. In the CC, participants did not partake in any exercises.

Procedure

Procedures common to all instructional conditions. At 8:45, a brief introduction to the day was given and participants were told that they were participating in an experiment which involved learning to define and apply constructivist concepts to everyday situations. At 9:00 a.m. each participant completed a consent form, a demographic information sheet and the pretest. The Pen/Plate scenario exercise was completed by participants in the EC, RC, and LC (Appendix 5).

Experiential condition. The procedure for this day paralleled the first day of Experiment 1. Participants took part in experiential exercises, group discussion, and scenario analysis all directed at teaching them the four systemic-constructivist constructs. They were introduced to the constructs of context, sign, purposivity, and difference-object. For a description of the day's activities, please refer to the Procedure subsection of the preceding experiment as well as Appendix 5 and Appendix 6.

Reading condition. Participants in the RC were given a self-study manual (see Materials above for description of the manual, or see Appendix 10 for complete text). The manual covered the same curriculum as the EC; however, the instructional method differed. Participants worked at their own pace throughout the day, reading about the
systemic-constructivist concepts and answering the questions. Answers were provided in the back of the self-study manual and participants were encouraged to make use of the answers in the manner that would best help them to learn the material. Participants did not have access to any study materials when writing the posttest or follow-up test.

**Lecture condition.** Participants were provided with a lecture that covered the content of the self-study manual. The facilitator introduced a systemic-constructivist construct and described the experiential examples that were designed for the experiential condition. Participants did not take part in any experiential exercises and group discussion was not encouraged. All other aspects of the LC were matched with the EC. After each lecture, the participants completed the Pen/Plate exercises. Four lecture and exercise units were completed, each taking approximately 45 minutes. Breaks were lengthened in order for the starting times for the constructs covered in the LC to match the starting times for the constructs covered in the EC.

**Control condition.** Participants in the CC were not instructed in the systemic-constructivist theory during the day. They were told to use the day as they pleased providing they did not discuss the pretest with any of the other CC participants. Participants returned at 3:00 p.m. to complete the post-test.

**Posttest and follow-up for all conditions.** The posttest and a consent form for the follow-up test was administered at 3:00 p.m. Participants were given a follow-up test three weeks after completing the posttest. The follow-up test was completed in the
lecture hall where they attended their psychology class. Students who did not attend their class that day were contacted by telephone and an appointment was made to have them complete the follow-up test. Each student who could not be reached by the telephone was sent a copy of the follow-up questionnaire in the mail with a pre-stamped reply envelope.

Design

Model. A mixed two-factor design was used in Experiment 2. Instructional method was the between-subjects factor which comprised four levels — experiential, reading, lecture, and control. Time was the within-subjects factor which was composed of three repeated measurements — pretest, posttest, and follow-up test. Two measurements were taken at each time interval, whereby the participants were asked to define the constructs and apply the constructs to interpersonal scenarios.
RESULTS

Analysis of data was conducted in two parts — the preliminary analysis and the major analysis. The preliminary analysis involved five stages: (a) data screening was carried out for Experiment 1 and Experiment 2 to check for missing data, (b) interrater reliabilities were calculated, (c) composite variables were produced for use in later analyses, (d) the two forms of the questionnaire were tested for differences, (e) data were tested to insure the statistical assumptions for ANOVA were met, and (f) the Experiment 2 pretest data were tested for differences between conditions. The results of these procedures are presented in the first section of this chapter.

The major analysis involved two stages: (a) For the major analyses of Experiment 1, paired t-tests were conducted to compare the within-group changes between the pretest and posttest on the define and apply variables. (b) For the major analysis of Experiment 2, a series of repeated measures ANOVAs, one-way ANOVAs, planned comparison tests, and Scheffe post hoc comparison tests was used to compare the instructional groups and to test for within-group changes on the Define and Apply variables. All statistical procedures were conducted using the Statistical Package for the Social Sciences for Windows Release 6.0 (SPSS, Inc., 1994).

Preliminary Analysis

In the preliminary analysis, the following procedures were carried out with the data sets from Experiment 1 and Experiment 2: (a) The data sets were examined for missing values, (b) interrater reliabilities were calculated, (c) composite variables were
produced, (d) the two orders of questionnaire presentation were compared, (e) the
data were examined for fit with the statistical assumptions of ANOVA, and (f) the
Experiment 2 pre-test data were tested for differences between conditions.

**Missing Data**

Following data collection, data from Experiment 1 and Experiment 2 was
examined for missing responses. Where data was missing, procedures were followed
to either remove the questionnaire from the analysis, delete the case from the analysis,
or substitute a data point for the missing value.

In Experiment 1, there were no missing demographic data. Complete pretest
and posttest data were obtained for N=10 participants. Five of the ten participants,
however, did not return their follow-up tests in time for the data analysis. Rather than
delete the five cases with missing values, no follow-up data were used in the analysis of
Experiment 1 data.

In Experiment 2, 10 of 44 participants did not complete the follow-up test. The
10 incomplete cases were deleted, leaving complete pretest, posttest, and follow-up
data for N=34 participants. There was only one other instance of missing data in
Experiment 2. A demographic data question referring to income category was not
answered by a person in the LC. To address this issue, the procedure specified by
Tabachnick and Fidell (1989) was followed: the mean was calculated from the available
group data and used to replace the missing value.
The \( n \) for the instructional conditions in Experiment 2 were unequal, with the experiential condition’s \( n = 9 \), reading condition’s \( n = 7 \), lecture condition’s \( n = 9 \), and control condition’s \( n = 9 \). Analysis of data with unequal sample sizes is permitted for two reasons. First, there were more participants in the smallest group than there were dependent variables measured in any one analysis. Second, each hypothesis was tested as if in a one-way design (unequal \( n \) creates difficulties only in designs with more than one independent variable) (Tabachnick and Fidell, 1989).

**Interrater Reliability**

Interrater reliability was calculated using both Kappa (\( \kappa \), Cohen, 1968) and intraclass coefficients (ICC, Shrout & Fleiss 1979). Kappa is a measure of the proportion of agreement between judges after chance agreement has been removed from the analysis. Although Kappa is best suited for categorical data, the Kappa coefficient is traditionally included in evaluating rater’s agreement on ordinal scales. The intraclass coefficient, ideally suited for ordinal data, measures how closely raters agree for each subject (Bartko, 1991).

Kappa and intraclass coefficients were calculated on two judge’s ratings of all the participants’ questionnaire responses in Experiment 1 and Experiment 2. (Table 6; Appendix 10). Prior to the major analyses, data from two cases with perfect agreement between judges were eliminated from the interrater reliability calculations because they had been used as training cases for scoring. All other completed pretest (\( N = 53 \)),
### Table 6

**Interrater Reliability Coefficients for Pretest, Posttest, and Follow-Up Test Variables**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pretest&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Posttest&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Follow-Up&lt;sup&gt;c&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>κ</td>
<td>ICC</td>
<td>κ</td>
</tr>
<tr>
<td><strong>Context</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Define</td>
<td>.60</td>
<td>.70</td>
<td>.65</td>
</tr>
<tr>
<td>Apply 1</td>
<td>.40</td>
<td>.58</td>
<td>.45</td>
</tr>
<tr>
<td>Apply 2</td>
<td>.51</td>
<td>.66</td>
<td>.60</td>
</tr>
<tr>
<td><strong>Sign</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Define</td>
<td>.48</td>
<td>.79</td>
<td>.49</td>
</tr>
<tr>
<td>Apply 1</td>
<td>.41</td>
<td>.63</td>
<td>.40</td>
</tr>
<tr>
<td>Apply 2</td>
<td>.40</td>
<td>.80</td>
<td>.41</td>
</tr>
<tr>
<td><strong>Purposivity</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Define</td>
<td>.46</td>
<td>.86</td>
<td>.40</td>
</tr>
<tr>
<td>Apply 1</td>
<td>.44</td>
<td>.77</td>
<td>.70</td>
</tr>
<tr>
<td>Apply 2</td>
<td>.36</td>
<td>.75</td>
<td>.44</td>
</tr>
<tr>
<td><strong>Difference-Object</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Define</td>
<td>.49</td>
<td>.66</td>
<td>.48</td>
</tr>
<tr>
<td>Apply 1</td>
<td>.66</td>
<td>.80</td>
<td>.42</td>
</tr>
<tr>
<td>Apply 2</td>
<td>.49</td>
<td>.65</td>
<td>.50</td>
</tr>
</tbody>
</table>

*Note.* κ = Kappa; ICC = intraclass coefficients. Kappa and intraclass coefficients were obtained from an analysis of Experiment 1 and Experiment 2 completed pretests (*N = 52*), completed posttests (*N = 51*), and completed follow-up tests (*N = 37*). Dashes indicate no data was collected on these variables. The posttest questionnaire contained no Apply 2 questions.
posttest (N = 51) and follow-up test (N = 37) data were used for the reliability estimates. Separate coefficients were calculated for the definition and application questions of each construct (context, sign, purposivity, and difference-object) and for each time interval (pretest, posttest, and follow-up).

One judge’s rating had to be changed from a “0” to a “1” for two of the participants pretest questions that dealt with the difference-object construct. The change was necessary because \( \kappa \) and ICC intraclass coefficients require that the variables have the same range of values (\( \kappa \): Norusis, 1993; ICC: Bartko and Carpenter: 1976) and one judge had given all 0s for two of the participants’ responses and the other judge had given 0s and a few 1s for the same participant’s responses. Changing two data points from a “0” to a “1” allowed for \( \kappa \) and ICCs to be calculated for these variables. The answers changed were Judge 1’s ratings of two participants’ Define and Apply-2 responses. Cases were randomly selected and the changes were made.

Interjudge reliabilities were first measured by \( \kappa \). The thirty-two questions showed an average coefficient of .52 with a range between .36 and .81. Landis and Koch (1977) have provided ranges for evaluating the strength of agreement, using \( \kappa \) (0 to .39: poor; .40 to .74 fair to good; .75 - 1.0; excellent). Compared with these standards, the values for \( \kappa \) obtained here fall within the fair to good range. The only \( \kappa \) score in the poor range (.36) was the pretest question asking the participants to apply
the purposivity construct to a scenario. Kappa, however, provides an overly conservative measure of interjudge reliability when the data is ordinal. Kappa measures whether or not the raters agree, rather than how close is their agreement.

Intraclass coefficients were calculated for the mean of ratings for each variable (Shrout & Fleiss 1979; Nichols, 1995; Model 3 -- Rater's Fixed). These calculations showed an average score of ICC = .78 with a range between .58 and .94. The lowest value .58 occurred with the A1 pretest question about applying the construct of context to the scenario.

**Composite Variables**

As measures of internal consistency, coefficient alphas (Cronbach, 1951) were calculated for the scores on the definition questions on the four systemic-constructivist constructs: context, sign, purposivity, and difference-object. The alpha coefficient obtained for these constructs measured at three time intervals (pretest, posttest, and follow-up) indicated an internal consistency of .72. Coefficient alpha, calculated for the twelve Apply variables, indicated an internal consistency of .80.

The original dependent variable means of all pretest Define variables were then combined into one score (PRE_DEF). The procedure was also followed for the means of pretest Apply variables (PRE_APP); posttest Define (POST_DEF)and Apply variables (POST_APP); and follow-up test Define (FU_DEF) and Apply variables (FU_DEF).
Next, four more variables were created. Each of these variables assessed the gain in participant's learning. They are the change between pretest and posttest and the change between posttest and follow-up test for both Define and Apply measures. The gain scores created were PREPS_AP (Posttest Apply minus Pretest Apply); PREPS_DF (Posttest Define minus Pretest Define); PSTFU_AP (Follow-up test Apply minus Posttest Apply); and PSTFU_DF (Follow-up test Define minus Posttest Define).

**Questionnaire Presentation: Order A and Order B**

Participants in Experiment 1 and Experiment 2 were provided with the same questions and scenarios; however, for half the participants, the scenarios were presented in reverse order (Table 2). The order was reversed to insure against the possibility that one set of scenarios was more difficult than the other set of scenarios. Order-A included the Spill and Book scenarios in the pretest and the Mats and Game scenarios in the posttest. Order-B reversed the order of the presentation of the scenarios. In Order-B, the Mats and Game scenarios were in the pretest and the Spill and Book scenarios were in the posttest.

In Experiment 2, 17 participants received questionnaires in order-A and 17 participants received questionnaires in order-B. Order-A questionnaires and order-B questionnaires were distributed evenly within the composition of each instructional condition: EC, 5-4 split; RC, 3-4 split; LC, 5-4 split; and CC, 4-5 split. A one-way ANOVA was used to test for an overall difference between order A and B on the
participant responses. Results indicated that the scores of the participants who received the scenarios in order-A or order-B did not significantly differ (F(6,27) = .10). The statistical analysis corroborated the prediction that the scenarios were of equivalent difficulty.

**Statistical Assumptions**

The fit between the Experiment 2 data set and the statistical assumptions of ANOVA was assessed. Data were examined in terms of normality, univariate outliers, and homogeneity of variance. The between group design of this work required that separate tests be conducted on the data from each condition. For Experiment 1, the distribution of scores and the test for univariate outliers is described.

Assumptions for the statistical tests were assessed for the mean scores in Experiment 1 and both the mean scores and the gain scores for each condition of Experiment 2. To assess normality, the distributions of scores for each group were examined. Skewness and kurtosis were within acceptable limits for all groups.

Tests for univariate outliers were conducted using box plots. There were no outliers in the Experiment 1 mean-score data (Table 7). Univariate outliers were found in the mean-score data of Experiment 2. There were 5 outliers in the CC, one outlier in the RC, no outliers in the LC, and two outliers in the EC. The procedure documented by Tabachnick & Fidell (1989) was followed: the outliers were adjusted toward the mean so that the outliers were one unit more extreme than the next most
Table 7

Descriptive Statistics for Experiment 1 Pretest and Posttest Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>M</th>
<th>SD</th>
<th>Var</th>
<th>Kurt</th>
<th>KSE</th>
<th>Skew</th>
<th>SSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PRE_DEF</td>
<td>.39</td>
<td>.35</td>
<td>.12</td>
<td>-.89</td>
<td>1.33</td>
<td>.69</td>
<td>.62</td>
</tr>
<tr>
<td>PRE_APP</td>
<td>.28</td>
<td>.26</td>
<td>.07</td>
<td>-.44</td>
<td>1.33</td>
<td>.69</td>
<td>.72</td>
</tr>
<tr>
<td>Posttest</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>POST_DEF</td>
<td>.80</td>
<td>.33</td>
<td>.11</td>
<td>.04</td>
<td>1.33</td>
<td>.69</td>
<td>.12</td>
</tr>
<tr>
<td>POST_APP</td>
<td>.68</td>
<td>.43</td>
<td>.19</td>
<td>-.69</td>
<td>1.33</td>
<td>.69</td>
<td>.73</td>
</tr>
</tbody>
</table>

Note. PRE_DEF = pretest define; PRE_APP = pretest apply; POST_DEF = posttest define; POST_APP = posttest apply. Var = Variance; Kurt = kurtosis; KSE = kurtosis standard error; SSE = skew standard error. N = 10.
extreme score.

Gain scores, which are differences in the mean scores, were affected by the change in mean-score outliers. Although there were a few gain-score outliers, the decision was made to leave these gain scores in the data set without adjustment. The decision against adjusting the gain scores was made because their adjustment significantly decreased the homogeneity of variance between groups. For this reason, only the mean-score outliers were adjusted, and the effect of this adjustment on the assumptions of normality and homogeneity of variance was tested for each group.

The result of adjusting the univariate outliers was that the statistical assumptions for ANOVA were met. The distribution for each group was close to normal as assessed by variable skew and kurtosis and variance between groups was homogeneous as assessed using the Box M test with the .001 criterion specified by Tabachnick & Fidell (1989) (Table 8 and Table 9).

**Pretest Comparison**

Participants in Experiment 2 were randomly assigned to either the EC, RC, LC, or CC. During the pretest, no statistically significant difference was expected between instructional conditions in their abilities to define the systemic-constructivist constructs or apply the systemic-constructivist constructs to the interpersonal scenarios.

Two one-way ANOVAs were used to compare the pretest Define and Apply variables across groups. There were no statistically significant differences between
Table 8

Descriptive Statistics for Experiment 2 Pretest, Posttest, and Follow-Up Test Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>n</th>
<th>M</th>
<th>SD</th>
<th>Var</th>
<th>Kurt</th>
<th>KSE</th>
<th>Skew</th>
<th>SSE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pretest</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experimental</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PRE_DEF</td>
<td>9</td>
<td>.21</td>
<td>.19</td>
<td>.04</td>
<td>1.43</td>
<td>1.40</td>
<td>.72</td>
<td>.15</td>
</tr>
<tr>
<td>PRE_APP</td>
<td>9</td>
<td>.17</td>
<td>.14</td>
<td>.02</td>
<td>1.56</td>
<td>1.40</td>
<td>.72</td>
<td>.27</td>
</tr>
<tr>
<td>Reading</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PRE_DEF</td>
<td>7</td>
<td>.11</td>
<td>.11</td>
<td>.01</td>
<td>1.77</td>
<td>1.59</td>
<td>.79</td>
<td>.38</td>
</tr>
<tr>
<td>PRE_APP</td>
<td>7</td>
<td>.29</td>
<td>.25</td>
<td>.06</td>
<td>.79</td>
<td>1.59</td>
<td>.79</td>
<td>.39</td>
</tr>
<tr>
<td>Lecture</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PRE_DEF</td>
<td>9</td>
<td>.10</td>
<td>.10</td>
<td>.01</td>
<td>1.28</td>
<td>1.40</td>
<td>.72</td>
<td>.50</td>
</tr>
<tr>
<td>PRE_APP</td>
<td>9</td>
<td>.33</td>
<td>.15</td>
<td>.02</td>
<td>.10</td>
<td>1.40</td>
<td>.72</td>
<td>.17</td>
</tr>
<tr>
<td>Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PRE_DEF</td>
<td>9</td>
<td>.14</td>
<td>.12</td>
<td>.01</td>
<td>2.02</td>
<td>1.40</td>
<td>.72</td>
<td>.25</td>
</tr>
<tr>
<td>PRE_APP</td>
<td>9</td>
<td>.32</td>
<td>.21</td>
<td>.05</td>
<td>.29</td>
<td>1.40</td>
<td>.72</td>
<td>.17</td>
</tr>
<tr>
<td><strong>Posttest</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experimental</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>POST_DEF</td>
<td>9</td>
<td>1.06</td>
<td>.36</td>
<td>.13</td>
<td>1.00</td>
<td>1.40</td>
<td>.72</td>
<td>.31</td>
</tr>
<tr>
<td>POST_APP</td>
<td>9</td>
<td>.69</td>
<td>.28</td>
<td>.08</td>
<td>.61</td>
<td>1.40</td>
<td>.72</td>
<td>.01</td>
</tr>
<tr>
<td>Reading</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>POST_DEF</td>
<td>7</td>
<td>1.71</td>
<td>.26</td>
<td>.07</td>
<td>2.05</td>
<td>1.59</td>
<td>.79</td>
<td>.11</td>
</tr>
<tr>
<td>POST_APP</td>
<td>7</td>
<td>1.13</td>
<td>.66</td>
<td>.44</td>
<td>1.56</td>
<td>1.59</td>
<td>.79</td>
<td>.62</td>
</tr>
<tr>
<td>Lecture</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>POST_DEF</td>
<td>9</td>
<td>.89</td>
<td>.38</td>
<td>.14</td>
<td>.87</td>
<td>1.40</td>
<td>.72</td>
<td>.79</td>
</tr>
<tr>
<td>POST_APP</td>
<td>9</td>
<td>.85</td>
<td>.43</td>
<td>.18</td>
<td>1.27</td>
<td>1.40</td>
<td>.72</td>
<td>.10</td>
</tr>
<tr>
<td>Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>POST_DEF</td>
<td>9</td>
<td>.17</td>
<td>.16</td>
<td>.02</td>
<td>1.50</td>
<td>1.40</td>
<td>.72</td>
<td>.27</td>
</tr>
<tr>
<td>POST_APP</td>
<td>9</td>
<td>.40</td>
<td>.07</td>
<td>.01</td>
<td>.72</td>
<td>1.40</td>
<td>.72</td>
<td>.49</td>
</tr>
<tr>
<td><strong>Follow-Up</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experimental</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FU_DEF</td>
<td>9</td>
<td>.44</td>
<td>.44</td>
<td>.19</td>
<td>1.47</td>
<td>1.40</td>
<td>.72</td>
<td>1.33</td>
</tr>
<tr>
<td>FU_APP</td>
<td>9</td>
<td>.47</td>
<td>.27</td>
<td>.07</td>
<td>.95</td>
<td>1.40</td>
<td>.72</td>
<td>.96</td>
</tr>
<tr>
<td>Reading</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FU_DEF</td>
<td>7</td>
<td>1.07</td>
<td>.44</td>
<td>.20</td>
<td>1.96</td>
<td>1.59</td>
<td>.79</td>
<td>.13</td>
</tr>
<tr>
<td>FU_APP</td>
<td>7</td>
<td>.82</td>
<td>.19</td>
<td>.04</td>
<td>.82</td>
<td>1.59</td>
<td>.79</td>
<td>.61</td>
</tr>
<tr>
<td>Lecture</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FU_DEF</td>
<td>9</td>
<td>.35</td>
<td>.22</td>
<td>.05</td>
<td>.55</td>
<td>1.40</td>
<td>.72</td>
<td>1.08</td>
</tr>
<tr>
<td>FU_APP</td>
<td>9</td>
<td>.32</td>
<td>.17</td>
<td>.03</td>
<td>.19</td>
<td>1.40</td>
<td>.72</td>
<td>.56</td>
</tr>
<tr>
<td>Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FU_DEF</td>
<td>9</td>
<td>.16</td>
<td>.18</td>
<td>.03</td>
<td>.14</td>
<td>1.40</td>
<td>.72</td>
<td>.87</td>
</tr>
<tr>
<td>FU_APP</td>
<td>9</td>
<td>.25</td>
<td>.18</td>
<td>.03</td>
<td>.29</td>
<td>1.40</td>
<td>.72</td>
<td>.00</td>
</tr>
</tbody>
</table>

Note. PRE_DEF = pretest define; PRE_APP = pretest apply; POST_DEF = posttest define; POST_APP = posttest apply; FU_DEF = follow-up define; FU_APP = follow-up apply. Var = Variance; Kurt = kurtosis; KSE = kurtosis standard error; SSE = skew standard error.
### Table 9

**Descriptive Statistics for Experiment 2 Gain-Score Variables**

<table>
<thead>
<tr>
<th>Variable</th>
<th>n</th>
<th>M</th>
<th>SD</th>
<th>Var</th>
<th>Kurt</th>
<th>KSE</th>
<th>Skew</th>
<th>SSE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Experiential</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PREPS_DF</td>
<td>9</td>
<td>.85</td>
<td>.42</td>
<td>.18</td>
<td>-1.48</td>
<td>1.40</td>
<td>.72</td>
<td>.59</td>
</tr>
<tr>
<td>PREPS_AP</td>
<td>9</td>
<td>.52</td>
<td>.32</td>
<td>.10</td>
<td>-1.33</td>
<td>1.40</td>
<td>.72</td>
<td>-.18</td>
</tr>
<tr>
<td>POSTFU_DF</td>
<td>9</td>
<td>-.61</td>
<td>.41</td>
<td>.17</td>
<td>-.67</td>
<td>1.40</td>
<td>.72</td>
<td>-.30</td>
</tr>
<tr>
<td>POSTFU_AP</td>
<td>9</td>
<td>-.22</td>
<td>.33</td>
<td>.11</td>
<td>.22</td>
<td>1.40</td>
<td>.72</td>
<td>1.06</td>
</tr>
<tr>
<td><strong>Reading</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PREPS_DF</td>
<td>7</td>
<td>1.61</td>
<td>.23</td>
<td>.05</td>
<td>-.44</td>
<td>1.59</td>
<td>.79</td>
<td>.74</td>
</tr>
<tr>
<td>PREPS_AP</td>
<td>7</td>
<td>.84</td>
<td>.50</td>
<td>.25</td>
<td>-1.37</td>
<td>1.59</td>
<td>.79</td>
<td>.02</td>
</tr>
<tr>
<td>POSTFU_DF</td>
<td>7</td>
<td>-.64</td>
<td>.32</td>
<td>.10</td>
<td>-1.31</td>
<td>1.59</td>
<td>.79</td>
<td>.37</td>
</tr>
<tr>
<td>POSTFU_AP</td>
<td>7</td>
<td>-.30</td>
<td>.55</td>
<td>.31</td>
<td>-1.27</td>
<td>1.59</td>
<td>.79</td>
<td>.40</td>
</tr>
<tr>
<td><strong>Lecture</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PREPS_DF</td>
<td>9</td>
<td>.79</td>
<td>.36</td>
<td>.13</td>
<td>-1.58</td>
<td>1.40</td>
<td>.72</td>
<td>.35</td>
</tr>
<tr>
<td>PREPS_AP</td>
<td>9</td>
<td>.52</td>
<td>.44</td>
<td>.19</td>
<td>-1.86</td>
<td>1.40</td>
<td>.72</td>
<td>.30</td>
</tr>
<tr>
<td>POSTFU_DF</td>
<td>9</td>
<td>-.54</td>
<td>.27</td>
<td>.07</td>
<td>.38</td>
<td>1.40</td>
<td>.72</td>
<td>1.20</td>
</tr>
<tr>
<td>POSTFU_AP</td>
<td>9</td>
<td>-.53</td>
<td>.30</td>
<td>.09</td>
<td>-2.03</td>
<td>1.40</td>
<td>.72</td>
<td>.03</td>
</tr>
<tr>
<td><strong>Control</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PREPS_DF</td>
<td>9</td>
<td>.03</td>
<td>.15</td>
<td>.02</td>
<td>3.57</td>
<td>1.40</td>
<td>.72</td>
<td>1.66</td>
</tr>
<tr>
<td>PREPS_AP</td>
<td>9</td>
<td>.09</td>
<td>.20</td>
<td>.04</td>
<td>.61</td>
<td>1.40</td>
<td>.72</td>
<td>.43</td>
</tr>
<tr>
<td>POSTFU_DF</td>
<td>9</td>
<td>-.01</td>
<td>.19</td>
<td>.04</td>
<td>.78</td>
<td>1.40</td>
<td>.72</td>
<td>-.31</td>
</tr>
<tr>
<td>POSTFU_AP</td>
<td>9</td>
<td>-.15</td>
<td>.14</td>
<td>.02</td>
<td>.20</td>
<td>1.40</td>
<td>.72</td>
<td>.72</td>
</tr>
</tbody>
</table>

**Note.** PREPS_DF = pretest to posttest gain for define; PREPS_AP = pretest to posttest gain for apply; POSTFU_DF = posttest to follow-up gain for define; POSTFU_AP = posttest to follow-up gain for apply. Var = Variance; Kurt = kurtosis; KSE = kurtosis standard error; SSE = skew standard error.
groups for the pretest Define variable ($F(3) = 1.17, p > .05$). Similarly, there were no statistically significant differences between groups for the pretest Apply variable ($F(3) = 1.30, p > .05$). Means are presented in Table 10 and Figures 1 and 2.

**Major Analysis: Hypothesis Testing**

In the major analysis the hypotheses for Experiment 1 and Experiment 2 were tested. Statistical analyses in Experiment 1 involved using paired $t$-tests to compare the pretest and posttest scores of the participants. Statistical analyses in Experiment 2 involved mixed-design ANOVA, and one-way ANOVAs, planned comparisons, and multiple comparisons testing of differences between instructional conditions and within instructional conditions. Gain scores were used in the ANOVAs as a way of testing the significance of the increase or decrease in learning over time.

**Experiment 1**

The hypothesis predicted that the means of the Define and Apply posttest scores would be significantly greater than the means of the pretest scores. This hypothesis was corroborated by the data. Two $t$-tests for paired samples were conducted. Participants scored significantly higher on the posttest definition questions than on the pretest definition questions. Participants also scored significantly higher on the posttest application questions than on the pretest application questions. Means and $t$-test
Table 10

**Mean Levels of Apply and Define Pretest Scores by Instructional Condition**

<table>
<thead>
<tr>
<th>Condition</th>
<th>n</th>
<th>Define</th>
<th></th>
<th>Apply</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>Experiential</td>
<td>9</td>
<td>.21</td>
<td>.19</td>
<td>.17</td>
<td>.14</td>
</tr>
<tr>
<td>Reading</td>
<td>7</td>
<td>.11</td>
<td>.11</td>
<td>.29</td>
<td>.25</td>
</tr>
<tr>
<td>Lecture</td>
<td>9</td>
<td>.10</td>
<td>.10</td>
<td>.33</td>
<td>.15</td>
</tr>
<tr>
<td>Control</td>
<td>9</td>
<td>.14</td>
<td>.12</td>
<td>.32</td>
<td>.21</td>
</tr>
</tbody>
</table>

**Note.** There were no significant differences between the instructional conditions' pretest means at $\alpha = .05$. 
Figure 1. Pretest mean comparisons by instructional conditions for the define variable. No significant differences at $\alpha = .05$.

Figure 2. Pretest mean comparisons by instructional conditions for the apply variable. No significant differences at $\alpha = .05$. 
statistics are presented in Table 11 and represented on the same page in Figure 3.

Experiment 2

The first hypothesis of Experiment 2 predicted that the instructional conditions participants' Define and Apply scores on the posttest would be significantly greater than their means on the pretest. This hypothesis was corroborated by the statistical analysis. Two mixed-design ANOVAs were carried out — one analysis for the Define questions and the other analysis for the Apply questions. ANOVA statistics are presented in Table 12. Each ANOVA had statistically significant instructional condition by time interactions. The statistically significant interactions permitted further univariate tests. Repeated-measures univariate tests were conducted on pretest to posttest differences for each condition. For both the Define and Apply measures, a statistically significant difference between pretest and posttest was found between all instructional conditions (EC, RC, LC.) ANOVA statistics are presented in Table 13. Means are presented in Table 14 and represented in the first three sets of bars of Figures 4 and 5.

The second hypothesis predicted that the means of the Define and Apply scores on the CC’s posttest would not be significantly greater than the means of their pretest scores. This hypothesis was corroborated by the statistical analysis. There were no statistically significant differences between pretest and posttest mean scores for the CC. ANOVA statistics are presented in Table 13, means are presented in Table 14, and the
Table 11

Paired t-Test Comparisons of Experiment 1 Pretest and Posttest Means

<table>
<thead>
<tr>
<th>Factor</th>
<th>Pretest</th>
<th>Posttest</th>
<th>t*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Define</td>
<td>.39 (.35)</td>
<td>.80 (.33)</td>
<td>3.02*</td>
</tr>
<tr>
<td>Apply</td>
<td>.28 (.25)</td>
<td>.68 (.43)</td>
<td>2.87*</td>
</tr>
</tbody>
</table>

Note. Data is from Experiment 1. Participants scored significantly higher on the posttest questions than the pretest questions.


Figure 3. Experiment 1 pretest and posttest means for define and apply variables. N = 10.
Table 12

Pretest and Posttest Mean Comparisons Across All Instructional Conditions (Hypothesis 1 and 2)

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>$\eta^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apply</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between Groups</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instruction</td>
<td>3</td>
<td>1.18</td>
<td>.39</td>
<td>3.18*</td>
<td>.24</td>
</tr>
<tr>
<td>Error</td>
<td>30</td>
<td>3.72</td>
<td>.12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within Groups</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>1</td>
<td>4.02</td>
<td>4.02</td>
<td>57.44***</td>
<td>.66</td>
</tr>
<tr>
<td>Inst. x Time</td>
<td>3</td>
<td>1.20</td>
<td>.40</td>
<td>5.71**</td>
<td>.36</td>
</tr>
<tr>
<td>Error</td>
<td>30</td>
<td>2.10</td>
<td>.07</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Define</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between Groups</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instruction</td>
<td>3</td>
<td>4.79</td>
<td>1.60</td>
<td>25.94***</td>
<td>.72</td>
</tr>
<tr>
<td>Error</td>
<td>30</td>
<td>1.85</td>
<td>.06</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within Groups</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>1</td>
<td>11.25</td>
<td>11.25</td>
<td>226.98***</td>
<td>.88</td>
</tr>
<tr>
<td>Inst. x Time</td>
<td>3</td>
<td>4.95</td>
<td>1.65</td>
<td>33.28***</td>
<td>.77</td>
</tr>
<tr>
<td>Error</td>
<td>30</td>
<td>1.49</td>
<td>.05</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. Instructional conditions scores on the posttest were significantly higher than scores on the pretest. There was a significant instructional condition by time interaction for both the define and apply variables. *p < .05. **p < .01. ***p < .001. N = 34.
Table 13

Pretest and Posttest Mean Comparisons by Each Instructional Condition

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>$\eta^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Define</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experiential</td>
<td>1</td>
<td>3.23</td>
<td>3.23</td>
<td>35.99***</td>
<td>.82</td>
</tr>
<tr>
<td>Error</td>
<td>8</td>
<td>.72</td>
<td>.09</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reading</td>
<td>1</td>
<td>9.02</td>
<td>9.02</td>
<td>335.14***</td>
<td>.98</td>
</tr>
<tr>
<td>Error</td>
<td>6</td>
<td>.16</td>
<td>.03</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lecture</td>
<td>1</td>
<td>2.83</td>
<td>2.83</td>
<td>43.70***</td>
<td>.85</td>
</tr>
<tr>
<td>Error</td>
<td>8</td>
<td>.52</td>
<td>.06</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>1</td>
<td>.00</td>
<td>.00</td>
<td>.32</td>
<td>.04</td>
</tr>
<tr>
<td>Error</td>
<td>8</td>
<td>.09</td>
<td>.01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apply</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experiential</td>
<td>1</td>
<td>1.22</td>
<td>1.22</td>
<td>24.51**</td>
<td>.75</td>
</tr>
<tr>
<td>Error</td>
<td>8</td>
<td>.40</td>
<td>.05</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reading</td>
<td>1</td>
<td>2.47</td>
<td>2.47</td>
<td>19.53**</td>
<td>.77</td>
</tr>
<tr>
<td>Error</td>
<td>6</td>
<td>.76</td>
<td>.13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lecture</td>
<td>1</td>
<td>1.22</td>
<td>1.22</td>
<td>12.56**</td>
<td>.61</td>
</tr>
<tr>
<td>Error</td>
<td>8</td>
<td>.78</td>
<td>.10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>1</td>
<td>.03</td>
<td>.03</td>
<td>1.25</td>
<td>.13</td>
</tr>
<tr>
<td>Error</td>
<td>8</td>
<td>.17</td>
<td>.02</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. Repeated measures univariate tests showed significant differences between pretest and posttest scores for each condition except for the control condition.

*p < .05. **P < .01. ***p < .001.
Table 14

Pretest and Posttest Means for Each Instructional Condition

<table>
<thead>
<tr>
<th>Condition</th>
<th>n</th>
<th>Pretest M</th>
<th>Pretest SD</th>
<th>Posttest M</th>
<th>Posttest SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Define</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experiential</td>
<td>9</td>
<td>.21</td>
<td>.19</td>
<td>1.06</td>
<td>.36</td>
</tr>
<tr>
<td>Reading</td>
<td>7</td>
<td>.11</td>
<td>.11</td>
<td>1.71</td>
<td>.26</td>
</tr>
<tr>
<td>Lecture</td>
<td>9</td>
<td>.10</td>
<td>.10</td>
<td>.89</td>
<td>.38</td>
</tr>
<tr>
<td>Control</td>
<td>7</td>
<td>.14</td>
<td>.12</td>
<td>.17</td>
<td>.16</td>
</tr>
<tr>
<td>Apply</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experiential</td>
<td>9</td>
<td>.17</td>
<td>.14</td>
<td>.69</td>
<td>.28</td>
</tr>
<tr>
<td>Reading</td>
<td>7</td>
<td>.29</td>
<td>.25</td>
<td>1.13</td>
<td>.66</td>
</tr>
<tr>
<td>Lecture</td>
<td>9</td>
<td>.33</td>
<td>.15</td>
<td>.85</td>
<td>.43</td>
</tr>
<tr>
<td>Control</td>
<td>7</td>
<td>.32</td>
<td>.21</td>
<td>.40</td>
<td>.07</td>
</tr>
</tbody>
</table>

Note. Graphical representation of this data is presented in Figures 4 and 5.
Figure 4. Pretest and posttest mean comparisons by instructional conditions for the define variable. Exact mean scores and standard deviations are presented in Table 14.

Figure 5. Pretest and posttest mean comparisons by instructional conditions for the apply variable. Exact mean scores and standard deviations are presented in Table 14.
means are represented in the last set of bars of Figures 4 and 5.

The third hypothesis predicted that the experiential group's pretest to posttest Apply gain score (PREPS_AP) would be greater than the other groups' pretest to posttest gain scores. This hypothesis was rejected by the statistical analysis. A one-way ANOVA was used to compare the pretest to posttest gain scores between instructional groups. A statistically significant difference was found between the groups ($F(3.33) = 5.71, p < .01$). A planned comparison was made between the EC and the mean of the RC and LC. There were no statistically significant differences between the gain scores of these groups ($t(20) = -1.00, p < .05$). The Scheffe post hoc test was used and the RC showed a statistically significant gain in pretest to posttest performance compared to gains made by other conditions. Means are presented in Table 15 and represented as the lines between the pretest and posttest in Figure 6.

The fourth hypothesis predicted that the EC posttest to follow-up gain score for the Apply variable would be greater than the RC, LC, and CC posttest to follow-up gain scores for the Apply variable (PSTFU_AP). This hypothesis was rejected by the statistical analysis. A one-way ANOVA was used to compare the posttest to follow-up gain scores between instructional groups. No statistically significant difference was found between the groups ($F(3.33) = 2.14, p > .05$). Means are presented in Table 16 and represented as the lines between the posttest and follow-up test in Figure 6.

The fifth hypothesis predicted that the EC pretest to posttest Define gain score (PREPS_DF) would be equal to the RC and LC pretest to posttest gain scores. This
Table 15

Mean Levels of Apply Pretest to Posttest Gain Scores by Instructional Condition (Hypothesis 3)

<table>
<thead>
<tr>
<th>Condition</th>
<th>n</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiential</td>
<td>9</td>
<td>.52</td>
<td>.32</td>
</tr>
<tr>
<td>Reading</td>
<td>7</td>
<td>.84</td>
<td>.50</td>
</tr>
<tr>
<td>Lecture</td>
<td>9</td>
<td>.52</td>
<td>.44</td>
</tr>
<tr>
<td>Control</td>
<td>9</td>
<td>.08</td>
<td>.20</td>
</tr>
</tbody>
</table>

Note. Gain scores are posttest scores minus pretest scores and are represented by the pretest to posttest lines in Figure 6.

Table 16

Mean Levels of Apply Posttest to Follow-Up Test Gain Scores by Instructional Condition (Hypothesis 4)

<table>
<thead>
<tr>
<th>Condition</th>
<th>n</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiential</td>
<td>9</td>
<td>-.22</td>
<td>.33</td>
</tr>
<tr>
<td>Reading</td>
<td>7</td>
<td>-.30</td>
<td>.55</td>
</tr>
<tr>
<td>Lecture</td>
<td>9</td>
<td>-.53</td>
<td>.30</td>
</tr>
<tr>
<td>Control</td>
<td>9</td>
<td>-.15</td>
<td>.14</td>
</tr>
</tbody>
</table>

Note. Gain scores are follow-up test scores minus posttest scores and are represented by the posttest to follow-up test lines in Figure 6.
Figure 6. Gain in apply scores between pretest, posttest, and follow-up tests for experiential (n = 9), reading (n = 7), lecture (n = 9), and control (n = 9) conditions.

Pretest to posttest gain scores are represented by the lines from pretest to posttest. The reading conditions pretest to posttest gain score was significantly higher than the pretest to posttest gain scores of the other conditions. Other pretest to posttest gain scores did not significantly differ.

Posttest to follow-up gain scores are represented by the lines from posttest to follow-up test. There were no significant differences between the posttest to follow-up gain scores between conditions.
hypothesis was rejected by the statistical analysis. A one-way ANOVA was used
to compare the pretest to posttest gain scores between instructional groups. A
statistically significant difference was found between the instructional conditions
($F(3,33) = 33.28, p < .01$). A planned comparison was made between the EC and
the mean of the RC and LC. There was a statistically significant difference between
the gain scores of these groups ($t(12.5) = -2.21, p = .05$). The Scheffe post hoc test
was used for further data exploration and all groups were shown to be significantly
different than the control and the RC’s scores were significantly greater than both the
EC or LCs. Means are presented in Table 17 and represented as lines between the
pretest and posttest in Figure 7.

The sixth hypothesis predicted that the EC posttest to follow-up test Define gain
score (PSTFU_DF) would be significantly less than the RC and LC posttest to follow-
up gain scores for the Define variable. This hypothesis was rejected by the statistical
analysis. A one-way ANOVA was used to compare the posttest to follow-up gain
scores between instructional groups. A statistically significant difference was found
between the groups ($F(3,33) = 8.08, p < .01$). A planned comparison was made
between the EC and the mean of the RC and LC. There were no statistically
significant differences between the gain scores of these groups ($t(12.5) = -12, p > .05$).
The Scheffe post hoc test was used for further data exploration and the control
group showed the least change between instructional conditions. The EC, RC, or LC
did not significantly differ from each other. Means are presented in Table 18 and
represented as lines between the posttest and follow-up test in Figure 7.
Table 17

Mean Levels of Define Pretest to Posttest Gain Scores by Instructional Condition (Hypothesis 5)

<table>
<thead>
<tr>
<th>Condition</th>
<th>n</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiential</td>
<td>9</td>
<td>.85</td>
<td>.42</td>
</tr>
<tr>
<td>Reading</td>
<td>7</td>
<td>1.61</td>
<td>.23</td>
</tr>
<tr>
<td>Lecture</td>
<td>9</td>
<td>.79</td>
<td>.36</td>
</tr>
<tr>
<td>Control</td>
<td>9</td>
<td>.03</td>
<td>.15</td>
</tr>
</tbody>
</table>

Note. Gain scores are posttest scores minus pretest scores and are represented by the pretest to posttest lines in Figure 7.

Table 18

Mean Levels of Define Posttest to Follow-Up Test Gain Scores by Instructional Condition (Hypothesis 6)

<table>
<thead>
<tr>
<th>Condition</th>
<th>n</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiential</td>
<td>9</td>
<td>-.61</td>
<td>.41</td>
</tr>
<tr>
<td>Reading</td>
<td>7</td>
<td>-.64</td>
<td>.32</td>
</tr>
<tr>
<td>Lecture</td>
<td>9</td>
<td>-.54</td>
<td>.27</td>
</tr>
<tr>
<td>Control</td>
<td>9</td>
<td>-.01</td>
<td>.19</td>
</tr>
</tbody>
</table>

Note. Gain scores are follow-up test scores minus posttest scores and are represented by the posttest to follow-up lines in Figure 7.
Figure 7. Gain in define scores between pretest, posttest, and follow-up tests for experiential \((n = 9)\), reading \((n = 7)\), lecture \((n = 9)\), and control \((n = 9)\) conditions.

Pretest to posttest gain scores are represented by the lines from pretest to posttest. The reading and lecture condition combined had a significantly higher gain score than the experiential condition. The experiential, reading, and lecture conditions pretest to posttest gain scores were significantly higher than the pretest to posttest gain score of the control condition.

Posttest to follow-up gain scores are represented by the lines from posttest to follow-up test. There were no significant differences between the posttest to follow-up gain scores between the experiential, reading, or lecture conditions. The control group showed significantly less change than the other conditions between the post-test and follow-up test.
DISCUSSION

In this chapter (a) overall results are summarised and explained in detail for each of the hypotheses, (b) results of Experiment 1 and Experiment 2 are integrated with the findings of past research, (c) limitations of the study are described, (d) future directions in theory, application, and research are discussed, and (e) conclusions are presented.

Summary of Results

Overall, participants in both experiments and across all instructional conditions, apart from the control condition (CC), demonstrated short-term learning of the systemic-constructivist constructs. In a comparison of pretest to posttest gains between instructional conditions, the reading condition (RC) outperformed both the experiential condition (EC) and the lecture condition (LC) on the definition and application questions. In a comparison of changes from posttest to follow-up, no significant difference was found between the EC, RC, or LC for either the Apply scores or the Define scores.

As predicted by the hypothesis of Experiment 1, the participants improved in their understanding of the systemic-constructivist principles. In Experiment 2, the first two hypotheses were corroborated: (1) the EC, RC, and LC improved from pretest to posttest and (2) the CC showed no improvement between pretest and posttest.

The third hypothesis concerned the application questions. It was predicted that in a comparison of pretest to posttest improvement, the EC would show greater
improvement than the other conditions. This was not the case. Although the EC, 
LC, and RC all improved, the RC improved significantly more than the other 
instructional conditions.

The fourth hypothesis also concerned the application questions. It was predicted 
that in a comparison of posttest to follow-up gain scores, the EC would show greater 
retention of learning than the RC or LC. The EC, RC, and LC, however, decreased in 
what they had learned to a similar degree.

The fifth hypothesis concerned the definition questions. It was predicted that in 
a comparison of pretest to posttest improvement, there would be no significant 
difference between conditions. The RC, however, showed greater improvement than 
both the EC and the LC.

The sixth hypothesis also concerned the definition questions. It was predicted 
that in a comparison of posttest to follow-up gain scores, the EC would show less 
retention in learning than the RC or LC. The EC, RC, and LC, however, decreased in 
what they had learned to a similar degree.

Integration with Past Literature

In this section, the following findings are discussed in the context of past 
literature: (a) findings related to pretest comparisons of instructional conditions and 
overall learning across conditions, (b) findings related to comparing instructional 
conditions' pretest to posttest gain scores, and (c) findings related to comparing
instructional conditions’ posttest to follow-up changes.

**Pretest Comparisons and Learning Across Instructional Conditions**

In this subsection, the following two questions will be addressed: (a) Did participants learn the systemic-constructivist theory? (b) Was the learning the result of the instructional interventions? An affirmative answer to these questions was arrived at through pretest comparisons and an investigation of learning across all instructional conditions.

No difference was found between the EC, RC, LC, and CC on the pretest given to Experiment 2 participants. The similarity of scores on the pretest suggests that no condition had prior knowledge of the systemic-constructivist theory. In a comparison of pretest to posttest performance, the participants in Experiment 1 and the EC, RC, and LC of Experiment 2 increased their knowledge of the systemic-constructivist principles. The CC showed no increase in knowledge. The improvement of the participants in Experiment 1 and the improvement of participants in the EC, RC, and LC of Experiment 2 suggests that the students were paying attention to the instructional activity and that the students attempted to learn what they were being taught. The fact that the CC did not improve between pretest and posttest, suggests that the learning that occurred in the EC, RC, and LC was caused by the instructional intervention and not some other unaccounted for phenomena.

Of the past studies reviewed (Blake, 1990; Clements, 1995; L. B. Specht &
Sandlin, 1991; P. H. Specht, 1985; Watson, 1975; Willis & Gueldenpfeen, 1981), only Willis and Gueldenpfeen included a pretest measure and no other studies included a no-instruction control condition. As with the present study, Willis and Gueldenpfeen found no difference between instructional conditions at pretest.

The studies that neither established a pretest baseline nor included a control condition had to assume that (a) random assignment alone adequately distributed the students who may have had prior knowledge of the subject matter being taught and (b) the relative performance of the students in the different instructional conditions was caused by the instructional intervention and not some other factor. Only the present study and, in part, the Willis and Gueldenpfeen study, adequately address these possible confounds.

**Pretest to Posttest Gain**

In this subsection, the gain in students’ pretest to posttest performance is compared with the results obtained by past studies. The subsection is organised as follows: (a) the findings of the present study are summarised, (b) the finding of no difference between the EC and the LC in Experiment 2 is compared with past studies, (c) the superior performance of the RC condition is discussed, and (d) an explanation for why some of the present findings were discrepant with both the hypotheses and two of the past studies is reported.

It was predicted that in a comparison of instructional conditions’ pretest to
posttest improvement, the EC would show greater improvement than the RC and LC on the application questions. On the definition question, it was predicted that there would be no difference between the instructional conditions. These two predictions were designed to parallel the distinction between Anderson's (1980) constructs of procedural and declarative knowledge. The EC, who learned procedural knowledge (i.e., knowing how) by way of concrete experiential exercises, was predicted to outperform the traditional instructional conditions on the application questions. All groups were predicted to learn the declarative knowledge (i.e., knowing that) in a similar manner and so not to differ in their ability to answer definition questions. For both the definition and application questions, however, the RC significantly outperformed the EC and the LC.

The finding in Experiment 2 of no difference between the EC and the LC is similar to the major findings of studies by Blake (1990), Clements (1995), and L. B. Specht and Sandlin (1991). None of these researchers found overall differences between the experiential and lecture conditions. The results were divergent, however, from the findings of P. H. Specht (1985) and Willis and Gueldenpfenning (1981). P. H. Specht, in a comparison of undergraduate students taught by either an experiential plus discussion method or a lecture plus discussion method, found the experiential condition outperformed the lecture condition. Similarly, Willis and Gueldenpfenning found that remedial reading tutors who received experiential practice plus handouts outperformed students who learned through lecture plus handouts.
Although, Watson's (1975) study was not an experiential study, Watson's study was the only study to differentiate between definition and application questions. Watson found that students in the case-study instruction condition and the traditional instruction condition did not differ for the majority of concepts on the definition-type questions. The case-study instruction condition, however, performed significantly better than the traditional instruction condition on the application questions. The results of Experiment 2 concur, in part, with Watson's results. There was some support for Watson's finding of no difference between instructional conditions on the definition questions, that is, the EC and LC were not significantly different. However, on the application questions in this study, unlike Watson's findings, the EC and the LC did not significantly differ, and both conditions were surpassed by the RC.

**Explanation for findings.** The following two issues need to be addressed: (a) Why did the RC show a greater gain in pretest to posttest learning than either the EC or the LC? (b) Why was there no significant difference between the EC and the LC performances when studies by P. H. Specht (1985) and Willis and Gueldenpfnenning (1981) found such a difference? Two explanations are offered: (1) The present work's findings may have been influenced by the degree of self-paced learning and the degree of participant interaction during the tasks and (2) the present works' findings may have been influenced by the dependent measure used to assess learning. The latter explanation is developed further because an inquiry into the methods of measuring experiential learning provides a possible explanation for the results and also helps
explain some of the divergent findings in the past experiential studies described above.

The RC may have showed greater gain than either the EC or the LC because the RC participants benefited from a self-paced instructional method and benefited from not being distracted by the activities and conversations of other participants. Participants in the RC were seated in a quiet room and were instructed to set their own pace as they read the systemic-constructivist self-study manual and completed the practice exercises. Participants in the LC were seated in a quiet room, however, the pace of the instruction was set by the instructor. Participants in the EC were engaged in numerous activities in which conversation was a natural part of the activities. The pace of the EC instruction was also set by the instructor.

The degree of self-paced instruction and degree of distraction in the present work’s RC, EC, and LC may have contributed to the findings. However, this explanation does not help to explain the findings of other experiential instruction studies. Of the past studies reviewed (Blake, 1990; Clements, 1995; L. B. Specht & Sandlin 1991; P. H. Specht, 1985; Watson, 1975; Willis & Gueldenpfnenning, 1981) no self-paced learning conditions were included in the studies and the degree of distraction among participants did not considerably differ between conditions. None of these studies included a separate self-paced reading condition and all studies, except for the Specht and Sandlin study, included discussion among members in each of the experiential and traditional instruction groups.

A second explanation of the findings relates to the method of measuring
participant learning, and, as will be discussed below, this explanation helps to explain some of the divergent findings in the experiential instruction literature. Experiential learning may have occurred in a manner that was unanticipated by the hypotheses. Rather than the instructional method being the most influential independent variable under study, the experiential congruence between method and measure may have been the factor primarily responsible for the results. "Experiential congruence" is a term that is proposed to refer to the degree of experiential similarity between the method of teaching a skill and the measure for assessing whether the skill has been learned. If someone takes part in a reading and writing exercise, an experientially congruent dependent measure would involve reading and writing. If someone takes part in a concrete activity, an experientially congruent measure would involve performing a concrete activity.

The participants in the RC read the self-study manual and read the answers to practice questions. The activity of working with written materials was experientially congruent with the written nature of the posttest and follow-up test. The participants in the LC listened to a lecture and the EC participants took part in experiential exercises. Both the LC and the EC listened to discussions about the constructs and heard the answers to the practice questions. The instructional methods employed with the EC and LC, however, were not experientially congruent with the dependent measures used to assess whether learning occurred.

The essence of the explanation is as follows: The EC may have experientially
learned systemic-constructivist principles that could not be readily translated into the written posttest and follow-up tests. The RC, however, was presented with the instructional material and answers in a written form; they may have had an advantage on the written posttest and follow-up tests. Perhaps if the dependent measure had been to experientially demonstrate, instead of write about the systemic-constructivist constructs, the EC would have had the advantage and the RC would have had more difficulty.

In answer to the first question raised at the beginning of this subsection, the RC may have shown a greater gain because learning was assessed on a measure that was experientially congruent with the method of instruction. The EC and the LC, however, received instruction that was not as experientially congruent with the measure used to assess learning. The low degree of experiential congruence between EC and LC instructional method and the dependent measures may explain the lower performance of EC relative to the RC.

**Experiential congruence and past studies.** This subsection will address the question of why there was no significant difference in the present study between the EC and the LC performances when studies by P. H. Specht (1985) and Willis and Gueldenpfenning (1981) found such a difference. To anticipate the issues raised in answering this question, the Willis and Gueldenpfenning study had a higher degree of experiential congruence between instructional method and dependent measure, and, because of a methodological problem, the Specht (1985) study’s results may not be well
suited for comparison with the other experiential studies reviewed here.

The concept of experiential congruence helps to clarify some of the divergent findings in the literature. Specifically, Blake (1990), Clements (1995), and L. B. Specht and Sandlin (1991) did not find their studies' experiential conditions yielded results that were clearly superior than those of their studies' traditional instruction conditions. The Willis and Gueldenpfenning (1981) study, however, found that students who received experiential training demonstrated performance superior to that of students who had received traditional instruction.

A major difference between these studies is the way in which learning was assessed. Studies by Blake (1990), Clements (1995), and L. B. Specht and Sandlin (1991) compared students in the experiential and lecture condition based upon their performances on written tests and written exercises. Students in the experiential condition were not asked to demonstrate what they had learned experientially and therefore may have had no advantage compared with the students who had learned through the lecture method. Conversely, Willis and Gueldenpfenning compared students assigned to the experiential, observational, and lecture conditions based upon the students' tutoring performances on videotape. The students were given the opportunity to experientially demonstrate what they had learned. The experiential dependent measure may have provided the experiential condition with the advantage over the lecture condition.

The non-significant difference between the EC and the LC in the present study
may be explained by the low experiential congruence between the instructional method and the dependent measure that was used. As with the Blake (1990), Clements (1995), and L. B. Specht and Sandlin (1991) studies, all of which showed no overall differences between experiential and traditional instruction, students in the present study were not asked to experientially demonstrate their knowledge of the systemic-constructivist constructs. Instead, the students' learning was assessed using written instruments. The Willis and Gueldenpfnenning study, however, used an experiential measure and obtained results indicating that the experiential instructional method was more effective than the lecture method.

Yet, the above does not explain P. H. Specht's (1985) findings. P. H. Specht in a comparison of experiential plus discussion conditions and lecture plus discussion conditions found that the experiential conditions demonstrated superior performance on a written examination. However, P. H. Specht does caution that (a) a possible weakness of the study was the simplicity of the material that was taught to the students and (b) the lecture method may have been more effective if the material was of greater complexity.

In a comparison of the task complexity of P. H. Specht's (1985) experiential conditions with the other studies reviewed in this work, P. H. Specht's study involved both shorter and simpler activities. Students in the experiential group in P. H. Specht's study participated in a single 30-minute experiential exercise on communication networks. Blake's experiential component involved 12 hours of experiential exercises.
Clements (1995) experiential component involved one to two hours of observation of a child, adolescent, or pregnant woman as well as the chance to participate in or observe the administration of three to five Piagetian tasks to children in each Piagetian stage, and six to nine hours of observation of a child. L. B. Specht and Sandlin's (1991) experiential condition engaged students in 2 hours of group activities whereby students assumed the role of a loan committee, made lending decisions, and worked together to discuss the uses and limitations of ratio analysis. Willis and Gueidenpfenning's (1981) experiential component involved eight 20-minute training sessions over a month's time in which students learned seven tutoring skills by playing the role of tutor, student, or observer. The experiential condition in the present study involved four one-hour experiential exercises in which students learned the systemic-constructivist constructs. The relative simplicity and brevity of the experiential tasks in the P. H. Specht study provides sufficient reason for discounting the study's findings in a comparison with studies of greater complexity.

In answer to the question raised at the beginning of this subsection, neither the EC nor the LC of the present study benefitted from an experiential congruence between instructional method and dependent measure. Instead of being asked to define a construct or apply a construct to understanding a written scenario, a more experientially congruent dependent measure could have been used for the EC. Experiential condition participants may then have benefitted from being asked to concretely demonstrate what they knew. Perhaps EC participants could have been handed a set of blocks and asked
to show how they may teach a systemic-constructivist construct using the blocks. The participants in the experiential condition of the Willis and Gueldenpfeiffer (1981) study may have benefitted from such an experiential congruence between instructional method and dependent measure.

In summary, examining the past studies' experiential congruence between method and measure helps to clarify some of the discrepancies in the experiential instruction literature. The superiority of the experiential approach over traditional instructional methods may be best illustrated in studies that incorporate an experiential measure of performance into their dependent measure. The results of studies using brief and simple tasks should be interpreted with caution.

**Posttest to Follow-up Changes**

Two predictions were made regarding the comparison of instructional conditions' posttest to follow-up changes. (1) It was predicted that the EC would demonstrate less change than the other conditions on the application questions. That is, the EC would retain their ability to apply the systemic-constructivist constructs better than the RC and LC. (2) It was also predicted that the EC would demonstrate greater change than the other conditions on the definition questions. That is, the EC would demonstrate less retention of the definitions they had learned compared with the RC and LC. The results, however, exhibited no significant differences between the EC, RC, or LC on the posttest to follow-up changes.
Few studies have examined posttest to follow-up changes between experiential and traditional instruction conditions. Of the two studies that examined these changes (L. B. Specht & Sandlin, 1991; P. H. Specht, 1985), neither made the conceptual distinction between definition and application questions. P. H. Specht found that the experiential condition, which outperformed the lecture condition at the posttest, maintained the advantage during the test administered five weeks following instruction. The P. H. Specht study, however, has the same limitations at follow-up as it did during the posttest (see previous section on experiential congruence). The brevity and simplicity of the experiential tasks may have confounded the results of the P. H. Specht study.

The L. B. Specht and Sandlin (1991) study found the experiential condition outperformed the lecture condition on general concepts but not specific concepts on a test administered six weeks following instruction. The conceptual distinction between general and specific concepts, however, is not clearly relevant to the present study. L. B. Specht and Sandlin’s measure of “general concepts” was a multi-part question that required the accounting students to demonstrate an understanding of the importance of industry ratios in deciding upon which borrowing decision should be made in a given situation. The measure of “specific concepts” involved having students choose the correct four of seven borrowing ratio formulas that were relevant to making a borrowing decision.

There is a paucity of published research comparing experiential instruction and
traditional instruction on posttest to follow-up changes. Below, in the section on
future directions, a study is proposed to address some of the problems and omissions in
the current experiential instruction literature.

Limitations of the Study

In this section, issues related to experimenters' bias, the dependent measures, the
sample size, and the generalisability of the findings are addressed. Next, directions for
future research are discussed and a follow-up study is proposed to address the
limitations of the present study.

One instructor, who was not blind to the hypotheses, taught the participants in
the instructional conditions. Experimental bias was controlled for in the RC by
providing instruction through the use of a self-study manual. Results from the LC and
the EC, however, may have been influenced by the instructor's biases. The fact that
the LC and the EC scores were not in the hypothesised direction, however, does
provide some assurance that the influence of experimental bias was minimal.

Considerations of the experiential congruency between method and measure
helped explain some of the discrepancies in past studies. Yet, the inferences that can
be drawn from this study (and past experiential studies) regarding the efficacy of
experiential learning compared with traditional instructional methods will have to be
tempered until the methodological issues raised here can be explored further. As
mentioned earlier, the written dependent measure may not have provided a fair
assessment of what the EC had learned in comparison with the RC.

The small N in the experiments precluded an analysis of sex differences, age differences, program of study differences, and so forth. The limitation of not testing the effects of these individual differences is that it cannot be determined whether the present study's findings best apply to people who share such characteristics. For example, Blake (1990) found that the engineering students in the sample were the students who best benefited from experiential instruction. Later studies would benefit from a larger N so that demographic comparisons could be examined. As the systemic-constructivist instructional method is refined, it will become increasingly important to understand who is and who is not benefiting from the instructional method so that the necessary refinements can be made.

Together, Experiment 1 and Experiment 2 provide some indication of generalisability. The participants in Experiment 1 all volunteered because they were interested in the brochure that described a workshop in experiential epistemology. Participants were professionals and graduate students who were self-selected by their own prior interests in philosophical matters. Experiment 2 participants, however, were recruited from a single classroom of undergraduate students who did not know the experiment would be about learning experiential epistemology until they arrived for the experiment. In both Experiment 1 and Experiment 2, systemic-constructivist constructs were successfully taught to participants. These Experiment 1 and Experiment 2 findings indicate that people can learn the systemic-constructivist theory both within
and outside of an academic setting. The findings pertaining to the four instructional conditions, however, were only demonstrated with the Experiment 2 sample. Caution should be taken in generalising the conclusions drawn about comparisons of instructional conditions in Experiment 2 to populations other than undergraduate students.

Although this study was concerned with how people actively construct their experiences, participants' had limited opportunities to provide feedback about their experiences. Participants' feedback was limited to how best to develop the experiential exercises. No feedback was obtained regarding which way participants would best learn the material: experientially or didactically. Also, participants were not asked to help interpret the findings. For participants to provide such feedback, the study would have had to have been modified such that each participant was exposed to several instructional methods. By receiving both experiential and didactic instruction in the systemic-constructivist theory, participants could gain referents for each method of instruction and could offer feedback based on a comparison enriched by such experiences.

Future Directions in Theory, Application, and Research

The systemic-constructivist model is part of a tradition of inquiry integrating the arts, social sciences, and the natural sciences. Theoreticians, researchers, and educators in these fields have been developing and applying constructivist principles to
their domains of study. In this tradition, the present work has outlined a systemic-constructivist theory and developed a method of teaching the theory to students. Additional work needs to be carried out in the (a) refinement of the theory, (b) application of the theory to issues pertinent to the disciplines from which it has emerged, and (c) refinement of an instructional method for teaching the theory and assessing whether the theory has been communicated to students.

The systemic-constructivist theory integrates a living systems model with a constructivist model. The viability of the theory depends upon its further integration with (or clarification about its divergence from) conceptual models both inside and outside of psychology. The rich conceptual structures in contemporary psychoanalytic theory and semiotics, for example, have much to offer the systemic-constructivist theory. Plans have been made by the author to study how these bodies of work can enrich (and, perhaps, be enriched by) the systemic-constructivist theory.

At present, a number of studies by the author are underway applying systemic-constructivist theory to issues related to clinical psychology. In particular, the systemic-constructivist theory is being applied to understanding issues pertaining to (a) inference, logic, causality, and communication in clinical assessment (Holigrocki, Kral, & Daly, 1995). (b) eating disorders (Holigrocki & Daly, 1995a), (c) the communication of dialectical theory to students (Holigrocki, 1994), (d) virtual reality (Holigrocki & Daly, 1995b), and (e) epistemological issues in constructivist psychotherapy (Holigrocki, 1995). Further work will involve the application of the
systemic-constructivist theory to issues related to the implementation of a drug and alcohol treatment program.

The further refinement of the systemic-constructivist instructional method will be a benefit to professors who seek to communicate both the process and content of constructivist epistemology to their students. Further research needs to be carried out to continue to refine the method of experientially teaching the theory to students and in developing a method of experientially assessing whether learning has occurred. Researchers are encouraged to conduct studies that examine all three variables: (a) instructional method, (b) time, and (c) experiential congruence between instructional method and dependent measure.

To specifically test the experiential congruence explanation offered in this work and to contribute further to experiential research in general, the following study is proposed: The study would take the form of a $4 \times 3 \times 2$ (Instruction x Time x Measure) design. The one between factor would be instructional condition (four levels: EC, RC, LC, and CC). Two within factors would be both time (three levels: pretest, posttest, follow-up) and measure (two levels: written demonstration of the principle and experiential demonstration of the principle). Earlier, the issue was raised that the degree of self-paced learning and the degree of distraction may have been factors that influenced the outcome of the instructional conditions. The influence of varying degrees of self-paced learning and varying degrees of distraction could be controlled for by using a self-paced, individualised instructional method for all instructional
conditions. The readings would be presented as described in the Experiment 2. The lectures, and instructions for the experiential exercises, would be videotaped and shown to individuals. Videotaped instruction would allow participants to control their pace of learning by rewinding and reviewing sections as needed.

Conclusions

A systemic-constructivist theory was developed and an experiential instructional method that was coherent with the theory was designed, implemented, and evaluated. A pilot study and two experiments were carried out to evaluate the systemic-constructivist instructional method. In the pilot study, data were obtained for the purpose of refining the instructional method and developing scoring criteria for the two experiments. Experiment 1 involved teaching professionals and graduate students the systemic-constructivist theory in an experiential learning laboratory. Experiment 2 involved teaching undergraduates the systemic-constructivist theory in one of four instructional conditions — experiential, reading, lecture, and a no instruction control condition.

Participants in both experiments learned the systemic-constructivist constructs that were taught to them. Although the study proceeded with the hypothesis that the experiential method itself would be the factor that would best aid the students’ learning of the systemic-constructivist constructs, the findings did not fully support this hypothesis.
Instead, the factor that seemed most crucial in assessing the participants’ learning of the constructs was the experiential congruence between the instructional method and the dependent measures. The concept of experiential congruence also helped to explain some of the divergent findings in the experiential instruction literature. Previous studies varied in the experiential congruence between their instructional methods and dependent measures. In general, studies that used written dependent measures found no difference between experiential and traditional instruction. Studies that used experiential dependent measures, however, found experiential instruction to be more effective than traditional instruction. The efficacy of an experiential instructional method over traditional instructional methods may be best illustrated in experiential studies that use experientially congruent dependent measures. Further study should be directed towards the refinement of the systemic-constructivist theory, the continued development of the instructional method, the design of a suitable experiential method of measurement, and further investigation of the experiential congruence concept.
Appendix 1: Consent Form

My doctoral dissertation involves the design, implementation, and evaluation of a systemic-constructivist instructional method. I am interested in creating the best possible way of teaching epistemology to those who seek to learn more about how they know what they know. The experiential epistemology workshops are the product of years of theoretical and pragmatic work directed at refining a way to explain the constructivist perspective to people. Continuing to refine this method of teaching involves an ongoing evaluation of whether the perspective is being successfully communicated.

You will be taking part in one of a number of ways of learning experiential epistemology. Integrated with the teaching is an ongoing evaluation of the process of learning. This evaluation involves applying the systemic-constructivist theory to scenarios that are taken from every-day life. You will record your understanding of the scenarios in a journal that I will collect at the end of the workshop. At the end of the workshop, I will also give you a questionnaire that will ask you to understand the scenarios in terms of the constructs that you have been learning. All data is to remain completely anonymous so do not write your name on either your journal or your responses to the questionnaire.

I will analyse this data for the purpose of understanding how workshop participants were applying the constructs that were being taught to them. With this information, I will be able to modify the workshops to improve their efficacy as teaching tools. The results of the data analysis will be used for my dissertation as and part of the data for a journal article and a book.

When all the data have been collected and analysed, you will receive an information package describing what I learned about teaching and refining the systemic-constructivist instructional method. I will also let you know where you can obtain a copy of the completed dissertation.

Please remember that your participation in the workshops is completely voluntary. If for any reason you would prefer not to participate in the workshops, you are free to withdraw without explanation or penalty.

If you have any questions or concerns regarding this research, do not hesitate to contact me. Dr. Raymond Daly (Dissertation Chair), or Dr. Roland S. Engelhart (Ethics Committee Chair). You can contact these people by calling the University of Windsor at 253-4232 and asking for extension 7102 for myself, extension 2229 for Dr. Daly, or extension 2222 for Dr. Engelhart.

Thank you for your participation. Your support and enthusiasm for the workshops are appreciated.

Richard Holigrocki
Department of Psychology
University of Windsor
I have read and understand the information on the preceding page, and I voluntarily consent to participate in this research. I understand that I am free to withdraw from the workshop at any time without explanation or penalty. Any concerns I have about this research should be directed to Richard Holigrocki, Department of Psychology, University of Windsor; Dr. Raymond Daly, Department of Psychology, University of Windsor; Dr. Roland Engelhart, Ethics Committee Chair, University of Windsor; or Dr. Robert Orr, Head of the Department of Psychology, University of Windsor. I will keep the preceding page for my records.

Date __________________________

Name __________________________

Signature ________________________
Appendix 2: Background Information

This information will be kept completely confidential and will be used to gain a general sense of the variety of people who are participating in the workshops.

1. Sex (circle one): Female Male

2. Age: ___

3. Marital status (circle the appropriate number):
   1. single
   2. married
   3. divorced
   4. separated
   5. cohabiting
   6. widowed

2a. Highest level of education attained (circle the appropriate number):
   1. less than high school
   2. high school graduate
   3. technical/trade diploma
   4. community college diploma
   5. university degree
   6. advanced degree (e.g., M.A., M.Ed.), please specify ___
   7. other (specify): ____________

b. Total number of years of education: ___ years

c. Are you presently a student? No Part-Time Full-Time

d. If yes, what are you studying? ____________________________

e. What year are you in your program? ___

3. Are you presently employed? No Part-Time Full-Time Retired

   If yes, what is your current job? ____________________________

4. Yearly household income (circle the appropriate number):
   1. $0 - $9,999
   2. $10,000 - $19,999
   3. $20,000 - $29,999
   4. $30,000 - $39,999
   5. $40,000 - $49,999
   6. $50,000 - $59,999
   7. $60,000 - $69,999
   8. $70,000 - $79,999
   9. $80,000 - $89,999
   10. $90,000 - over

Is English your first language? Yes No

If no, please specify: ____________________________
Appendix 3: Confirmation of Registration

Date:
Time: 8:30 a.m. - 4:30 p.m.
Location: Conference Room, 961 Ouellette Ave., Windsor, Ontario
(Just north of Erie on the west side of Ouellette)
Parking: There is limited parking available behind the building. Cars can also be parked on Victoria Avenue which is just a two-minute walk west of Ouellette Avenue.

Thank you for registering for the Experiential Epistemology Workshops. Ray and I are committed to designing the best possible learning experience for you. During the two-day workshop you will take part in experiential exercises, group brainstorming, collaboration, and learning journal work. Through participating in these activities you will gain an implicit understanding of the core concepts of the systemic-constructivist perspective.

We will be supplying the materials needed for the experiential epistemology exercises. All you need to do is bring a pen and yourself. By the way, there may be space for a few more people in the workshop that you are attending. If you know of someone else who may be interested in taking part in one of the workshops, just give me a phone call to ensure that space is available. My phone number is written below.

As part of my doctoral dissertation I am trying to improve and refine these workshops. An important part of doing so is to receive anonymous feedback from you about the workshops and to have you anonymously hand-in written samples about how you are understanding the concepts. Your ideas are important to me!

As you know, there will be a minimum $10.00 fee required. You can pay by cash or a personal cheque made out to Rick Holigrocki. If you have any questions, please call me at 258-7464.

I look forward to seeing you.

Sincerely,

Rick Holigrocki
Department of Psychology
University of Windsor
## Appendix 4: Schedules for Experiments

### Pilot

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
<th>Time</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30 - 9:00</td>
<td>Name-tags and Coffee</td>
<td>8:30 - 9:00</td>
<td>Coffee</td>
</tr>
<tr>
<td>9:00 - 10:00</td>
<td>Introduction, C, Pre, DI</td>
<td>9:00 - 10:15</td>
<td>Difference and Object</td>
</tr>
<tr>
<td>10:00 - 12:00</td>
<td>Context</td>
<td>10:15 - 10:30</td>
<td>Break</td>
</tr>
<tr>
<td>12:00 - 1:00</td>
<td>Lunch</td>
<td>10:30 - 11:45</td>
<td>Nonconscious Structuring</td>
</tr>
<tr>
<td>1:00 - 2:00</td>
<td>Signification</td>
<td>11:45 - 12:45</td>
<td>Lunch</td>
</tr>
<tr>
<td>2:00 - 2:15</td>
<td>Break</td>
<td>12:45 - 2:00</td>
<td>Purposivity</td>
</tr>
<tr>
<td>2:15 - 3:30</td>
<td>Causality</td>
<td>2:00 - 2:15</td>
<td>Break</td>
</tr>
<tr>
<td>3:30 - 3:45</td>
<td>Break</td>
<td>2:15 - 3:30</td>
<td>Self-Ordering</td>
</tr>
<tr>
<td>3:45 - 4:30</td>
<td>Conclusion of Day 1</td>
<td>3:30 - 4:30</td>
<td>Post, FB, and Conclusion</td>
</tr>
</tbody>
</table>

### Experiment 1

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
<th>Time</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30 - 9:00</td>
<td>Name-tags, Coffee</td>
<td>8:30 - 9:00</td>
<td>Coffee</td>
</tr>
<tr>
<td>9:00 - 9:30</td>
<td>Introduction, C, Pre, DI</td>
<td>9:00 - 10:00</td>
<td>Causality - Part 1</td>
</tr>
<tr>
<td>9:30 - 10:30</td>
<td>Context</td>
<td>10:00 - 10:15</td>
<td>Break</td>
</tr>
<tr>
<td>10:30 - 10:45</td>
<td>Break</td>
<td>10:15 - 11:30</td>
<td>Causality - Part 2</td>
</tr>
<tr>
<td>10:45 - 11:45</td>
<td>Signs</td>
<td>11:30 - 12:30</td>
<td>Lunch</td>
</tr>
<tr>
<td>11:45 - 12:30</td>
<td>Lunch</td>
<td>12:30 - 1:15</td>
<td>Nonconscious Structuring</td>
</tr>
<tr>
<td>12:30 - 1:30</td>
<td>Purposivity</td>
<td>1:45 - 2:00</td>
<td>Break</td>
</tr>
<tr>
<td>1:30 - 1:45</td>
<td>Break</td>
<td>2:00 - 3:00</td>
<td>Self-Ordering</td>
</tr>
<tr>
<td>1:45 - 2:45</td>
<td>Difference and Object</td>
<td>3:00 - 3:15</td>
<td>Break</td>
</tr>
<tr>
<td>2:45 - 3:00</td>
<td>Break</td>
<td>3:15 - 4:00</td>
<td>Conclusion (Feedback)</td>
</tr>
<tr>
<td>3:00 - 4:00</td>
<td>Synthesis, Post</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note:** C = Consent Form; Pre = Pretest; DI = Demographic Information; Post = Posttest; FB = Feedback form
### Experiment 2

<table>
<thead>
<tr>
<th>Experiential Condition</th>
<th>Lecture Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>8:45 - 9:30</strong> Introduction, C, Pre, DI</td>
<td><strong>8:45 - 9:30</strong> Introduction, C, Pre, DI</td>
</tr>
<tr>
<td><strong>9:30 - 10:30</strong> Context</td>
<td><strong>9:30 - 10:30</strong> Context</td>
</tr>
<tr>
<td><strong>10:30 - 10:45</strong> Break</td>
<td><strong>10:30 - 10:45</strong> Break</td>
</tr>
<tr>
<td><strong>10:45 - 11:45</strong> Signs</td>
<td><strong>10:45 - 11:45</strong> Signs</td>
</tr>
<tr>
<td><strong>11:45 - 12:30</strong> Lunch</td>
<td><strong>11:45 - 12:30</strong> Lunch</td>
</tr>
<tr>
<td><strong>12:30 - 1:30</strong> Purposivity</td>
<td><strong>12:30 - 1:30</strong> Purposivity</td>
</tr>
<tr>
<td><strong>1:30 - 1:45</strong> Break</td>
<td><strong>1:30 - 1:45</strong> Break</td>
</tr>
<tr>
<td><strong>1:45 - 2:45</strong> Difference and Object</td>
<td><strong>1:45 - 2:45</strong> Difference and Object</td>
</tr>
<tr>
<td><strong>2:45 - 3:00</strong> Break</td>
<td><strong>2:45 - 3:00</strong> Break</td>
</tr>
<tr>
<td><strong>3:00 - 4:00</strong> Synthesis, Post</td>
<td><strong>3:00 - 4:00</strong> Synthesis, Post</td>
</tr>
</tbody>
</table>

### Reading Condition

| **8:45 - 9:30** Introduction, C, Pre, DI                              | **8:45 - 9:30** Introduction, C, Pre, DI |
| **9:30 - 10:00** Self-study manual                                   | **9:30 - 3:00** No Instruction |
| distributed and instructions provided.                               | **3:00 - 4:00** Post               |
| **10:00 - 3:00** Self-study period                                   |                                           |
| **3:00 - 4:00** Post                                                  |                                           |

### Control Condition

| **8:45 - 9:30** Introduction, C, Pre, DI                              | **8:45 - 9:30** Introduction, C, Pre, DI |
| **9:30 - 10:00** Self-study manual                                   | **9:30 - 3:00** No Instruction |
| distributed and instructions provided.                               | **3:00 - 4:00** Post               |
| **10:00 - 3:00** Self-study period                                   |                                           |
| **3:00 - 4:00** Post                                                  |                                           |

**Note:** C = Consent Form; Pre = Pretest; DI = Demographic Information; Post = Posttest; FB = Feedback form
Appendix 5: Experiential Exercises

The experiential exercises provide the participants with concrete activities to engage in. In carrying out the activities, each participant comes to share with the other participants a preconceptual experience. After each experiential exercise, the experience is discussed in terms of a systemic-constructivist construct. The discussion is understood by the participants through the preconceptual structures they have formed from engaging in the experiential exercises.

**Context**

**Definition:** Context is a dynamic schema or a conceptual framework that people use to understand or interpret something.

Exercise 1: Creating a Context

**Purpose:** Participants learned how contexts are developed and how objects are interpreted in terms of a self-generated context.

**Materials:** Bags containing approximately 30 tiddlywinks each.

**Duration:** 35 minutes

**Procedure:** Participants were divided into three groups and each group was provided with a bag of tiddlywinks. Groups had fifteen minutes to design a game. After 15-minutes the participants were reassembled and each group in turn demonstrated its game to the other participants, who worked together to discover the rules of the game that was being played and the meaning of the actions of the players.

After the group demonstrations, the following topics were discussed:

What does a tiddlywink mean?  
How did you know what to do with the tiddlywinks?  
How are meaning and action products of past activity?  
How does a part of the pattern (tiddlywink) evoke the whole pattern (game)?  
How did the rules of the game (context) come to be?

After the discussion, participants began Exercise 2.

Exercise 2: Everyday Contexts

**Purpose:** To show how contexts are used to interpret simple, everyday activities.

**Materials:** Stapler, paper, paper-clips, scissors, water-jug, cups

**Duration:** 10 minutes
Procedure: A volunteer was given a stapler and two pieces of paper. When the volunteer stapled the paper, the facilitator asked, “What did you do?” “Why did you do that instead of doing something else?” The group was asked how stapling the paper was similar to the tiddlywink games.

Participants were then grouped into dyads and asked to pass combinations of objects to each other and to find some way of using the objects together. No talking was allowed. As the objects were being passed to the participants, participants were asked whether the person they were with was using the objects as they anticipated they would use them. The group was then reassembled and the idea of interpreting objects in terms of a context was discussed. A discussion was carried out about how a person structures (i.e., knows, acts toward) their environment based upon what they know and how this interpretative structure is altered through experience (e.g., learning a new game).

Sign

Definition: A sign is something that signifies (stands for) something (a referent) to someone. Signs can be symbols, objects, actions, or words.

Exercise 1:

Purpose: The constructs of sign and referent are highlighted by disrupting the conventional relationship between the sign and what it usually represents.

Materials: Pens, forks, cups, balls, paper-clips, action figures

Duration: 20 minutes

Procedure: The exercise began by the facilitator picking up a stapler and banging it against the ground. The facilitator asked, “What is this?” When the participants guessed that it was a “hammer,” the participants were divided up into dyads and given the materials listed above.

Person A of the dyad was asked to demonstrate an unconventional use for an object or a combination of objects while person B of the dyad was to guess how person A was understanding the object. For ten minutes, participants took turns demonstrating unconventional uses for the objects. The group was reassembled and the activities were discussed in terms of the concepts of sign systems. After the discussion, participants began exercise 2.

Exercise 2:

Purpose: The purpose of the second exercise was to demonstrate how the referent of a word or sentence is related to the context of the person who interprets the word.

Materials: Flip-chart, marker, exercise cards

Duration: 20 minutes
Procedure: The following sentences were written on the flip-chart.

"I bought myself a dark blue suit because I heard that this was the way applicants should dress for the sales position. Dark blue is my favourite colour."

Participants were divided into four groups. Each group was given an instruction card. Written upon the card was one of the four sets of instructions:

1) You are a 35 year-old man who has been looking for a job for 6 months who has just said the sentences that are written on the flip-chart.
2) You are a 10 year-old child who has just said the sentences that are written on the flip-chart.
3) You are a woman who has been blind since birth who has just said the sentence that are written on the flip-chart.
4) You are a computer program that has just randomly generated the two grammatically correct sentences written on the flip-chart.

Each group was asked to pretend that they were the person or thing indicated on their card. Other participants had to ask them questions to try to guess who or what they were. This exercise was discussed with the participants. The topic of the discussion was that words can have many referents depending upon the personal context of the knower.

Purposivity

Definition: Purposivity refers to understanding objects or activities in terms of the intentions or goals that a living being is directing itself towards.

Exercise 1

Purpose: To demonstrate that actions have meaning in relation to the goal or purpose that a person is working towards.

Materials: Overhead projector, transparencies, flip-chart, marker

Duration: 10 minutes

Procedure: A drawing was displayed: Two points labelled A and B were connected by a zigzag line. Participants were told that this line represented the path that a person walked when given the instruction to walk directly from point A to point B. The question was asked, "Why did the person walk that way?"

Participants suggested that the person walked that way because the person was drunk, had neurological problems, was being defiant, etc. A template was then placed over the line that showed that the line stayed within the boundaries set by a maze. What previously seemed like erratic behaviour became organised when the underlying structure was revealed to the group.
Next, the following scenario was written on the flip-chart. “A person walks through a room in what appears to be a random pattern. The person walks forward 5 paces, to the right 3 paces, backward 2 paces to the left 6 paces, and forward 10 paces.”

Participants were asked, “What led the person to walk this way?” “How could we find out the reason they are walking this way?”

Exercise 2

Purpose: To demonstrate that an act is meaningful in relation to the goal that is implicit in the task.

Materials: Overhead projector, maze on a transparency, markers, tape, paper

Duration: 15 minutes

Procedure: A volunteer was asked to complete a maze in front of the other participants. Before the maze could be completed, paper was taped to the wall on which the maze would be projected. The facilitator verbally described the activities related to preparing for the exercises. For example, the facilitator commented on the process of looking at the items on the desk to find the tape and scissors. Other items on the desk were not attended to. In pursuit of the goal of locating the tape and scissors, these other items are meaningful in the sense that they are not-the-tape and not-the-scissors. Once the required objects were obtained, the facilitator proceeded to tape the sheet to the wall. The facilitator’s actions were then discussed in terms of how the goal was implicitly expressed through the various behaviours in which the facilitator was engaged.

Once the maze was taped to the wall, the volunteer was asked to complete the maze. Completing the maze involved drawing a line from point A to point B. As the volunteer moved the pen, each movement could be understood in terms of the goal of reaching point B. Whether the volunteer made correct choices or incorrect choices (and had to backtrack) the behaviours were described as completely purposeful and understandable in terms of the goal of completing the maze.

The facilitator led a discussion about the actions that had just taken place. All the volunteer’s actions were viewed as meaningful in relation to the activity of reaching the goal of completing the maze while abiding by the rules of interpreting the maze itself. One rule, which was implicit in how the maze was conceptualised, was that the lines of the maze could not be crossed.

Exercise 3

Purpose: To provide the participants with an example of purposivity that is relevant to them.

Materials: Action figures, blocks, balls.

Duration: 20 minutes
**Procedure:** Participants were divided into groups of three and given 10 minutes to choose a few action figures and create a scenario in which the action figures were working together toward attaining a goal. Each group was asked to demonstrate its scenarios.

The facilitator commented on the first scenario, in terms of how the objects that the characters related to and the actions that the characters were engaged in were related to the goals that were being attained. Next, participants demonstrated the remaining scenarios and participants discussed the purative aspects of the scenarios with each other.

**Difference and Object**

**Definition:** Difference is a change that is registered by the sensory system, however, the person is not aware of the sensory registration. An object is a gestalt, form, or whole that is experienced as standing out from a background.

**Exercise 1**

**Purpose:** To demonstrate that an object is a configurational pattern that stands out from a background.

**Materials:** Overhead projector, drawings of geometric shapes on transparencies, flip-chart.

**Duration:** 10 minutes

**Procedure:** A blurry form is displayed on a projection screen and slowly brought into focus. Participants were asked to identify the object. Next, participants were asked, "What is a shape?" and "What is triangle?" and their answers were written on the flip-chart.

Next, the facilitator made a shape with his hands using two thumbs and two index fingers and asked the participants whether or not he had made a triangle. Slowly the facilitator moved his index fingers apart so the shape was distorted and asked whether the shape was still that of a triangle. Eventually, the triangle-object, no longer "stood out" for the participants.

**Exercise 2**

**Purpose:** To demonstrate the construct of object as standing out from a background.

**Materials:** Twelve large colour photographs mounted on cardboard.

**Duration:** 15 minutes

**Procedure:** Participants sat on the floor and colour photographs were distributed in front of them. Participants were instructed to focus on the "red" in the pictures. Each person picked a red part of the picture and described the part of the picture to the group. Next, participants were asked to identify a circular part of the pictures and describe the circular part to the group.

The exercise was discussed in light of how certain aspects of the pictures stood out as foreground while other aspects become the background. The foreground was described as the object. The facilitator explained that the objects stand out because of the configuration of
differences being sensorially registered by the participants as they observed the paper. The bio-electrical activity in the rods and cones of their eyes change in response to the frequencies of light being reflected off the paper. These changes or differences were transformed into neural signals. Configurations of the neural signals were the objects that the participants were experiencing as “red” or “circular.”

Exercise 3

Purpose: To demonstrate the construct of object and difference as applied to various sensory modalities.

Materials: Twelve sheets of paper were prepared as follows: A corner of the paper had been dipped in perfume, a candy had been attached to the centre of the paper, a square had been drawn on the paper, the bottom edge of the paper had instructions to crumple the paper and listen to the sound of the crumpling, and a rough surface had been glued to the front of the page.

Duration: 20 minutes

Procedure: Participants were each given a sheet of paper that had been prepared to stimulate five of their senses. Participants were told to run their finger across the rough surface, crumple the paper and listen, smell the paper, see the square, and taste the candy. They were asked to pay attention to how the object (square, taste of candy, etc.) stood out for them. Although their nervous systems were registering the complexity of patterns in the room, (sounds, sights, smells, etc.) when they interacted with the paper, specific objects stood out against the background of patterns in the room. These objects of perception are gestalts, or forms that they experience. For example, when smelling the perfume on the paper, the smell became an object for the participants while all other sensations faded to the background.

Non-Linear Causality

Definition: Causality refers to the attribution of responsibility for how something came to be. In living systems, causality is non-linear and involves interpretative processes.

Exercise 1

Purpose: To demonstrate that causality is a basic organisational principle.

Materials: Ball, sheet of paper, flip-chart, marker.

Duration: 5 minutes

Procedure: The facilitator held up a sheet of paper with a ball concealed behind the paper and dropped the ball. Participants were asked to describe what they were thinking about as they watched the ball. All responses were written down on the flip-chart. Of the responses
recorded, what was emphasised was explanations about how the ball came to be (the cause of the event).

Exercise 2:

Purpose: To demonstrate the concept of linear causality and the limitations of the construct to explaining certain phenomena.

Materials: Several balls

Duration: 10 minutes

Procedure: Participants were asked to predict what would happen if one ball was rolled toward another ball. Participants all agreed that the second ball, once hit by the first ball, would continue to move in the direction of the first ball. The following question was then proposed: How could you explain what had happened if the second ball had veered off in an unpredictable way? To demonstrate this, the facilitator held both tennis balls and moved them so that the second ball moved sharply to the right after it was struck by the first ball. The facilitator responded to each suggested explanation by ruling out any external conditions the participant had attempted to introduce. For example, when a participant said that the ball was rolling down a hill, the facilitator said, “the surface was not inclined.” When a person said that the wind was blowing the ball, the facilitator replied, “there was no wind,” and so forth.

Next, the question was asked, “What if the second ball were a living entity?” “How would the second ball being a living entity explain the behaviour of the second ball?”

Exercise 3

Purpose: To provide participants with the experiential referents for the differences between causality in living and non-living systems.

Materials: Balls, rubber snakes, toy mammals, and action figures.

Duration: 30 minutes

Procedure: Participants were divided into small groups and asked to work through a series of exercises. In each exercise, a ball was rolled toward one of the objects listed in the Materials section. One person controlled the rolling ball and the other person controlled the second object that the ball struck. For example, when a ball would strike another ball, the second ball would move forward. Or, when a ball would strike the snake, the snake could move away from the ball, coil itself around the ball, and so forth.

Next, participants were given 5 minutes to create a scenario in which one of the action figures caused the other figure to do something. The group was reassembled and the interactions between the balls and characters were discussed. The focus of the discussion was how complex living systems are not caused to act in the way of simple objects. To understand
the cause of behaviour in a living system, a person must understand how the living system is interpreting the event.

**Nonconscious Structuring**

*Definition:* Nonconscious structuring refers to the system’s active motoric, perceptual, and conceptual organising of its environment that occurs outside of conscious awareness.

**Exercise 1:**

*Purpose:* To provide several examples of non-conscious processes.

*Materials:* Blocks, flip-chart, marker.

*Duration:* 15 minutes

*Procedure:* Participants were given three blocks each and instructed to place one block so that it was supported by the other two blocks. After doing so, the participants were asked, “What rules are the two blocks following so that the one block does not fall to the ground?”

Next two volunteers were asked to describe the first activity that they performed upon entering the workshop room in the morning. The responses to this question were written on the flip-chart. The question was asked, “What rules were followed to construct these grammatically correct sentences?”

Two other volunteers were requested and balls were thrown toward each of them. After the volunteers caught (or attempted to catch) the balls, the following questions were asked to the group, “How did the volunteers know that the balls should be caught?” “How did they know how to move their bodies in such a manner to catch the balls?”

Participants were asked to think about a dog catching a Frisbee. The question was asked, “How does the dog do the complex trigonometrical equations that allow it to predict where the Frisbee will be so that it can jump and catch the Frisbee?” Similar questions were asked such as, “How does the stomach know how to digest food?” “What rules does the stomach follow?” The intention of the line of questioning was to have participants reflect upon the extent to which order is created without the need of conscious reflection.

**Exercise 2**

*Purpose:* To provide a complex example of nonconscious structuring in an interpersonal context.

*Materials:* Pen

*Duration:* 15 minutes

*Procedure:* The two facilitators acted out the interpersonal scenario (Plate on the Table) in which a father asks a child to comply with instructions that are unclear. As this scenario was
being acted out, participants were asked to comment on the nonconscious structur(ing) that was occurring.

**Self-Ordering**

**Definition:** Self-ordering refers to the recursive process through which a living system engages in the ongoing organisation of its environment.

**Exercise 1**

**Purpose:** To demonstrate the process of revision-of-action in relation to the-revision of-perception.

**Materials:** Blocks, paper, pens

**Duration:** 25 minutes

**Procedure:** Participants were asked to form dyads and to use wooden blocks to build a house. No talking was allowed and each participant would take a turn adding one block to the structure.

In a similar exercise, participants were told to draw a picture. No discussion was allowed as to what the picture would be and no talking was allowed during the exercise. Each person in the dyad was to take a turn adding one line to the picture.

These two exercises were discussed in terms of how each person had to act based upon what the other person had done. The dyads exemplified the ongoing self-ordering process of continually revising actions in relations to perceptions.
Appendix 6: Questionnaire

Scenario Analysis

Please read these two scenarios describing interactions between people and write one- or two-sentence answers to the questions on the following pages.

(Spill) Spilling the Drink

"Julie," said Wendy. "the bowl, please."
Julie reached around the candle, picked up the bowl of salad, and passed it to
Wendy. "Here you are, Wendy," said Julie.
As Wendy was serving the salad onto her plate, she brushed against Julie's glass of wine.
"Sorry," said Wendy. Wendy got up out of her chair, walked to the sink to get a cloth, wiped
up the spill, then sat back down.
"I broke a glass just yesterday," said Julie.

(Book) Reading a Book

Cindy was sitting on the porch reading a book. She heard the screen door open and saw
Florence, her mother, come out of the house holding a bottle of vodka and swaggering.
"Cindy, we need more orange juice. Could you go to the store for me?" asked Florence.
Cindy turned away and continued reading her book.
"Could you go to the store?" asked Florence, louder. "Didn't you hear me?" Florence
turned around and went back into the house.
A tear fell from Cindy's eye and landed on her book.
Context*

Define “context”:
(Spill) Using the concept of context, explain why Wendy said “sorry.”
(Book) Using the concept of context, what might be a possible explanation of Cindy’s behaviour toward Florence?

Sign

Define “sign”:
(Spill) Using the concept of sign, discuss the meaning of “the bowl, please.”
(Book) Using the concept of sign, explain Cindy’s reaction to Florence.

Purposivity

Define “purposivity”:
(Spill) Using the concept of purposivity, explain what the candle may have meant to Julie.
(Book) Using the concept of purposivity, explain what Cindy’s reading may have meant to Florence.

Difference and Object

Define “difference and object”:
(Spill) (a.) Discuss the salad bowl using the concepts of difference and object.
(b.) Using the concepts of difference and object, explain why Julie and Wendy appear to understand each other.
(Book) Using the concepts of difference and object, discuss Cindy’s knowledge that Florence was on the porch.

*Note: On questionnaire used in the study, each question was followed by two blank lines. The blank lines have been omitted in the Appendix.
Scenario Analysis

Please read these two scenarios describing interactions between people and write one- or two-sentence answers to the questions on the following pages.

(Mats) Placemats on the Table

"Sandra," said Bill, "it's six now, could you help me?"
Sandra put the cat on the floor, went to cupboard, and took out four placemats. "Should I put these on the table?" she asked.
"That's right," replied her father, "just set them down around the table."
Sandra walked over to the table and put the placemats on the table.
"Remember," said Bill, "Katey will be late today."
Sandra took one of the placemats off the table and went into the kitchen. "I put them on the table," she said to her father who was carrying the plates and cutlery.
"Thank you," said her father.

(Game) Watching the Game

Lisa heard the front door being unlocked. John walked into the room and stood behind Lisa who was reading a book.
"Hi, Lisa," said John.
"Hi," said Lisa.
"I was out with the guys," said John.
"Sure," said Lisa.
"Really," said John, "we were just watching the game."
"I didn't say you weren't with them," said Lisa with her eyes on her book.
"Don't give me that," said John, "you can call them if you want."
"I know what they will probably say," said Lisa.
Context
Define "context":
(Mats) Using the concept of context, explain why Sandra's father said "thank you."
(Game) Using the concept of context, what might be a possible explanation of Lisa's behaviour towards John?

Sign
Define "sign":
(Mats) Using the concept of sign, discuss the meaning of "six."
(Game) Using the concept of sign, explain Lisa's reaction to John's absence.

Purposivity
Define "purposivity":
(Mats) Using the concept of purposivity, explain what the cat may have meant to Sandra.
(Game) Using the concept of purposivity, explain what Lisa's looking at her book may have meant to John.

Difference and Object
Define "difference and object":
(Mats) (a.) Discuss the placemats using the concepts of difference and object.
    (b.) Using the concepts of difference and object, explain why the father and daughter appear to understand each other.
(Game) Using the concepts of difference and object, discuss Lisa's knowledge that John was home.
(Pen) Pen in the Eye

“Come in, have a seat,” said Dr. Smith, an optometrist.
“You see, doctor,” said Phil. “I have been having some difficulty with my eyes.”
The doctor reached into his pocket and pulled out a pen. “I’m going to move this pen and
I would like you to track the pen with your eyes.”
The doctor moved the pen from side to side and Phil followed the movements.
“Ouch!,” yelled Phil as the doctor poked him in the eye.
“Oh my, I’m very sorry,” said the Dr. Smith, “let’s try that again.”
Phil sat back in the chair and tried to be co-operative.
Later, as Phil was leaving the office, he was stopped by the receptionist.
“Please fill out this form,” she said, handing him a pen.
Phil stepped back and raised his hands in front of his face.

(Plate) Plates on the Table

Mr. Patterson was setting the table with his four-year old son.
“Jim,” said Mr. Patterson, “please put the plate on the table.”
Jim walked over to the table and placed the plate he was carrying on the table. Mr.
Patterson’s voice grew louder. “That is not where I want it.”
Jim moved the plate over so it was centred directly in front of the chair.
“You are making me angry, Jim,” said Jim’s father, “either do as I say or there will be
trouble.”
Jim started to tremble and moved the plate a little to the left of where it was. His father
stared at him and walked quickly toward him.
“You are being very bad. I can see why this family is falling apart,” said Jim’s father.
Jim turned to go into the other room.
“You get back here and do as I say,” said his father. “you can’t just walk away from your
responsibilities.”
Jim returned to the table and adjusted the plate.
Later, Jim went upstairs to tidy his room. He felt that despite how much he cleaned his
room, he just could not get it tidy enough.
Exercise

Context
Define "context":
(Pen) Using the concept of context, explain how Phil came to raise his hands in front of his face.
(Plate) Using the concept of context, explain why Jim may believe that his room is not tidy.

Sign
Define "sign":
(Pen) Using the concept of sign, discuss the meaning of the pen.
(Plate) Using the concept of sign, explain why the activity of setting the table may have a different meaning for Jim compared to how most people would think about this activity.

Purposivity
Define "purposivity":
(Pen) Using the concept of purposivity, explain what the poke may have meant to Phil.
(Plate) Using the concept of purposivity, explain what Jim's setting the table may have meant to Mr. Patterson.

Difference and Object
Define "difference and object":
(Pen) (a.) Discuss the pen using the concepts of difference and object.
    (b.) Using the concepts of difference and object, explain why the receptionist may not be able to understand Phil's behaviour.
(Plate) Using the concepts of difference and object, discuss Jim's knowledge that Mr. Patterson was angry.
Appendix 7: Rating Criteria for Judges

SCORING CRITERIA

Scoring:

2 ....... Right
1....... Somewhat Right
0....... Wrong

Answers are scored following the WAIS-R Comprehension Subtest procedure. This procedure is described by Wechsler (1981) as follows:

Each item is scored 2, 1, or 0, depending on the degree of understanding expressed and the quality of the response. In scoring each item, the examiner should match the subject's response against the general criteria and the sample answers given below for each question. Undoubtedly, some subjects will give unusual responses which are not typified by the sample answers. In such instances, the score should be determined by the examiner's own judgement. Most of the 0-point examples given typify marginal responses....Particular care should be exercised in scoring items which require two correct responses for full credit (these items are indicated by an asterisk preceding the item number). In order to receive full credit, the subject must express at least two of the general ideas which are indicated. Full credit cannot be given if the subject gives two answers, both of which express the same idea. (p. 125)
(Spill) Spilling the Drink

"Julie," said Wendy, "the bowl, please."
Julie reached around the candle, picked up the bowl of salad, and passed it to
Wendy. "Here you are, Wendy," said Julie.
As Wendy was serving the salad onto her plate, she brushed against Julie's glass of wine.
"Sorry," said Wendy. Wendy got up out of her chair, walked to the sink to get a cloth, wiped
up the spill, then sat back down.
"I broke a glass just yesterday," said Julie.

(Book) Reading a Book

Cindy was sitting on the porch reading a book. She heard the screen door open and saw
Florence, her mother, come out of the house holding a bottle of vodka and swaggering.
"Cindy, we need more orange juice. Could you go to the store for me?" asked Florence.
Cindy turned away and continued reading her book.
"Could you go to the store?" asked Florence, louder. "Didn't you hear me?" Florence
turned around and went back into the house.
A tear fell from Cindy's eye and landed on her book.

(Mats) Placemats on the Table

"Sandra," said Bill, "it's six now, could you help me?"
Sandra put the cat on the floor, went to cupboard, and took out four placemats. "Should I put
these on the table?" she asked.
"That's right," replied her father, "just set them down around the table."
Sandra walked over to the table and put the placemats on the table.
"Remember," said Bill, "Katey will be late today."
Sandra took one of the placemats off the table and went into the kitchen. "I put them on
the table," she said to her father who was carrying the plates and cutlery.
"Thank you," said her father.

(Game) Watching the Game

Lisa heard the front door being unlocked. John walked into the room and stood behind
Lisa who was reading a book.
"Hi, Lisa," said John.
"Hi," said Lisa.
"I was out with the guys," said John.
"Sure," said Lisa.
"Really," said John, "we were just watching the game."
"I didn't say you weren't with them," said Lisa with her eyes on her book.
"Don't give me that," said John. "you can call them if you want."
"I know what they will probably say," said Lisa.
SCORING CRITERIA FOR FORM "Spill/Book"

Items, General Criteria, And Sample Responses

CONTEXT

*Define “context”:

- **Description:** Schema ... Pattern ... Framework ... Conceptual organisation ... Meaning system ... Belief system ... Knowledge system.

- **Function:** Used to understand or interpret something ... Used to conceptually organise the world ... Used to know the environment ... Used to make sense of a situation ... How one understands the world ... One's interpretation of a situation.

- **Location:** Internal ... Situated inside a person ... In our heads ... Not outside of ourselves.

2 POINTS — A response recognising at least two of the three general ideas given above.  
1 POINT — A response recognising one of the above ideas.  
0 POINTS — How someone should act ... Demands of a situation ... Situation ... What is around you ... A particular context (restaurant, being polite, a game).

*(Spill) Using the concept of context, explain why Wendy said “sorry.”

- **Specific schema:** She was engaging in a spilling-a-drink schema or being-polite schema ... Being-polite pattern ... spilling-a-drink framework.

- **Interpretation:** She said sorry because of how she interpreted (understood, made sense of) the spilling of the drink ... She made sense of the event in a way that led her to apologise ... She said sorry because of how she understood what she did.

- **Context Development:** The context of her saying sorry (being polite) was developed from observing or taking part in similar interactions ... She had said sorry before when drinks were spilled.

2 POINTS — A response recognising at least two of the three general ideas given above.  
1 POINT — A response recognising one of the above ideas.  
0 POINTS — How someone should act ... She was being polite ... Because she spilled the drink ... Demands of a situation ... It was her fault ... She wanted to apologise.
(Book) Using the concept of context, explain what might be a possible explanation of Cindy’s behaviour toward Florence.

2 POINT — Recognition that Cindy interpreted (made sense of, framed) Florence’s actions.

Cindy interpreted (understood, thought of, believed of) her mother’s actions in a manner that led her to the conclusion that her mother was intoxicated ... She made sense of the event ... Cindy understands her Florence in through a framework (personal context) that has been developed from seeing her behave this way in the past.

1 POINT — The idea that contexts are developed from past experiences without a clear reference to interpretation.

Cindy has seen her mother behave this way before ... Florence has been drunk before.

0 POINTS — Description of reason for Cindy’s behaviour with no mention of Cindy’s role of interpreting her mother’s behaviour or how Cindy’s context came to be developed.

Cindy was angry ... Cindy is upset because her mother is drunk ... Cindy’s behaviour is caused by her mother’s alcoholism ... Cindy feels helpless.

SIGN

Define “sign”:

2 POINT — A symbol, word, thing, object, or action that stands for something to someone.

A meaning attributed to (attached to) something ... A symbol that has different meanings to different people ... Symbol with a personal referent ... A sign an object that is interpreted in terms of a context.

1 POINT — A symbol, word, thing, object, or action that stands for something. (No mention of someone)

Signs are symbols for what they represent ... Meaning of signs change depending upon context ... Signs refer to concepts.

0 POINTS — What a symbol refers to ... A word ... A logo ... Instructions ... A cue ... A symbol ... All words are signs.
(Spill) Using the concept of sign, discuss the meaning of “the bowl please.”

2 POINT — Answer should mention that “the bowl please” is a sign standing for something to someone.
   To Julie and Wendy, “the bowl please” is a signs that means pass the bowl ... A symbol that has a meaning to Julie and Wendy in the dinner time context that they are sharing ... Words with a referent for Wendy and Julie.

1 POINT — Answer should mention that “the bowl please” is a sign standing for something (No mention of the sign standing for something to someone).
   “The bowl please” is a sign that means pass the bowl ... This sign (word, cue, symbol) means pass the bowl ... The bowl stands for (represents, refers to) the salad.

0 POINTS — “The bowl please” is a sign ... The bowl is a sign ... “The bowl please” means pass the bowl.

(Book) Using the concept of sign, explain Cindy’s reaction to Florence.

2 POINT — Answer should mention that Florence is a sign standing for something to Cindy (Or Cindy’s behaviour as a sign standing for something to Florence).
   To Cindy, Florence’s behaviour is a sign that means Florence is intoxicated ... Florence’s behaviour was a sign to Cindy that her mother was intoxicated... Cindy’s reaction was a sign to Florence that Cindy was angry.

1 POINT — Answer should mention that Cindy’s or Florence’s behaviour is a sign standing for something (No mention that their behaviour is a sign to someone).
   Florence’s behaviour was a sign that she was intoxicated ... Cindy’s behaviour is a sign that she is angry with her mother.
   This sign (word, cue, symbol) means pass the bowl ... The bowl stands for (represents, refers to) the salad.

0 POINTS — Florence is a sign ... Orange juice is a sign.
PURPOSIVITY

Define “purposivity”:

2 POINTS — Understanding objects or actions in terms of the intentions or goals that a living being is directing itself towards.

1 POINT — Mentioning a goal and an action directed toward attaining the goal (Without mention of the idea of understanding objects or actions in terms of this goal).

Doing a certain things to achieve a goal ... What we do to attain a goal ... Thinking that is directed toward a goal.

0 POINTS — Purpose ... Aim ... Why we do something ... The reason for action ... Our explanations for behaving.

(Spill) Using the concept of purposivity, explain what the candle may have meant to Julie.

2 POINTS — Julie understands the candle as an obstacle to the goal of reaching the bowl. Candle is an obstacle to attaining the goal...Understanding the candle in terms of the goals pursued.

1 POINT — The candle is understood as an obstruction to Julie. (The idea of goal is only implied).

Candle is an obstacle ... Candle is not the bowl ... Candle is blocking the movement.

0 POINTS — To create a conformable atmosphere ... A symbol of friendship ... A decoration ... Something that burns (without mention that it had to be avoided) ... It is near the salad bowl.

(Book) Using the concept of purposivity, explain what Cindy’s reading may have meant to Florence.

2 POINTS — Florence understands Cindy’s reading as an obstacle to the goal of having Cindy go to the store to get orange juice for her.

Reading is not going to get her to the store ... Her reading is an obstacle to attaining the goal.

1 POINT — The reading as an obstruction to Florence. (The idea of goal is only implied)

An obstacle ... A barrier.

0 POINTS — Cindy is ignoring Florence ... Cindy is angry at Florence ... Cindy is not paying attention to Florence.
DIFFERENCE AND OBJECT

*Define “difference and object”:

• **Difference**: A change registered by the sensory system ... A sensory registration that occurs outside of awareness ... Information that is being registered (although not attended to) ... A change or contrast at the sensory level.

• **Object**: A gestalt, form, or whole that is experienced ... The focus of attention ... A form or experience that stands out for someone ... Some thing or person that stands out in front of a background ... People are aware of objects ... Objects are configurations of differences.

2 POINTS — A correct definition for both difference and object.
1 POINT — A correct definition for either difference of object.
0 POINTS — Object is a thing ... Difference is what you are not paying attention to ...
   Difference is separate from the object ... Difference is contrast.

*(Spill) (a.) Discuss the salad bowl using the concepts of difference and object.
(b.) Using the concepts of difference and object, explain why Julie and Wendy appear to understand each other.

• **Difference (part a)**: The bowl or something on the table is a change registered by visual or tactile senses ... When the salad bowl is in the visual field but is not being attended to sensory events (differences) are still being registered.

• **Object (part a)**: The bowl is a gestalt, form, or whole that is experienced ... The bowl is the focus of attention for Julie during a part of the scenario ... A form or experience that stands out for someone ... Bowl that stands out in front of the table ... Bowl is a configuration of differences.

• **Difference (part b)**: Similar information is being registered sensorially by Julie and Wendy .... Their sensory systems are responding to similar differences.

• **Object (part b)**: They share the same objects (gestalts) of experience ... Both see the bowl and wine glass which are objects (gestalts) to both of them.

2 POINTS — A response recognising at least two of the four ideas given above.
1 POINT — A response recognising one of the above ideas.
0 POINTS — The salad bowl is different than what else is on the table .... The salad bowl is a thing or object ... Wendy and Julie understand each other because they are not different from each other ... Wendy and Julie are objective.
*(Book) Using the concepts of difference and object, discuss Cindy's knowledge that Florence was on the porch.

- **Difference:** The sight of Florence or the sound of the screen door are changes registered by visual or tactile senses ... When Florence is in the visual field but is not being attended to sensory events (differences) are still being registered.

- **Object:** Florence or the sound of Florence is a gestalt, form, or whole that is experienced ... The object (Florence, sound of Florence) is the focus of attention for Cindy during a part of the scenario... Florence is an experience that stands out for Cindy ... Florence emerged as an object from the background.

2 POINTS — A correct application for both difference and object.
1 POINT — A correct application for either difference or object.
0 POINTS — Cindy heard Florence open the door (no mention of object or difference).
SCORING CRITERIA FOR FORM "Mats/Game"

Items, General Criteria, And Sample Responses

CONTEXT

*Define “context”:

- **Description**: Schema ... Pattern ... Framework ... Conceptual organisation ... Meaning system ... Belief system ... Knowledge system.

- **Function**: Used to understand or interpret something ... Used to conceptually organise the world...Used to know the environment ... Used to make sense of a situation ... How one understands the world ... One’s interpretation of a situation.

- **Location**: Internal ... Situated inside a person...In our heads...Not outside of ourselves.

2 POINTS — A response recognising at least two of the three general ideas given above.
1 POINT — A response recognising one of the above ideas.
0 POINTS — How someone should act ... Demands of a situation ... Situation ... What is around you ... A particular context (restaurant, being polite, a game).

*(Mats) Using the concept of context, explain why Sandra’s father said “thank you.”

- **Specific schema**: Sandra’s father was engaging in a being-polite schema ... The plates were arranged in a manner that was coherent with the father’s context ... Being-polite pattern ... his way of organising and responding to what she did.

- **Interpretation**: Sandra’s father said “thank you” because of how he interpreted (understood, made sense of) Sandra’s behaviour ... He made sense of the event in a way that led him to thank Sandra ... He said “thank you” because of how he understood what she did.

- **Context Development**: Sandra’s father context of saying “thank you” (being polite) was developed from observing or taking part in similar interactions ... He had previously thanked Sandra when she helped him.

2 POINTS — A response recognising at least two of the three general ideas given above.
1 POINT — A response recognising one of the above ideas.
0 POINTS — How someone should act ... He was being polite ... Because she helped him set the table ... Demands of a situation ... It was Sandra’s fault.
(Game) Using the concept of context, what might be a possible explanation of Lisa’s behaviour towards John?

2 POINT — Recognition that Lisa interpreted (made sense of, framed) John’s actions.
Lisa interpreted (believed, thought of, understood) John’s actions in a manner that led her to the conclusion that he was lying to her ... It was how she made sense of the event ... She was interpreting (understanding) his current behaviour through a schema that was developed over time.

1 POINT — The idea that Lisa’s context was developed from past experience without a clear reference to interpretation.
John has lied to her before ... Lisa has had many experiences with John and now does not trust him ... John had an affair in the past ... Lisa had an affair in the past.

0 POINTS — Description of reason for Lisa’s behaviour with no mention of Lisa’s role of interpreting John’s behaviour or how her context came to be developed.
Lisa was angry ... Lisa was upset because John was not home ... John was not really out with the guys ... Lisa does not trust John.

SIGN

Define “sign”:

2 POINT — A symbol, word, thing, object, or action that stands for something to someone.
A meaning attributed to (attached to) something ... A symbol that has different meanings to different people ... Symbol with a personal referent ... A sign an object that is interpreted in terms of a context.

1 POINT — A symbol, word, thing, object, or action that stands for something. (No mention of someone)
Signs are symbols for what they represent ... Meaning of signs change depending upon context ... Signs refer to concepts.

0 POINTS — What a symbol refers to ... A word ... A logo ... Instructions ... A cue ... A symbol ... All words are signs.
(Mats) Using the concept of sign, discuss the meaning of “six.”

2 POINT — Answer should mention that six is a sign standing for something to someone. To Sandra or her father “six” is a sign meaning six o’clock ... “Six” is a sign to this family meaning that it is dinner time.

1 POINT — Answer should mention that “six” is a sign standing for something. (No mention that “six” is a sign to someone)

“Six” is a sign meaning dinner-time ... Six is a sign meaning the number of people expected for dinner ... Six is a sign meaning six o’clock ... Six is a symbol meaning six o’clock.

0 POINT — (The meaning of six without a clear indication that six is a sign or stating that six is a sign without indicating the meaning of the sign)

Six is a sign ... Six means dinner-time ... six o’clock ... The number of people of people expected for dinner ... Time to prepare for dinner.

(Game) Using the concept of sign, explain Lisa’s reaction to John’s absence.

2 POINT — Answer should mention that John’s absence is a sign standing for something to Lisa (Or Lisa’s behaviour as a sign standing for something to John)

To Lisa, John’s absence is a sign meaning that he does not care about her ... John’s absence is a sign to Lisa that he is seeing another woman ... To Lisa, his absence stands for his rejection of her ... In terms of Lisa’s context (framework, schema) John’s absence stands for lying.

1 POINT — Answer should mention that Lisa’s or John’s behaviour is a sign standing for something. (No mention that his absence is a sign to Lisa)

John’s behaviour is a sign meaning he was not with the guys ... His absence could represent (stand for) he is rejecting her ... Lisa’s silence signifies her anger.

0 POINT — (The meaning of John’s absence without a clear indication that the absence is a sign or stating that his absence is a sign without indicating the meaning of the sign)

John’s absence is a sign ... She thinks he is lying ... Lisa is angry ... Lisa ignored him ... Her tone of voice.
PURPOSIVITY

Define “purposivity”:

2 POINTS — Understanding objects or actions in terms of the intentions or goals that a living being is directing itself towards.

1 POINT — Mentioning a goal and an action directed toward attaining the goal (Without mention of the idea of understanding objects or actions in terms of this goal)
   - Doing a certain things to achieve a goal ... What we do to attain a goal ... Thinking that is directed toward a goal.

0 POINTS — Purpose ... Aim ... Why we do something ... The reason for action ... Our explanations for behaving.

(Mats) Using the concept of purposivity, explain what the cat may have meant to Sandra.

2 POINTS — Julie understands the cat as an obstacle to the goal of going to the cupboard.
   - Cat is an obstacle to attaining the goal...Understanding the cat in terms of the goals pursued.

1 POINT — The cat is understood as an obstruction to Sandra (The idea of goal is only implied).
   - Cat is an obstacle ... Cat is not the placemat.

0 POINTS — She wanted to put the cat on the floor ... Sandra loves her cat.

(Game) Using the concept of purposivity, explain what Lisa’s looking at her book may have meant to John.

2 POINTS — John understands Lisa’s reading as an obstacle to the goal of having Lisa listen to him.
   - Her reading is an obstacle to attaining John’s goal.

1 POINT — The reading as an obstruction to John. (The idea of goal is only implied)
   - An obstacle ... A barrier.

0 POINTS — Lisa is angry at John ... Lisa is not paying attention to John ... John wanted her to trust him ... Lisa loved to read.
DIFFERENCE AND OBJECT

*Define “difference and object”:

- **Difference**: A change registered by the sensory system ... A sensory registration that occurs outside of awareness ... Information that is being registered (although not attended to) ... A change or contrast at the sensory level.

- **Object**: A gestalt, form, or whole that is experienced ... The focus of attention ... A form or experience that stands out for someone ... Some thing or person that stands out in front of a background ... People are aware of objects ... Objects are configurations of differences.

2 POINTS — A correct definition for both difference and object.
1 POINT — A correct definition for either difference of object.
0 POINTS — Object is a thing ... Difference is what you are not paying attention to ...
Difference is separate from the object ... Difference is contrast.

*(Mats)(a.) Discuss the placemats using the concepts of difference and object.

(b.) Using the concepts of difference and object, explain why the father and daughter appear to understand each other.

- **Difference (part a)**: The placemats are changes registered by visual or tactile senses ... When the placemats are in the visual field but are not being attended to sensory events (differences) are still being registered.

- **Object (part a)**: The placemats are gestalts, forms, or wholes that are experienced ... The placemats are the focus of attention for Sandra during a part of the scenario ... A form or experience that stands out for someone ... Placemats stand out in front of the table ... Placemats are a configuration of differences.

- **Difference (part b)**: Similar information is being registered sensorially by Sandra and her father ... Their sensory systems are responding to similar differences.

- **Object (part b)**: They share the same objects of experience ... Both see the placemats which are objects to both of them.

2 POINTS — A response recognising at least two of the four ideas given above.
1 POINT — A response recognising one of the above ideas.
0 POINTS — The placemats are different than what else is on the table .... The placemats are a thing or object ... Sandra and her father understand each other because they are not different from each other ... Sandra and her father are objective.
(Game) Using the concepts of difference and object, discuss Lisa's knowledge that John was home.

- **Difference:** The sound of the door is a change registered by Lisa's auditory senses ... When John is making sounds that are registered as sensory events (differences) but are not being attended to.

- **Object:** John or the sound of John is a gestalt, form, or whole that is experienced ... The object (John, sound of John) is the focus of attention for Lisa during a part of the scenario... John is an experience that stands out for Lisa ... John emerged as an object from the background.

2 POINTS — A correct application for both difference and object.
1 POINT — A correct application for either difference or object.
0 POINTS — Lisa heard John unlock the door (no mention of object or difference).
Appendix 8: Follow-up Consent Form and Questionnaire

Follow-Up Study

I am interested in what you will remember about experiential epistemology. With your permission, in a month I would like to come to your Social Psychology class and have you complete a brief questionnaire. I will also send you feedback about this follow-up study.

Please note that the follow-up study will not be anonymous as I will be comparing the answers you gave today to what you later remember. If you are interested in participating, please fill in the information below.

Richard Holigrocki

Date ______________________

Name ______________________

Signature ___________________

Address ______________________

Street ______________________ Apt. #

City ______________________ State/Prov.

Zip/Postal Code
Appendix 9: Self-Study Manual

Systemic-constructivism is a theory about how a person understands the world in which they live. In this workbook, four of the core concepts of this theory will be described for you. Each concept will be defined and a few examples of its application to every-day situations will be provided. Next, you will be given the chance to define the concept yourself and apply it to an interpersonal scenario. Please check and refine your answers against the answers that are written on the final few pages of this workbook. At 3:00 p.m., you will be given another questionnaire, similar to the questionnaire you completed this morning.

Context

Context is a dynamic schema or a conceptual framework that someone uses to understand or interpret something. In writing, context is a term that is used to refer to the connected structure of a composition or the coherence between parts of a discourse. The whole structure of a written work influences the parts which comprise it. The meaning of a text is partially determined by what was written before or after any particular passage of a text. The sentence “I see said the blind man who picked up the hammer and saw” is a good example of context in writing. The meaning of the earlier words in the sentence are changed by what is read in the later part of the sentence.

The concept of context, in a more general sense, is also used to describe the situation or the framework through which a person understands something. If a person is understanding a situation in terms of a wedding context, people will be observed as behaving in certain ways, dressing in certain ways, and engaging in certain rituals. The context seems to surround a person. The people, objects, the room itself are all influenced by a wedding-context.

An auto-body shop is another context. When people go to an auto-body shop to get their cars fixed, they expect the employees of the auto-body shop to act in certain ways and they also expect to see certain things. An employee should, for example, come to the customers and ask them which car belongs to them. Customers would also expect to see tools in the shop, a reception area, waiting room, and garage area. If parts of this context are missing or something is added to the context, customers are surprised. For example, if a hostess, menus, and a grill are in the auto-body shop or there are no car parts in the shop, the customers may wonder whether they are really in an auto-body shop.

People usually do not think about the context until their expectations are not being met. In each of their contexts, they expect to see people acting in certain ways and expect to encounter certain things. When their expectations are not met, they begin to pay attention to the context.

So where is the context? People usually think of a context as being external to them. That is, contexts seem as if they are “out there” and that people walk through the contexts. In some ways it seems natural to think of contexts as if contexts were outside of people. When a person enters a certain place they understand the context from what they see around them. The people and objects have certain shared characteristics that can be called a “context.” The restaurant has waiters, tables, a cash register, menus; all of which can be called a context.

Instead of thinking about context as being outside of a person, try to think of context as being a schema or a meaning system within a person. Once again, think of context as being within a person. The world starts looking differently when context is thought of in this way. Consider the restaurant example. A person walks into a building and brings with them their
context of restaurant. They look into the room expecting to see certain objects that fit into their context of what a restaurant is. The objects in a context do not inform the person what the context is. Instead, the person understands the objects in term of a context that they bring with them.

To summarise, context is an internal conceptual framework that people use to understand the world. Context is the way people make sense of or interpret the objects in their environment.

**Tick-Tack-Toe and Monopoly**

Consider the game *Tick-Tack-Toe*. “Tick-Tack-Toe” or “naughts-and-crosses” is a game with simple rules that is played on a game board that players construct. To play Tick-Tack-Toe, the participants take turns marking Xs and Os, respectively, on a nine-spaced figure formed by two pairs of parallel lines intersecting at right angles. The winner of the game is the first person to place three Xs or three Os in a straight line.

In this activity, each of the components of the game are meaningful in terms of a Tick-Tack-Toe game context. If a person pointed to any one aspect of the game and asked the player “What is this?” it is likely that that the player would describe the object or activity in terms of the game. The four lines would be described as a “game board” and the activity of drawing an “X” would be described as “taking a turn.” Drawing a line through three “O”s would be described as “winning.” Each activity is understood in terms of the Tick-Tack-Toe game context.

Let us look at another game, such as *Monopoly*. The purpose of this game is to accumulate Monopoly money from other players by purchasing property and charging the other players who have the misfortune of landing on developed property. After a person learns to play Monopoly, the pieces of the game, that have little meaning before the game, become meaningful in terms of the game. The green pieces (the houses) and the red pieces (the hotels) symbolise having to pay another player Monopoly money or receiving Monopoly money from a player who has landed on “property.” The playing pieces (cards, money, houses, hotels), the actions (buying property, going to jail), and the words (Park Place, Reading Railroad) all are meaningful in terms of the Monopoly context that is shared by the players of the game.

The Tick-Tack-Toe context and the Monopoly context have been created by repeatedly observing or taking part in the activities of the game. Once the context is formed, the pieces of the game are interpreted in terms of the game context.

**Every-Day Contexts**

Let us look at a few of the contexts that people use every day. Every activity that a person involves himself or herself with depends upon a context. Consider the activity of stapling. Stapling two pieces of paper together is something that most students have done or observed many times. If person A passes a stapler and a piece of paper to person B, person B will likely staple the two pieces of paper together. In a similar example, if person A passes a cup and a water-jug to person B, person B would likely pour the water into the cup. In most cases person B will pour the water without need for any instruction from person A. The question we may ask is, how does person B know what to do with the stapler and the water-jug?

Over the years of behaving in certain ways with the objects that people have around them and seeing other people similarly using the objects, people develop contexts of knowing the objects. If a person has stapled paper time and time again, the person has within him or her a
stapling-paper context. Showing the person a part of this context, brings to mind the whole context — the part elicits the whole. If the person sees the stapler, he or she immediately understand the stapler in terms of past activities and experiences with staplers. Once a context has been formed, the objects in the world will be interpreted in terms of the context.

Please read the two scenarios and answer the following questions:

Scenario 1: Pen in the Eye

“Come in, have a seat,” said Dr. Smith, an optometrist.
“Uncle, doctor,” said Phil, “I have been having some difficulty with my eyes.”
The doctor reached into his pocket and pulled out a pen. “I’m going to move this pen and I would like you to track the pen with your eyes.”
The doctor moved the pen from side to side and Phil followed the movements.
“Oh c’mon,” yelled Phil as the doctor poked him in the eye.
“Ouch!” said the Dr. Smith, “let’s try that again.”
Phil sat back in the chair and tried to be co-operative.
Later, as Phil was leaving the office, he was stopped by the receptionist.
“Please fill out this form,” she said, handing him a pen.
Phil stepped back and raised his hands in front of his face.

Scenario 2: Plates on the Table

Mr. Patterson was setting the table with his four-year old son.
“Jim,” said Mr. Patterson, “please put the plate on the table.”
Jim walked over to the table and placed the plate he was carrying on the table. Mr. Patterson’s voice grew louder, “That is not where I want it.”
Jim moved the plate over so it was centred directly in front of the chair.
“You are making me angry, Jim.” said Jim’s father. “either do as I say or there will be trouble.”
Jim started to tremble and moved the plate a little to the left of where it was. His father stared at him and walked quickly toward him.
“You are being very bad. I can see why this family is falling apart,” said Jim’s father.
Jim turned to go into the other room.
“You get back here and do as I say,” said his father, “you can’t just walk away from your responsibilities.”
Jim returned to the table and adjusted the plate.
Later, Jim went upstairs to tidy his room. He felt that despite how much he cleaned his room, he just could not get it tidy enough.
(1) Define “context.”
(2) Using the concept of context, explain how Phil came to raise his hands in front of his face.
(scenario 1)
(3) Using the concept of context, explain why Jim may believe that his room is not tidy.
(scenario 2)

Check and refine your answers against the answers written in Appendix A.
Sign

The next concept that will be explained is the concept of sign. A sign is something that signifies (stands for) something (a referent) to someone. Signs can be objects, words, actions, symbols, symptoms; pretty well anything that a person can experience. Greater-than (>) and less-than (<) signs, sign language, nodding; all are signs that represent something to someone. What is important to remember is that signs are always different than what they represent. A spruce tree, for example, is not Christmas but is a sign that often stands for Christmas. A spruce tree will not stand for Christmas throughout the whole year and across all cultures. What a sign stands for depends upon the context of the person who is understanding the sign. Words are also signs. The word “bus” stands for an object that is a vehicle that carries many passengers. The word “bus” itself could not carry children to a zoo, just as children would be very disappointed if they were taken on a trip to see the word “zo0.”

Signs are personal. Consider this example: A child comes home from school after having completed an art project in which the child glued macaroni to a coffee mug. The child goes into the kitchen and sees a jar of macaroni. The macaroni is a sign for the child that stands for or represents all the activities involved in the art project. Another child who has not participated in the art lesson with macaroni, would not attach the same significance to the macaroni. To another child, the macaroni may only be a sign of food, cooking, and so forth. Signs are understandable to people in terms of the context through which they are interpreting the signs.

Changing the Referent of a Thing

In this example the concept of sign will be highlighted by disrupting the conventional relationship between the sign and what it usually represents. Two people were given everyday objects such as a stapler, paper-clip, scissors, fork, and a ball. Person A was asked to demonstrate an unconventional use for the object while person B was to guess how person A was understanding the object. Person A picked up the stapler and started banging it against the ground. Person B guessed that person A was using the stapler as a hammer. Switching roles, person B picked up the fork and started dragging the fork through her hair. Person A guessed that person B was using the fork as a comb.

In this example, the objects (fork and stapler) were signs that came to represent something that they usually do not represent. Another way of saying this is that the referents of the objects were changed. The two people came to understand the stapler as a sign for hammering and the fork as a sign for combing.

Changing the Referents of Language

In the previous example, the two people learned that objects can be signs for many different activities. The referent for a stapler is usually stapling, however, the referent can be changed to practically anything depending upon the imagination of the person using the stapler.

In the following example, instead of objects, language will be examined as a sign. Consider the following sentences. “I bought myself a dark blue suit because I heard that this was the way applicants should dress for the sales position. Dark blue is my favourite colour.”

What these sentences refer to differs depending upon who wrote the sentence, that is, the sentences are signs that can be understood in many different ways. The sentences would differ in what they signify in each of these conditions:
1) The writer is a 35 year-old man who has been looking for a job for 6 months.
2) The writer is a 10 year-old child.
3) The writer is a woman who has been blind since birth.
4) A computer program has just randomly generated the two grammatically correct sentences.

If the writer was a 35 year-old man who has been looking for a job for 6 months, then the sentences may mean that he was applying for a sales position and that dark blue was his favourite colour.

If the writer was a 10 year-old child, the sentences may mean that the child is rehearsing for a part in a play.

If the writer was a woman who had been blind since birth, then the sentences would take on quite a different meaning. The statement that her favourite colour is blue is particularly interesting. “Blue,” for English speaking people who are not visually impaired, is a sign that may stand for a certain experience of colour. For the visually impaired woman, the word “blue” would not signify the same experience as that of a person who has no visual impairment. “Blue” could be a word that may signify any of a number of experiences other than the colour. For example, “blue” may stand for a certain texture, or perhaps a memory of a friend who told her that she “looked good in blue.”

If the sentences were written by a computer programmed to randomly generate grammatically correct sentences, then the meaning of the sentence (or sign) would have little to do with the conventional meanings of the words in the sentence. To the computer, the words “blue” or “bought” would be coded as adjectives and verbs, but would not have experiential referents.

To summarise, people understand signs in terms of their contexts. Signs are symbols, objects, or words that stand for something to someone.

Please answer the following questions.

(4) Define “sign.”
(5) Using the concept of sign, discuss the meaning of the pen. (scenario 1)
(6) Using the concept of sign, explain why the activity of setting the table may have a different meaning for Jim compared to how most people would think about this activity. (scenario 2)

Check and refine your answers against the answers written in Appendix A.
Purposivity

Purposivity refers to understanding actions or objects in terms of the intentions or goals that a living being is directing itself towards. The definition of purposivity is similar to the definition of purpose. A purpose is an intention, goal, or aim toward which a living being directs its behaviour. Purposivity also refers to the activity of engaging in goal-directed behaviour, but most importantly, purposivity refers to how a person understands the world in terms of the goals the person is pursuing. Objects and actions are understood purposively. That is, depending upon the goal that a person is seeking to attain, the person’s actions and how they know the world will be understood in terms of this goal.

For example, if a person is looking for his or her misplaced car keys, the world will be known in respect to this goal. If while searching for the car keys the person sees a piece of paper on the floor, the person may understand the paper as something that the keys may be under. Or the person may look at the paper and understand the paper as not-the-keys. On another occasion, when the person is about to write a letter, the paper may be understood as something upon which to write.

Activities are also understood in terms of the goals or purpose that the person is trying to attain. To understand a person’s behaviours one must attempt to understand the goal the person is working towards. There is no way, however, of ever being certain of another person’s purposes. The meaning that a person gives to behaviours or objects is deeply embedded in the person’s own life experiences to which that person is privy.

Walking from A to B

A person is told to walk directly from point A to point B. The person walks 10 meters to the left, 10 meters forward, 10 meters to the right, and 5 meters forward. Why has the person chosen to walk in this indirect manner? One could speculate that the person did not hear the instructions, was acting defiantly, got lost, was drunk, and so forth. If you learned that the person was following the corridors in a building, then this behaviour which seemed random is understandable. Perhaps the route taken was the most direct way of walking from point A to point B. A person’s activities are understandable when you see the full goal. The full goal for this person was to travel directly from point A to point B and avoid walking into a wall. In terms of purposivity, the behaviour was purposive because each movement, whether straight ahead or turning, was directed toward attaining the goal. The walls of the corridor were known as obstructions to attaining the goal and hence avoided. If the goal is changed, the meaning of the objects that the person encounters change. If the goal was to decorate the corridor, the walls would have been understood in terms of their colour or what pictures were on the walls. The walls are obstructions only if the goal is to travel past them.

Completing the Maze

In another exercise, a group facilitator asked to have a person complete a maze in front of a group of people. Before the volunteer could do so, the maze, which was drawn on a large piece of paper, had to be taped to the wall. To attain the goal of taping the sheet on the wall, the facilitator had to look at the items on the desk to find the tape and scissors. Other items, such as the pens, paper, and ruler, were not attended to other than being understood as not-the-tape and not-the-scissors. Once the required objects were obtained, the facilitator proceeded to tape the sheet to the wall. All of the facilitator’s actions (getting the tape, cutting the tape,
moving toward the wall) can be understood as directed toward the goal of taping the sheet to the wall.

Once the maze was taped to the wall, the volunteer was asked to complete the maze. Completing the maze involved drawing a line from point A to point B. As the volunteer moved the pen, each movement could be understood in terms of the goal of reaching point B. Whether the volunteer made correct choices or incorrect choices (and had to backtrack) the behaviours were completely purposeful and understandable in terms of the goal of completing the maze.

Finding the Rabbit

A hunter was in the woods looking for a rabbit. The hunter searched the woods but saw only trees, grass, rocks, and a stream. Hearing a sound to the left, the hunter turned toward the sound and saw a squirrel. The squirrel was, to the hunter, not-a-rabbit. The trees were understood as either not-rabbits or something the rabbit could be hiding behind. The trees were known as obstacles toward finding the rabbit.

The rabbit was also behaving in a purposeful manner. It was hungry and searching for food. If the rabbit knew that carrots were on the other side of a field, the field may be understood as something that must be crossed to attain a goal of eating carrots. As with the hunter, the rabbit’s environment was understood in terms of the goal it was trying to attain.

An observer can never be certain of the purpose of a hunter and would be even less certain of the purpose of a rabbit. The best an observer can do is try to infer the hunter’s and rabbit’s purposes based on what the observer knows of their life situations.

Completing the maze, the taping of the maze to the wall, the hunter’s search for the rabbit, the rabbit’s search for carrots, are all examples of purposivity. In each example, the participants were behaving in a certain manner to attain a goal. The actions and the objects they encountered were understood in terms of that goal.

Please answer the questions on the following page.

(7) Define “purposivity.”

(8) Using the concept of purposivity, explain what the poke may have meant to Phil. (scenario 1)

(9) Using the concept of purposivity, explain what Jim’s setting the table may have meant to Mr. Patterson. (scenario 2)

Check and refine your answers against the answers written in Appendix A.
Difference and Object

Sensory systems enable organisms to obtain the information they need about their environments. People only sense a small part of all the potential information that is in their world. No person can perceive radio waves, x-rays, ultra-violet rays, sounds above or below a certain frequency range, although these patterns can be registered by some animals and machines. Of the information that we can register, only a small part of even this limited information can be attended to at any one time. For example, a sensory system can register some of the frequencies of sound emanating from a dripping tap, however, the person may not necessarily be paying attention to this sound. Similarly, a person’s tactile-sensory system can register the weight of a telephone although the person may not be paying attention to these sensations.

Difference

Difference is a concept that refers to a change that is registered by our sensory systems regardless of whether a person is paying attention to the change. All sensory systems register differences. In vision, light enters the eye through the pupil and is focused by the lens onto the retina. Particles of light entering the retina are registered by part of the retina called the receptor cells. These cells, or rods and cones, go through a chemical change as they register the light. This change can be thought of as a bio-electrical impulse or neural signal. Neighbouring bipolar cells and ganglion cells are activated and these changes are transferred throughout the network of ganglion cells that form an optic nerve and this information is carried to the brain’s occipital lobe.

Hearing is similar. Hearing involves transforming sound waves into neural activity. The outer ear channels sound waves through the auditory canal to the eardrum. The eardrum vibrates with the waves and the middle ear transmits these vibrations through tiny bones to a snail-shaped tube in the inner ear called the cochlea. The cochlea’s membrane vibrates the fluid that fills this tube which causes ripples in another membrane (i.e., the basilar membrane) which is lined with hair cells. The hair cells have small hair like projections which move when the basilar membrane ripples. This movement triggers impulses in the adjacent nerve fibres, which converge to form the auditory nerve. In short, the sound waves cause the hair cells of the inner ear to move and this movement is transferred into bio-electrical impulses sent to the temporal lobe’s auditory cortex. All along the journey, the electrical impulses are registered as differences in the past activity of the parts.

The senses of touch, taste, smell, kinaesthesia (sensing of the positions of the limbs), and equilibrium (sensing the position and balance of the whole body) also convert stimuli from the environment into bio-electrical impulses that are transformed and transferred (differences that are transmitted) throughout the nervous system.

Object

The differences that are registered by the body are often organised into what can be called an object. The object is a gestalt, form, or whole that is experienced as standing out for a person in front of a background. For example, if a person is making a sandwich, the bread may be an object to which the person is attending. As the person reaches for the mustard, the
mustard container becomes the focal object and the bread fades to the background. When the knife is held, the body is registering the differences that are being transformed and transmitted through the muscles in the hand through the neurones to the brain, however, the person may not be attending to the knife. Although the person may be using the knife to spread the mustard, the knife may not be an object to the person. Not all differences or sensations become objects, however, all objects are comprised of differences. The object is the configuration of differences that a person experiences and the object always stands out from a background.

Our sensory systems are continually active. When a person runs their finger over a rough surface, the body responds with bio-electrical neural activity. Even without the person’s awareness, the neural activity of the person is continually altered by such encounters with stimuli. The sensory system registers such differences whether or not configurations of these differences become objects of which the person is aware.

Shapes

A group of people were asked to look at a projection screen on which shapes were being displayed. The task involved the participants saying when they first saw something appear. A number of shapes were brought into focus. First a square, then a triangle, and lastly a circle. The participants named the shapes as they came into focus. For the second part of the exercise, participants were asked to explain what a shape was. Shapes were described as patterns, objects, and forms.

The facilitator made a shape with his hands using two thumbs and two index fingers and asked the participants whether or not the shape was a triangle. The participants agreed that it was a triangle. Slowly the facilitator started to move the index fingers apart so the shape was being distorted and asked whether the shape was still that of a triangle. As the shape became closer to that of the shape of a “U,” it became increasingly difficult for the participants to see the shape as a triangle. For some time, the participants looked at the shape and reported mentally filling in the gaps to continue to see a triangle. Eventually, the triangle-object no longer stood out for the participants.

Objects in Photographs

A group of people were given colour photographs to look at. The photographs were of animal babies, sumo wrestlers, electronic equipment, and mountain climbers. Participants were instructed to focus on the colour “red” in the pictures. Each person picked out a red part of the picture and described it to the group. Some of the objects described were red letters, a red towel, a red jacket, a red line and so forth. Next, the participants were asked to identify a circular part of the pictures. Participants looked at their photographs and pointed out the letter “O,” animals eyes, and round buttons. When describing a red part or a circular part of the pictures, this part became the foreground while the rest of the picture faded to the background. The object “red” or “circle” became the central part of the picture although it may have went unnoticed before the participant was given the instruction.

When instructed to find parts of the photographs which were certain colours, certain aspects of the pictures stood out as foreground in the pictures while the rest of the picture became the background. The foreground was the object. The object stood out because a configuration of differences were being registered by the person who was looking at the paper. The bio-electrical activity in the rods and cones of the person’s eyes was changing in
response to the frequencies of light being reflected off the paper. These changes or differences were being transformed into neural signals. Configurations of the neural signals were the objects that the participants were experiencing as “red” or “circular.”

Sheet of Paper

In the next example, people were given a sheet of paper that had been prepared to stimulate five of their senses. A corner of the paper had been dipped in perfume, a candy had been taped to the centre of the paper, a square had been drawn on the paper, the bottom edge of the paper had instructions to crumple the paper and listen to the sound of the crumpling, and a rough surface had been glued to the front of the page.

Participants were told to: run their finger across the rough surface, crumple the paper and listen, smell the paper, see the square, and taste the candy. They were asked to pay attention to how the object (square, taste of candy, etc.) stood out for them. Although their nervous systems were registering the complexity of patterns in the room, (sounds, sights, smells, etc.) when they interacted with the paper, specific objects stood out for them. These objects of perception are gestalts, or forms that they experience. For example, when smelling the perfume on the paper, the smell became an object for them while all other sensations faded to the background.

Please answer the following questions:

(10) Define “difference and object.”
(11) (a.) Discuss the pen using the concepts of difference and object.
    (b.) Using the concepts of difference and object, explain why the receptionist may not be able to understand Phil’s behaviour. (scenario 1)
(12) Using the concepts of difference and object, discuss Jim’s knowledge that Mr. Patterson was angry. (scenario 2)

Check and refine your answers against the answers written in Appendix A. When you have finished, please hand in your work. This research will continue at 3:00 p.m. today.
Appendix A: Answers

(1) Define “context”:

Context is a dynamic schema or a conceptual framework that someone uses to understand or interpret something.

(2) Using the concept of context, explain how Phil came to raise his hands in front of his face.

Phil’s past interactions with the pen led to the development of a context. He anticipated being struck in the eye with the pen and moved in relation to this context (his way of interpreting the event).

(3) Using the concept of context, explain why Jim may believe that his room is not tidy.

Jim’s past interactions with his father led to the development of a personal context in which he never felt satisfied with what he did. He interpreted his behaviours through this context and because of this interpretation he was dissatisfied with the tidiness of his room.

(4) Define “sign”:

A sign is something that signifies (stands for) something (a referent) to someone. Signs can be symbols, objects, actions, or words.

(5) Using the concept of sign, discuss the meaning of the pen.

The pen is sign that stands for a number of different things during Phil’s interaction with it. To the doctor it is an instrument to check someone’s eyes. to the receptionist it is a writing tool. to Phil it was, at various times, a sign for each of these as well as a sign standing for a weapon.

(6) Using the concept of sign, explain why the activity of setting the table may have a different meaning for Jim compared to how most people would think about this activity.

The meaning of a sign depends upon the past experiences of the person who is interpreting the sign. Through the unusual interactions between Jim and his father, the activity of setting the table may have become a sign for “being bad” or “trying to prevent the family from falling apart.” For other people, setting the table likely is likely a sign for preparing for dinner.

(7) Define “purposivity”:

Purposivity refers to understanding objects or activities in terms of the intentions or goals that a living being is directing itself towards.
(8) Using the concept of purposivity, explain what the poke may have meant to Phil.

Phil’s purpose was to get his eye’s checked. When he was poked in the eye, the poke was an obstruction to the goal. The poke was meaningful in terms of not-getting his eyes checked.

(9) Using the concept of purposivity, explain what Jim’s setting the table may have meant to Mr. Patterson.

Mr. Patterson’s goal was to have Jim set the table in a certain way. From Mr. Patterson’s perspective Jim’s behaviours were obstructions to getting the table set. Jim’s behaviours were also interpreted by Mr. Patterson as obstructions to keeping the family together.

(10) Define “difference and object”:

Difference is a change that is registered by the sensory system, however, the person is not aware of the sensory registration. An object is a gestalt, form, or whole that is experienced as standing out from a background.

(11) (a.) Discuss the pen using the concepts of difference and object.
(b.) Using the concepts of difference and object, explain why the receptionist may not be able to understand Phil’s behaviour.

(a.) The pen is a difference that is registered by Phil’s sensory system (visually and later tactiley) even before he is paying attention to it. Once Phil focuses on the pen, it is an object for Phil.

(b.) The receptionist may not be able to understand Phil’s behaviour because although she is registering similar differences as Phil, she does not share his objects. The pen is not salient to her as it is to Phil.

(12) Using the concepts of difference and object, discuss Jim’s knowledge that Mr. Patterson was angry.

The sounds in the room are being registered (differences in bio-electrical activity) by Jim’s sensory system whether or not he is paying attention to them. As Mr. Patterson’s voice raised, the intonation became an object that stood out from other sounds in the room and may have signified anger to Jim.
Appendix 10: Statistical Notes

Interjudge Reliability

Although Pearson correlation and average percent agreement are often used to check interjudge or interobserver reliability, Hunter and Koopman (1990) illustrate how each of these measures can produce misleading, usually spuriously high, estimates of interobserver reliability. These two interjudge reliability statistics also assess two different types of reliability. The proportion of agreement is calculated from a single subject’s score (a within-subject measure) while Pearson correlation is calculated from group data (between-subjects). Proportion of agreement and the correlation coefficient (unless agreement is 100%) are independent of one another. The second problem, is that proportion of agreement fails to recognise that some agreement will be due to chance. Instead, Hunter and Koopman suggest the use of Cohen’s (1968) kappa and the intraclass correlation. Kappa “is the proportion of agreement after chance agreement has been removed from consideration” (Cohen, 1968). It should also be noted that Kappa values are usually much lower than values of average proportion of agreement. Hunter and Koopman provide this forewarning to readers and reviewers who are used to seeing spuriously high reliabilities in the .85 - .95 range.

The problem with the Pearson correlation is that this statistic does not take into account differences between the means and standard deviations of judges scores (Hunter and Koopman, 1990). One judge’s consistent low-scoring of responses can be highly correlated with another judges consistent high-scoring of responses. Using a Pearson correlation often makes judges seem to be far closer in their ratings than is the case. The intraclass correlation (Shrout & Fleiss 1979), however, does not ignore differences in means and standard deviations.
REFERENCES


Harris, E. (1993). *The foundations of metaphysics in science*. Atlantic Highlands, NJ:
Humanities Press International.


(Eds.), *What is psychotherapy?* (pp. 199-201). San Francisco: Jossey-Bass.


the mind. Chicago: The University of Chicago Press.


Moreno, J. L. (1937). Inter-personal therapy and the psychopathology of interpersonal relationships. Sociometry, 1, 9-76.


Science Teaching. 22(4), 303-325.


22(2), 196-210.


invented reality: Contributions to constructivism (pp. 41-61). New York: Norton.


In F. B. Murray (Ed.), The impact of Piagetian theory on education, philosophy,
psychiatry, and psychology (pp. 109-122). Baltimore, MD: University Park Press.


Ward, C. & Herron, J. D. (1980). Helping students understand formal chemical


York: Norton.

communication. New York: W.W. Norton & Company.


theories of mind. In R. Shaw and J. Bransford (Eds.), Perceiving, acting, and

London: Tavistock Publications.


VITA AUCTORIS

1988  B.A. (Hons.) Psychology and Sociology, York University, Canada
1990  M.A. Clinical Psychology, University of Windsor, Canada
1992  Predoctoral Internship, Connecticut Valley Hospital, USA

Richard J. Holigrocki is currently living in Topeka, Kansas, USA. He is a postdoctoral psychology fellow at The Menninger Clinic.