SIMULATION DEBRIEFING: Applying Kolb's Model of Experiential Learning to Improve Classroom Practices

by

David James Wighton
B.A., University of Colorado, 1966
M.Ed., University of British Columbia, 1970
M.Ed., University of Calgary, 1985

ACCEPTED
FACULTY OF GRADUATE STUDIES

DEAN

DATE 91/08/21

A Dissertation Submitted in Partial Fulfillment of the Requirements for the Degree of

DOCTOR OF PHILOSOPHY

in the Department of Psychological Foundations in Education

We accept this dissertation as conforming to the required standard

Dr. W. Muir, Supervisor (Psychological Foundations in Education)

Dr. J. Anderson, Departmental Member (Psychological Foundations in Education)

Dr. D. Bacher, Departmental Member (Psychological Foundations in Education)

Dr. T. Riecken, Outside Member (Department of Social and Natural Sciences)

Dr. M. Petruk, External Examiner (University of Alberta)

University of Victoria

Supervisor: Dr. W. Muir

ABSTRACT

Although practitioners of educational simulations have considered the debriefing activity to be vital, no empirical studies have supported that contention. In an attempt to resolve this contradiction, this study examined the effect of a computer simulation and debriefing unit on student achievement and attitude. The design of the debriefing activities was based on Kolb's Model of Experiential Learning.

After attrition, the study sample consisted of 16 grade 5 classes (347 students), drawn from both rural and urban schools and assigned randomly to nine groups. Seven of these groups took part in a computer-based simulation for 10 class periods and then received from 1 to 6 additional debriefing periods, depending upon their treatment group. There were two control groups--one which participated in simulation activities only ("Non-debriefed") and one which had no exposure to the learning materials ("Nil Exposure"). Quantitative data were collected on students' achievement and attitudinal development at the end of the unit and one month afterwards. Qualitative data were also obtained from students and teachers.

Several patterns of significant results were found. On both the immediate and retention sets of achievement and attitude measures, every experimental group scored significantly higher ($p < .001$) than the nil exposure control group, thus attesting to the general pedagogical value of the unit. With respect to the attitude measures, no relationship was found between debriefing activities and scores on these surveys. Achievement test results revealed that: (a) Students receiving debriefing scored significantly higher (majority at $p < .001$) than the non-debriefed control group; (b) every group which engaged in analytical debriefing (Kolb's Abstract Conceptualization stage), either separately or in conjunction with some other activity, attained scores that were superior to the other debriefing groups; (c) there was no definite relationship between achievement scores and debriefing activities based on Kolb's other stages; and (d) similar patterns of significance were found in both the immediate and retention tests.

Qualitative data revealed that the general reaction of students and teachers to the unit was very positive. Also, simulation play was characterized by an extremely

high degree of student involvement.

Although Kolb's model of experiential learning was not fully supported by the results of this study, nevertheless, its use in structuring debriefing activities does show promise. Further research is needed to determine if the relationships between achievement and Kolb's stages vary by type of simulation, age of student, design of unit, etc. Furthermore, although there was no evidence that debriefing influenced student attitudes, the characteristics of this specific study (e.g., amount of exposure to the materials) may have contributed to that outcome.

The results from this study suggest that debriefing does increase the learning that can be gained from simulations, thus supporting the arguments from practitioners that debriefing must be used if a simulation is to be fully effective. Furthermore, the results from this study reduce the value of much of the previous research comparing simulations to other forms of instruction. Results from that research have generally been inconclusive and/or disappointing. However, since, in most of those studies, students only played the simulation and did not engage in any debriefing, it now appears that researchers may not have utilized the full potential of the simulation mode. The simulation may be more powerful than suggested by previous research.

Examiners:

_____

Dr. W. Muir, Supervisor (Psychological Foundations in Education)

_____

Dr. J. Anderson, Departmental Member (Psychological Foundations in Education)

_____

Dr. D. Bachor, Departmental Member (Psychological Foundations in Education)

_____

Dr. T. Riecken, Outside Member (Department of Social and Natural Sciences)

_____

Dr. M. Petruk, External Examiner (University of Alberta)

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ACKNOWLEDGEMENTS

This research was made possible by the staff and students of: Campus View, Cloverdale, Doncaster, Frank Hobbs, George Jay, Gordon Head, Hillcrest, John Muir, Margaret Jenkins, Marigold, Northridge, Sangster, and Sooke elementary schools. Thank you to the participating teachers for their time, energy, and contributions and to the students for their willing participation. Appreciation is also extended to the Learning and Technology Center of the Victoria School District for their ready cooperation in lending the necessary demonstration hardware.

I would like to express my appreciation to Drs. Anderson, Bachor, Muir, and Riecken, members of my supervisory committee, for their encouragement, advice, and assistance during the course of this research. I was indeed fortunate that your expertise was made available to me in such a supportive and accessible fashion. I also wish to acknowledge the impact that Dr. John Wighton and Dr. Herbert Hallworth had on my decision to pursue this venture.

My relatives and family played a critical role in this research as well, in providing the emotional and oftentimes financial support that made my pursuit of this goal possible. To my parents, my sisters, and my in-laws--thank you for your help. Finally, none of this would have been possible without the sacrifices that were made by my children, and especially my wife, Ardelle, who deferred her goals so that I could have mine.

CHAPTER 1: INTRODUCTION

Background to the Problem

Simulations in Education

Researchers and practitioners have reached contradictory conclusions on the value of educational simulations. These have served as the impetus for this study.

Simulations were introduced into education in the late 1950's and quickly gained widespread use (Garson, 1985). Since then, many proponents have made claims about their benefits (e.g., Bacon & Newkirk, 1974; Dorn, 1989). Although extensive research has been conducted (Willis, Hovey, & Hovey, 1987), the consensus from those who reviewed this research (e.g., Dekkers and Donatti, 1981) has been that the beneficial nature of simulations has not been substantiated.

Although the poor quality of much of that research (Willis et al., 1987) may have been a contributory factor, there is a puzzling lack of congruity between the findings of researchers and the claims of practitioners. Since the latest research summaries were somewhat dated, a personal review of recent simulation studies was initiated to determine if research findings had changed after the introduction of the microcomputer. Since microcomputer simulations can be more realistic than previous conventional simulations (Grabe, 1985), it was possible that recent research results could have been more favourable. However, as shown in the next chapter, only a few microcomputer simulation studies were free from design weaknesses and these generally provided inconclusive or contradictory findings.

The review of contemporary studies did open up another line of inquiry however. By altering the sequence of learning activities either before or after simulation play, Gokhale (1989), Rivers and Vockell (1985), and Woodward (1985) examined how simulations could be used more effectively in the classroom. Learning activities that follow simulation play are known as debriefing and this topic became the focus for further review--a review which revealed a second contradiction between researchers and practitioners.

The Debriefing Activity

Debriefing can be defined as the "process by which the experience of the game/simulation is examined, discussed and turned into learning" (Thatcher, 1986, p. 151). This post-simulation activity completes the learning process that was begun by the simulation, by bringing meaning to the experience, and by consolidating the concepts (Cowles & Hauser, 1977; Pearson & Smith, 1985).

The importance of debriefing has been acknowledged generally. Bacon and Newkirk (1974) considered the debriefing activity to be "the most important step in making the simulation a learning experience" (p. 41). The essential nature of debriefing has been stressed by many others, including Gillespie (1973) who felt that debriefing should not be used to make the simulation effective, but instead, the simulation was an activity that enabled the debriefing to be effective.

In spite of widespread agreement that debriefing was needed for learning to be optimal, almost all of the earlier simulation research was conducted without the benefit of this apparently vital activity (Chapman, Davis, & Meier, 1974). The exclusion of debriefing from experimental treatments was recommended by Fletcher (1971) who explained that there was too much opportunity for learning to occur during debriefing sessions and to thus obscure the effect of the simulation itself. More recently, with the exception of Kinzer, Sherwood, and Loofbourrow (1989) who incorporated a study sheet into their treatment, current researchers have examined the impact of microcomputer simulations without exposing students to a debriefing activity.

This practice of excluding debriefing from experimental treatments may be why researchers have not found simulations to be more effective. If debriefing is necessary for learning to occur, then examining the impact of simulations without this activity would lead to undervalued, and likely invalid, appreciations of their worth.

The value of much of the simulation research thus appears to be tied to the issue of whether or not debriefing is necessary. Practitioners certainly have thought debriefing was valuable since there have been many emphatic statements supporting its worth (e.g., Thatcher, 1986). But, in another baffling contradiction, in the limited research (pre-microcomputer) that has been conducted on this topic (Chartier, 1972; Livingstone, 1973; Sibley, 1974), debriefing has been found to have had no impact.

Debriefing and Learning Theory

Miller (1988) suggested that the reason that debriefing has been neglected in both the literature and in the classroom use of simulations was due, in part, to the absence of a learning theory that could explain the practice. There is some support for his contention since none of the models of debriefing discovered in the literature were found to have been linked to any underlying theory by the practitioners who had proposed them.

A learning model around which simulation debriefing activities might be structured is Kolb's model of experiential learning. Kolb (1984) conceived of a cyclical model of experiential learning consisting of four stages--concrete experience, observation and reflection, abstract conceptualization, and active experimentation. Although this model has been applied in numerous fields (Atkinson & Murrell, 1988; Sugarman, 1985), including education (e.g. McCarthy, 1985), little interest apparently has been given in North America to its employment with educational simulations. Two British authors however have suggested that it has potential value with simulations (Pearson & Smith, 1986; Thatcher, 1986) while another has advocated its use with simulation debriefing (Miller, 1988).

No further references were found linking Kolb's model to simulation debriefing, and no empirical research was discovered that had investigated the use of Kolb's model with any aspect of simulation use. However, nine models of debriefing suggested by simulation practitioners (e.g., Moriah, 1984; Greenblat & Duke, 1981) and by other experiential learning proponents (e.g., Jaques, 1985; van Ments, 1989) were examined for congruence to Kolb's model. It was concluded that they all had high or moderate congruence with Kolb's model. This, and the comments from the aforementioned British authors, suggest that an investigation into the applicability of Kolb's model in the design of simulation debriefing activities would be appropriate and potentially valuable.

Statement of the Problem

A number of weaknesses and deficiencies have been perceived in the body of research that has been conducted on the educational use of simulations. As outlined below, these constitute the problem that this study has been designed to address.

Ineffective Use of Simulations

The inconclusive nature of the research into educational simulations is understandable since there may have been a fundamental weakness in the way much of it was conducted. It is suggested that the full potential of educational simulations has not been revealed by many previous researchers because of the incomplete manner in which simulations were utilized in their studies, that is by the omission of debriefing.

Kolb's learning model can be used to explain the inconclusive nature of the results that have been obtained. Simulation play represents only one of Kolb's four stages, namely Concrete Experience. According to Kolb (1984), concrete experience by itself is not sufficient for learning to take place but rather that experience must be transformed. In addition, the highest level of learning will occur only when all four modes in the learning process are combined. Therefore, based on his model, the experience of the simulation activity has to be transformed by other activities (the debriefing) for learning to occur. In addition, complete learning will take place when the total activity package (the simulation and the debriefing) reflects all four stages in the model. However, research into educational simulations generally has focussed solely on the first stage of the model (acquiring the concrete experience through simulation play) to the exclusion of the three remaining modes (the debriefing). From Kolb's perspective therefore, the findings from simulation research studies should have been inconclusive and disappointing since only one quarter of the learning cycle had been employed.

An entirely different perspective can be employed to explain the disappointing research results as well. In general, it is suggested that research has not only utilized simulations in an incomplete manner, but also in an ineffective manner. For example, a review of recent simulation studies revealed that a common problem with this research was the inappropriate selection and/or utilization of the simulation

itself. This took the form of the use of poor quality simulations (e.g., Kinzer et al., 1989), inadequate interaction with the learning materials (e.g., McKenzie & Padilla, 1984), and inadequate exposure to the simulation treatment itself (e.g., Birkenholtz, Stewart, McCaskey, Ogle, & Linhardt, 1989). Disappointing results should not be surprising since, in many cases, research studies have not been designed appropriately or structured in such a way as to take full advantage of the strengths of this mode of instruction, in terms of both the omission of debriefing and the ineffective use of the simulations.

Overemphasis on Proving the Worth of Simulations

A large amount of the simulation research appears to have been focussed on trying to confirm the perceived value of simulations by comparing this mode to other instructional techniques. Inconclusive results have resulted in more and more studies, all trying to confirm "scientifically" the intuitive positive feeling that practitioners have for this particular mode. It appears that too much emphasis has been placed on this issue with too little attention paid to examining how simulations can be used more effectively in the classroom.

Contradictory Findings on the Value of Debriefing

Another problem noted in the research literature is the contradiction between the perceived importance of the debriefing activity and the research results that have been obtained when that activity has been formally studied. Simulation practitioners have considered the post-simulation debriefing to be an essential activity. Kolb's model of learning also supports the importance of debriefing as this activity can encompass elements from the second, third and fourth modes in his learning cycle. However, the little research on debriefing that has been conducted contradicts the viewpoints suggested by the Kolb model and by simulation practitioners.

The Need for Research on the Applicability of Kolb's Model with Simulations and Debriefing

Apparently, no research has been done yet on the applicability of Kolb's four stage learning model to the use of educational simulations in the classroom. No empirical study employing educational simulations was found that had investigated either the appropriateness of Kolb's full experiential learning model or the relative value of its component stages to the use of simulations in the classroom.

The Need for Qualitative Research into Simulation Debriefing

All three of the research studies that were conducted on debriefing were based on a quantitative approach. No studies were found that collected qualitative data associated with the debriefing activity. Consequently, no insights were possible on the conduct or effects of debriefing, as perceived by the participants.

Purpose of the Study

This study was intended to address the aforementioned deficiencies in the research. Its general purpose was to investigate means by which teachers could use simulations more effectively in the classroom. The specific purpose was to examine the effect of various simulation debriefing activities on students and teachers when those activities were structured in a manner consistent with Kolb's four stage model of experiential learning.

In the course of this research, students were exposed to a simulation experience for an extended period of time. Data were collected at the end of the experimental period as well as 4 weeks later. Quantitative data were gathered to examine the effects of the debriefing on student learning and attitude development. Qualitative data were collected from students and teachers in order to examine the extent of students' involvement in the simulation experience, and the reactions of all participants to the simulation and debriefing experiences.

CHAPTER 2: REVIEW OF THE LITERATURE

Educational Simulations

Background

Definitions

Although simulations have been defined in a variety of ways, typically some reference has been made to a model of reality. For Brownell (1987), a simulation was "a model of an actual situation that is achieved by identifying variables relevant to the real-life situation and mathematically defining the relationships between those variables" (p. 92). Chapman, Davis, and Meier (1974) defined a simulation as a "technique for constructing a working model of a real life process, so that the real-life phenomenon is replicated with reasonable accuracy" (p. 8).

Simulation definitions generally have also contained some reference to intended purpose. Butler (1983), for example, described simulations as "situations in which participants assume roles in a lifelike environment in order to learn how the environment works and/or to solve problems inherent to that environment" (p. 4). Kinzer et al., (1989) stated that "a simulation is a model of an event or situation in which the learner makes decisions and learns through observing outcomes of those decisions" (p. 42). This focus on learning was adopted by Smith (1986) as well.

> Educational simulations are controlled representations of real situations, calling for participants to respond, and providing some form of feedback to those responses. Instructional simulations are those simulations intended to result in predetermined learning outcomes. (p. 3).

Finally, learning through experience has been the basis of defining simulations for other authors, including Mandell and Mandell (1989).

> Simulations are models or imitations of processes. Simulations present life-like situations that allow students to learn through experience and to take risk without suffering the consequences of poor choices. (p. 49)

Brief History of Educational Simulations in North America

Garson (1985) reported that simulations were introduced into university courses in the late 1950's and early 1960's. One decade later, the educational use of simulations/games had grown so rapidly that they were found in virtually all subjects and all levels from elementary to postgraduate. Ruben and Lederman (1982) described the simulation as being so popular in the mid 1970's that, in retrospect, they felt that Kaplan's Law of the Instrument was applicable. (In 1964, Kaplan suggested that if you gave a small boy a hammer, he would soon discover that everything needed hammering). Garson, however, noted that simulation use peaked in the 1970's during a period of funding support by the U. S. Office of Education.

By the early 1980's, a decline in the popularity of simulations was evident. Dorn (1989), for example, observed that the number of published articles and books on the topic had dropped after the peak years of 1971-1975. Ruben and Lederman (1982) attributed the reasons for this decline to: (a) a re-emphasis on basic skills; (b) a decrease in resources for new development; (c) the absence of sufficient research evidence supporting their use; (d) the perception by many critics that simulations lacked in rigor and substance; (e) the insufficient training of teachers in their use; and (f) a tendency toward uncritical acceptance and use of simulations.

Although the popularity of instructional simulations may have declined, interest in their use has remained. Dorn (1989), for example, noted that simulations "are still alive and well and can provide teachers...with an alternative to traditional and conventional modes of classroom instruction" (p. 1). Furthermore, the advent of the microcomputer has rekindled interest in this mode (Garson,1987; Grabe,1985).

The Advantages of Educational Simulations

Opinions about the value of instructional simulations have been offered by many authors. These opinions may be found in articles or books which focus on the classroom use of simulations (e.g., Butler, 1983; Cruickshank & Telfer, 1980; Dorn, 1989; Greenblat & Uretsky, 1977; Ruben, 1980; Stadsklev, 1974; and, Willis et al., 1987). Authors of general books on educational computing have also commented on simulations (e.g., Alessi & Trollip, 1985; Brownell, 1987; Bullough & Beatty, 1991; Coburn et al., 1985; Lockhard, Abrams, & Many, 1987; Woodhouse & McDougall,

1986). Another valuable source of opinions can be found in specialized publications on educational computing, for instance books which focus on a particular age group (e.g., Clements, 1985), or books which concentrate on a specific curricular area such as general social studies (e.g., Budin, Kendall, & Lengel, 1986), geography (e.g., Tapsfield, 1984), science (e.g., Marks, 1982), or reading (e.g., Rude, 1986).

The following comments about the advantages and limitations of educational simulations have been derived from the aforementioned sources.

Students can use simulations to investigate models of reality when reality itself cannot be studied due to reasons of cost, danger, time, or complexity.

Learning can be enhanced because, in simulations, students often must make decisions in the context of real life situations. They can experience the psychological reactions typically encountered from exposure to the real thing. Better transfer of learning can occur because the students are working with what may be an abstract concept in context, that is, in a concrete, real situation.

There is risk-free learning with simulations. As penalties for a poor decision are not severe, and as there is not usually one right answer, students are encouraged to explore, to try a number of different solutions, to engage in discovery learning by asking "what if" questions, and to formulate hypotheses and test them. With simulations, not to make a mistake is a mistake.

In the simulation experience, students make a decision, see the consequences of that decision, and then make further decisions. As such, they are involved in the learning experience to a degree that is found with few other instructional activities. Students learn by working with a concept in an active, dynamic fashion.

Simulations can be utilized in the classroom in a variety of situations and for a variety of purposes. They can be used by individual students or by groups, cooperatively or competitively, to promote a wide range of cognitive objectives ranging from mastery of content to higher level thinking skills including reasoning, logical thinking, problem solving, and decision making. Social interaction skills such as discussion and group problem solving can be developed effectively with simulations and they can be an excellent vehicle for teaching affective learning (e.g., increasing empathy for others). Finally, they are appropriate for a wide number of subject areas, grade levels, and students with varying abilities and experiences.

Finally, for the reasons cited above, students find simulations to be very motivational.

The Limitations of Educational Simulations

In building a simulation, designers have to limit the complexity of reality to manageable limits. In doing so, there is a danger that their model will not accurately reflect the real thing since reality may not lend itself to mathematical relationships and precise rules. Or, the designers may simplify the model to the point of distortion and/or build in their own biases. Moreover, the students may find the experience of the simulation so seductive that they are tempted to believe that everything about the simulation, including the model, is genuine.

Students may think that because they can understand the simple representation of the real life event, they also understand all the real phenomena similar to it.

Simulations may be too readily accepted by teachers as replacements for messy or time consuming practical experiences. Eliminating such activities can deprive students of the experience they need in working with practical situations.

For some teachers, simulations may be threatening as they don't fit into the traditional patterns of instruction. Also, for some, the change of the teacher's role that is required and the increased student interaction in the classroom that results can be disconcerting. Insufficient training in how to use simulations in the classroom, in the computer technology, and in problem solving techniques also can create instances of teacher unhappiness and/or misuse.

Successful integration of simulations into classroom activities can be difficult to achieve. Many simulations require a large amount of classroom time that may be disproportionate to the amount of curriculum that they represent. Also the difficulty of selecting appropriate simulations often is increased by the general lack of teacher experience with that type of resource, the scarcity of materials from which to choose, the expense of the product, the difficulty of previewing a simulation without playing it completely, and the difficulty of evaluating the validity of the model on which the simulation is based. Moreover, if a simulation is used in the classroom, it may be quite difficult for the teacher to evaluate whether it was successful or not.

Research Results: Educational Simulations before the Microcomputer

Weaknesses of the Research

Although several hundred research reports on educational simulations have been published (Willis et al., 1987), the general quality of the research has been quite weak. Many authors have warned that making generalizations from the results should be done cautiously (e.g., Bredemeier & Greenblat, 1981; Butler, Markulis, & Strong, 1988; Chapman et al., 1974; Dekkers & Donatti, 1981; Foster, Lachman, & Mason, 1980; Jackson, 1979; Pierfy, 1977; Reiser & Gerlach, 1987; Twelker, 1972; Walford, 1985; Willis et al., 1987; Woodward, 1985). Walford (1985), for example, asserted that "we do not...yet have sufficient illuminative evaluation studies in either quality or number to identify the merits of simulations convincingly" (p. 20).

The major fault cited has been poor research design, such as the absence of control groups, poorly formulated hypotheses, non-randomization of experimental groups, insufficient exposure to the simulation, inadequate testing procedures, and unsophisticated statistical analysis. In addition, instrumentation has commonly consisted solely of tests designed by the investigator. This, plus scant detail about their construction, has raised doubts about the reliability and validity of the instrumentation. In fact, in their meta-analysis, Dekkers and Donatti (1981) found that there was a significant negative correlation between the presence of information on the validity of the measuring instrument(s) and the effect size obtained. This led them to suggest that a developer bias might have been present in those studies that had used developer-made instrumentation and that, therefore, such results were questionable.

Perhaps the strongest warning has been made by Willis et al. (1987) who felt that only about 30 of the simulation studies conducted up to 1987 had met minimum requirements for validity. They cautioned that the research base was sufficient only to make the assertion that students like simulations better than lectures.

Summary of Research Findings

Sources. At least nine summaries of simulation research have been published. The first was by Cherryholmes, in 1966, who synthesized the results of six studies. Subsequent summaries of the literature were conducted by Coleman, Livingstone, Fennessey, Edwards, and Kidder in 1973 (38 studies), Chapman et al. in 1974 (unspecified number), Roberts in 1976 (13 studies), Pierfy in 1977 (22 studies), Reiser and Gerlach in 1977 (15 studies), and Pate and Mateja in 1979 (16 studies). Other authors have written brief reviews of the literature as part of more comprehensive articles. These included Chartier (1972), Foster et al. (1980), Jackson (1979), Reid (1980), Roberts (1976), and Willis et al. (1987).

The most extensive reviews to date have been conducted by Bredemeier and Greenblat in 1981 and Dekkers and Donatti, also in 1981. Bredemeier and Greenblat cited in excess of 70 studies (1966-1981) in their synthesis of findings whereas Dekkers and Donatti found 120 studies (1969-1979).

Although all of these research studies have had different emphases and different observations, the consensus of opinion of the nine sets of authors is that claims about the beneficial nature of simulations have remained both relatively unsubstantiated and inconclusive. Other areas on which some consensus of opinion appears to have been reached are summarized below.

Learning. Cherryholmes (1966) observed that no consistent or significant effects on learning were found when simulations were compared to traditional instruction. Others have worded this finding more positively, for example by concluding that simulations were as effective as conventional instruction. However, all nine authors reached the same conclusion that simulations generally were as good as, but no better than traditional instruction in promoting learning.

Retention of knowledge. The effect of simulations on retention is not as clear. Cherryholmes (1966), Dekkers and Donatti (1981), and Foster et al. (1980) concluded that simulations had no significant effect on retention. Others disagreed. Pierfy (1977) noted that 8 out of the 11 studies in his survey found that simulations

had a significant effect that lasted beyond the initial testing. Pate and Mateja (1979) identified 16 studies which found a positive effect on retention. Dorn (1989) concluded that "studies that measured the effectiveness of simulation games for retention of cognitive learning show contradictory and inconclusive results" (p.7).

Affective response. Simulations have consistently been shown to generate more interest, enthusiasm, and motivation on the part of the participants than other, more traditional, educational methods. This finding was reported by Bredemeier and Greenblat (1981), Butler (1983), Chapman et al. (1974), Chartier (1973), Cherryholmes (1966), Foster et al. (1980), Jackson (1979), Pierfy (1977), Reid (1980), Reiser and Gerlach (1977), and, Roberts (1976).

However, the effects of simulations on changing student attitudes towards the topic being studied have not been as clear. Foster et al. (1980) and Pierfy (1977) felt that simulations did change students' attitudes. Dekkers and Donatti (1981) agreed, observing that the data suggested that the older the students, the more likely was the simulation to produce an attitudinal change. Others have disagreed, claiming that the research on the impact of simulations in producing attitudinal change has been inconclusive (Bredemeier & Greenblat, 1981), confusing and contradictory (Dorn, 1989), not enduring (Chapman et al., 1974), usually aroused in the simulation itself and not necessarily in the subject matter (Reiser & Gerlach, 1977), or no greater than what can be achieved through other techniques (Reid, 1980).

Research Results: Educational Simulations With the Microcomputer

Overview of Microcomputer Simulation Research

Fifteen published research studies were found which examined some use of microcomputer simulations to instruct grade 1-12 students. These will be reviewed in the following three categories: (a) comparison of simulations to some other mode of instruction; (b) examinations into student grouping; and, (c) examinations into the effective use of simulations.

Studies Comparing Instructional Modes

There were 9 studies which compared the simulation to some other mode of instruction. Three of these (Choi & Gennaro, 1987; Gokhale, 1989; Rivers & Vockell, 1987) compared simulations to traditional lab approaches in the sciences. In all three cases, no significant differences between the treatments were discovered--the simulation was found to be as effective as the traditional approach. Choi and Gennaro also found this equivalence in a retention test given 45 days after the conclusion of the unit. The only notable finding in favour of the simulation was Choi and Gennaro's observation that students in the simulation had achieved their comparable success levels in about one quarter of the time required for the lab experiences.

Results favouring the simulation were found in Woodward's (1985) study. Mildly handicapped senior high school students first received large group instruction in a health topic. At the end of this instruction, half of the group received traditional application activities such as tracking their diets, analysing cholesterol levels, and diagnosing poor health habits. The other half worked individually on a microcomputer health simulation for an equivalent amount of time. Student assessments were made 1 day, 2 days, and 2 weeks after instruction. Woodward found that the simulation had a significant effect on the mastery of key concepts in the unit--an effect which was maintained over a 2 week period. He also found that the simulation group scored significantly better on a measure of problem solving skills. However, since the simulation group received instruction in problem solving that was not provided to the conventional group, Woodward's last finding should be considered very carefully.

The results from the remaining five studies were considered to be untenable for a variety of reasons. The most common problem was the ineffective use that was made of the simulation mode. In three studies (Kinzer et al., 1989; McKenzie & Padilla, 1984; Shaw & Okey, 1985), students did not actually have hands-on experience with the simulation, but instead either watched the teacher demonstrate the program or simply read about what the simulation results would have been. In another case (Birkenholtz et al., 1989), the amount of time that students were exposed to the simulation was so limited (20 minutes total over five class periods) that no effect could reasonably have been expected. Finally, the learning materials employed by Shaw and Okey could not be considered to have been simulations.

Design weaknesses were also encountered. In two studies (Kinzer et al., 1989; Shaw & Okey, 1985), control groups were exposed to the instructional materials individually while the experimental groups had only large group exposure. Finally, in Norton and Resta's (1986) research, the treatment groups used holistic approaches whereas the control group employed a subskill activity.

Studies Examining Student Grouping

Variables of grouping have been examined in five recent simulation studies. However, only two of these studies were considered to have reached defensible conclusions. Sherwood and Hasselbring (1984) found no significant differences in learning among students using a computer simulation in small groups, students using a computer simulation in one large group, and students using a non-computerized simulation in one large group. Trowbridge and Durnin (1984) found that grade 7 and 8 students were able to learn from a simulation but no statistically significant differences were found among different sized groups. Based on their qualitative data however, they suggested that there were some differences in how the groups dealt with some aspects of learning.

The results from the other three studies were considered to be untenable. Two of the studies (Johnson et al., 1985; Johnson et al., 1986) examined the impact of cooperative, competitive, and individualistic instruction on grade 8 students. Unfortunately, the groups differed not only in their treatment, but also in the number of students working together. In effect, the study was a comparison of the work of four cooperating students versus the work of individual competing students versus the work of individual non-competing students. As such, the findings in favour of the cooperative group could easily have been attributed to the fact that a group effort had been more effective than individualistic efforts. The superiority of group work over individual efforts has been found in conventional instruction (Johnson & Johnson, 1974), with simulations (Gentry, 1980; VanSickle, 1978), as well as with microcomputer materials (Cox & Berger, 1985).

The primary objectives of the study conducted by Okey and Oliver (1987) were to determine if different ways of grouping and using a simulation affected the acquisition of skills and if simulation skills could be transferred or applied to other

situations. Difficulties encountered in the report of this research were the paucity of information that was provided, for example the absence of statistical data supporting the conclusions and the omission of any information on the type of transfer skills expected.

Studies Examining the Effective Use of Simulations

There were four studies which examined some aspect to increasing the effective use of educational simulations in the classroom. Rivers and Vockell (1987) found that students using the guided approach to the use of a computer simulation surpassed the other students using a pure discovery approach. Gokhale (1989), in investigating the sequencing of instruction, found that students who had completed a simulation followed by a reading assignment scored significantly higher ($p = 0.001$) than students who completed the same activities but in the opposite order. He concluded that "exploratory type of experiential activity prior to formal instruction results in better conceptual learning and better transfer as compared to the reverse sequence" (Gokhale, 1989, p. 96A).

Some doubts were generated about the results of the other two studies. Waugh (1986), for example, examined the effect of teacher actions during microcomputer simulation play. However, such an ineffective simulation was used in the study that he had to conclude that students would have had difficulty using the software program no matter what kind of teacher interaction had been used. Woodward et al. (1988) investigated the effectiveness of providing students with instruction in how to play a particular simulation. They concluded that their results supported "the view that a structured approach in simulations, one where learners' tactics are specified and guided, does have significant educational effects" (Woodward et al.,1988, p. 82). The authors then went on to note that "some research on computer simulations suggests that when contrary procedures are followed...student learning is insignificant (Waugh, 1986)" (p. 83). Support for both of these conclusions is weak since their research did not enable any comparisons to be made between structured and unstructured approaches and because, as noted above, the Waugh study that they cited was flawed.

Debriefing

Background

Relationship to the Previous Review of Microcomputer Research

As seen in the previous section, to a large extent, educational simulation researchers have concentrated on comparing the effectiveness of the simulation to conventional instruction (and/or some other mode).

Relatively little attention has been paid to investigating those variables, under the control of the teacher, which can contribute to the effective use of the simulation within the classroom. When such research has been conducted, most of the attention has gone towards examining grouping techniques. Little attention has been given to the role of the teacher in structuring the learning activities to achieve maximum effectiveness. According to Thames (1979), this is a critical element.

> The game experience itself offers little opportunity for real learning. Remember that it is just that--an experience. Therefore the question becomes not whether the use of simulation/games is a valid learning experience but rather how can the teacher enhance the opportunity for learning from a simulation/gaming experience. (p. 122)

As noted previously, three studies have contained an element of learning activity manipulation. Gokhale (1989) examined the effects of providing a learning activity prior to the simulation experience. Woodward (1985) structured the pre-simulation activities as part of his study procedures while Rivers and Vockell (1987) examined the effects of giving students guidance in playing the simulation through pre-simulation learning activities. These researchers manipulated the sequence or structure of the learning activities preceding simulation play. What about activities that follow simulation play? Post-simulation activities, referred to collectively as debriefing, are the focus for this section of the literature review and, indeed, for the dissertation as a whole.

What is Debriefing?

The word debriefing is thought to have had military origins. Lederman (1984) and Raths (1987), for example, observed that it initially was used to describe the process of working with prisoners of war, spies, and astronauts. Pearson and Smith (1985), also recognized its historical roots in military campaigns and war games, noting that debriefing was "the time after a mission or exercise when participants were brought together to describe what had occurred, to account for the actions that had taken place, and to develop new strategies as a result of the experience" (p. 69).

Debriefing is a learning process/activity that is commonly associated with experience-based learning. According to Raths (1987), debriefing is needed because individuals who have participated in complex experiences may not have achieved the full learning that had been intended. They may not be able to remember all that occurred, they may have difficulty verbalizing impressions, and they may forget or distort what happened unless their experiences are thoroughly reviewed. Debriefing is thus "a process of helping students reflect on their learning experiences, attach personal meanings to them, and deepen their understandings" (Raths, 1987, p. 26). Lederman (1984) defined it similarly as "a structured, guided method for bringing meaning to the experience and for learning from that meaning" (p. 417). Thatcher (1986) defined debriefing more specifically as "the process by which the experience of the...simulation is examined, discussed and turned into learning" (p. 151).

Use of Debriefing

Debriefing can be used in one of two ways (van Ments, 1989). First, it can be used to transmit information from the participant to the person gathering the information. The participant does not benefit directly from this data collection; rather, the purpose is to collect and synthesize the information so as to improve a product, process, or program.

The second use of debriefing is to encourage growth among the participants. Information is collected so that it can be shared and interpreted and, in this respect, there is a two-way flow of information. The focus of the process is on the benefit to the individual. Van Ments (1989), in noting the existence of the two different

flavours of debriefing, commented that "the true nature of the process is two-way, and it certainly does not have the overtones of authority...which it had in its original usage" (p. 49). It is this use of debriefing that will be examined in this research.

Debriefing is now employed in many experiential-based learning environments. These include after para military operations, such as search and rescue operations (Lavalle, Stoffel, & Wade, 1982), and after psychological research with human subjects (Feldman, 1983; Smith & Richardson, 1983). Within the field of education, debriefing has been used as a means of formative evaluation during the development of an instructional product or process (e.g., Burt & Geis, 1986; Dervin & Clark, 1987), for evaluating programs (e.g., Kaufman, 1983), and for evaluating personnel (e.g., Sia & Sydnor, 1987; Ross, 1987).

Debriefing has been used widely within many different types of experiential based learning activities. These include role playing (e.g., van Ments, 1989), case studies (e.g., Kreps & Lederman, 1985), simulations and games (e.g., Greenblat & Duke,1981; Thatcher, 1986), sciencing (e.g., Wassermann & Ivany, 1988), field experiences (e.g., Laramee, 1977; Pearson & Smith, 1986), and outdoor/action education programs (e.g., Brenner & Nichols, 1981; Gillis, 1985).

Debriefing Simulations: Practitioner Viewpoint

The Purposes of Simulation Debriefing

> Very few games are self-teaching. They do not give students time to reflect on their moves or to piece together what the game is about as they play. This is why the design of a good debriefing session is such an important part of gaming. It can help students to reflect on their behavior while it gives teachers a handle for evaluating what students have learned. In short, debriefing sessions can be as much a part of the learning experience of a game as any activity.... (Gillespie, 1973, p. 23)

> Simply to experience is not enough. Often we are so deeply involved in the experience itself that we are unable, or do not have the opportunity to step back from it and reflect upon what we are doing in any critical way. In any planned activity for learning, debriefing provides an opportunity to engage in this reflection. (Pearson & Smith, 1986, p. 155)

Many others have described similar objectives. For example, Bottinelli (1980) considered the purpose of a simulation debriefing was to "provide an opportunity for players to discuss their feelings about the roles they played, the interactions with and among groups and between individuals, and the relevance, realism and outcomes of the activity" (p. 95). Zelmer and Zelmer (1980) explained that simulations require debriefing so that "participants are not left with unresolved issues or erroneous impressions" (p. 139) and Butler (1983) asserted that the activity "provides an opportunity to reflect on what has happened, how it happened and what it means" (p. 22). Coleman et al. (1973) observed that debriefing was valuable in overcoming what they considered was the weakest link in the experiential process of learning, namely generalizing from a particular experience.

The Importance of Simulation Debriefing

Debriefing has been considered an essential activity in the educational use of simulations by many authors writing on the subject of simulations. Livingstone (1973), for example, recognized that there was universal acceptance of the importance of simulation/game debriefing sessions in the following manner: "The importance of the postgame discussion...(is)...a belief held unanimously among writers of books and articles on simulation games for social studies teachers" (p. 10). Recognition of the importance of debriefing has since been given by many others, for example Alder et al. (1974), Butler (1983), Chapman et al. (1974), Greenblat and Duke (1981), Heyman (1975), Jones (1987), Lederman (1984), Plummer (1980), Thames (1979), Willis et al. (1987), and Zelmer and Zelmer (1980).

Not only has the need for debriefing been upheld, but its value has often been expressed in the most emphatic of terms, such as in the following statements:

"Clearly it is the most important step in making the simulation a learning experience" (Bacon & Newkirk, 1974, p. 41).

"It is an extremely important part of any simulation and is vital for closure" (Bottinelli, 1980, p. 95).

"A simulation game is an aborted learning experience without a debriefing" (Chapman, 1973, p. 22).

"The debriefing process...is unquestionably the most important part of the exercise" (Ellman, 1977, p. 253).

"However rich the experience of playing the game may be, you will find that the most important learning takes place during the postplay discussion and critique" (Greenblat & Baily, 1980, p. 245).

"The most important part of any gaming/simulation is the discussion that follows immediately after the playing has stopped" (Hasell, 1980, p. 302).

"80% of the value of gaming lies in the debriefing" (Stadsklev, 1974, p. 43).

> The effectiveness of games and simulations in the learning process depends upon the quality of the process of debriefing used after the experience is finished....Practitioners of the art of games and simulations neglect the debriefing at their peril. (Thatcher, 1986, p. 153)

> There are very few hard and fast rules in the realm of educational games and simulation, but one of them most certainly is "If you are using a simulation game for educational purposes, it is absolutely essential that you conduct a thorough and humanistic debriefing session"....If you fail to include a debriefing session when you schedule simulation, you cut off the learning process before it has had a chance to develop fully, and you are quite likely to have a number of damaging loose ends and unresolved feelings among the students. In short, you have defeated the very purpose of simulation as a teaching technique....If you find that there is not enough time for debriefing, we suggest you not use the simulation. (Cowles & Hauser, 1977, p. 2).

Those statements emphasize the importance that practitioners attribute to the debriefing activity, even in relation to the simulation experience itself. For them, the debriefing activity should not be employed to make the simulation effective; rather, the simulation should be used to provide a common base of experience for all students so that the debriefing can be effective. Gillespie (1973), for example, asserted that "we might...say that the entire game was a discovery exercise set up so that students could learn something from the debriefing session" (p. 24). Hasell (1980) expressed a similar opinion. "In fact, you should think of the [simulation] as a communication tool that prepares the participants for this debriefing session" (p. 302).

The General Level of Usage of Debriefing

In spite of the perceived importance of the debriefing activity, authors such as Ellman (1977), Gray (1988), Miller (1988), and Jamieson, Miller, and Watts (198 observed that it was often omitted or only touched upon by teachers. Turner (1982) offered the following warning:

> The single most important and often most neglected aspect of effective use of simulation games is the development of carefully planned...debriefing activities....To assume that the students understand the lessons and values of the game and have made transfer to real-world concerns, is negligence on the part of the teacher. (p. 131)

Jamieson et al. (1988) and Pearson and Smith (1986) identified a number of problems associated with debriefing as it was commonly conducted. For example, insufficient time for debriefing is a frequent problem that can be compounded by a tendency to prolong the simulation when it is going well. A didactic approach can often be used by teachers in debriefing sessions where students are frequently told what they have learned from the simulation. Student feelings are also commonly ignored, for example by neglecting to bring students out of their roles (de-roling) or failing to reduce the tensions and anxieties that were generated during the simulation.

Debriefing Simulations: Researcher Viewpoint

Debriefing Activities in Empirical Research

Given this strong support for debriefing, it is surprising that there is little evidence of its actual use as a procedure in empirical research studies involving simulations. This absence, noted by Chapman et al. in 1974, is still the general case today (Miller, 1988). An intensive search of the literature was conducted for studies that reported some aspect of microcomputer simulation use in the classroom. Fifteen published reports were found; however, only one of these involved any activity associated with debriefing as part of the study's procedures. Kinzer et al. (1989) had students complete a study sheet as the simulation was demonstrated to them. In all other cases, subjects were tested immediately after simulation play.

The exclusion of a debriefing activity from empirical studies is not likely due to a lack of support for the activity. Fletcher (1971), in fact, argued that postgame discussions should be omitted from research studies as there was too much opportunity for student learning to occur during those sessions and to affect the results of the testing. Heyman (1975) speculated that the reason for the absence of interest in debriefing was that the discussion was usually so exciting that it was thought to do its work well without special attention. Chapman et al. (1974) noted that it was fairly common practice for researchers to allow players little or no discussion as they were concerned about the uncontrollable vagaries of post game discussions contaminating the research results. Chapman et al. also noted, on the other hand, that the general absence of debriefing had to raise the question whether such research studies had been contaminated by omission.

Research into Debriefing

There have been a number of studies that have specifically examined some aspect of the debriefing process with simulations. Work by VanSickle (1978), Chartier (1972), Livingstone (1973), and Sibley (1974) will be summarized below.

VanSickle (1978). In an article on the impact of simulations on decision-making skills, VanSickle claimed that six studies had found that structured discussions increased student learning. Unfortunately, in four of these, the discussion activity had not been treated as a separate activity and, as such, conclusions about its specific impact cannot be defended. The fifth study did not examine debriefing and so will not be discussed here.

In the sixth study, Kidder and Guthrie (1972) examined the effects of a simulation on the performance of university education students. One group had a single play of a simulation followed by a 10 minute discussion. A second group, which had a 25 minute discussion between two plays of the simulation, was found to perform better. Although the second group did perform better, it is difficult to claim that this was a result of the discussion since the treatment of the two groups differed in two respects. As a result, this study also does not support VanSickle's claim that "intermittent, structured discussion can increase student learning in games" (p. 419).

When examined within the wider context of debriefing, Kidder and Guthrie's (1972) study does raise an interesting question. As will be discussed later in this chapter, the use of a discussion and the provision of additional simulation play can be considered to be debriefing. Thus, these researchers did compare a group which played a simulation and had a partial debriefing experience with a group which played a simulation and had a more complete debriefing experience. The positive finding for the second group suggests that a complete debriefing is more effective than a partial debriefing. However, it is possible that the provision of the activities themselves was not as important as the provision of additional exposure to the content.

Chartier (1972). This researcher is one of three who has specifically investigated the importance of the debriefing process. Subjects who played and discussed a simulation were found to have learned no more than subjects who experienced three other conditions: (a) participation in the simulation but without discussion, (b) discussion of the simulation based on the game instructions but without actual play, (c) study of the game instructions with no discussion or play. A significant finding was observed however on the affective measure. Students who participated in the simulation and discussed it expressed more learning satisfaction than the students in the three other groups.

Livingstone (1973) questioned these results and their generalizability. He observed that the subjects were extremely capable (doctoral students) and that the simulation was conceptually quite simple. Although Livingstone may have been justified in questioning the study's results, he was incorrect in stating that the subjects were doctoral students. Doctoral students were used to assist in the study; in fact, the subjects consisted of 133 undergraduate students.

Livingstone's (1973) complaint about the conceptual simplicity of the material may be legitimate. Chartier (1972) reported that students who merely read the instructions to the simulation (taking an average of 22 minutes) had equivalent achievement as the students who participated in the full set of activities (75 minutes of activity). This finding raises doubts about the value of the simulation activity and suggests that conceptual simplicity of the materials could account for the absence of significant differences. If some students could learn the material in one third of the

time of other students simply by reading the instructions to the simulation, the value of the discussion period, and indeed of the simulation itself, must be suspect.

Livingstone (1973). This researcher investigated the impact of post game discussions on student learning. Two high school classes were tested immediately after simulation play and two other classes were tested after they had played the simulation and had had discussion. Simulation play lasted for two 60 minute periods. Class discussions were held for an unspecified period of time. Sixteen questions were suggested by the researcher for the discussion activity, but teachers were free to select which of these they wished to use in their discussions.

Students were randomly assigned to groups. In each group, one class was taught by one instructor and the second was taught by the other instructor. Two tests were given--an attitude survey (12 questions) and a test of student understanding of the simulation. The latter consisted of seven items, two of which were drawn from the discussion questions. The results suggested that the discussions had no significant effect on student understanding of the game and no consistent effect on their attitudes toward the real-life persons represented in the game. Livingstone concluded:

> The results of one or two experiments do not completely refute a generalization as widely accepted as this one this experiment was designed to test. Nevertheless, they should at least arouse some skepticism, especially in the absence of any experimental evidence to support that generalization. Future research may yet show that the post game discussion is as important as it has been thought to be. But in the absence of any such findings, the results of this experiment (and those of the previously cited experiment of Chartier, 1972) suggest that those who speak and write on the subject of simulation games for social studies education should moderate their claims for the value of post-game discussions. (p. 10)

There were some limitations to Livingstone's (1973) study that should be noted. For example, the debriefing sessions that the teachers conducted were constrained. Teachers were instructed to say as little as possible, to select discussion questions from a list of 16 possible questions, to avoid saying anything that was not on the lesson plan, and not to rephrase anything that a student had said

(e.g., an unclear comment). Instead, they were to initiate a student discussion and keep the discussion moving without directly contributing to it. The author explained that he didn't want student learning to be affected by anything that the teacher had contributed.

Unfortunately, there is some doubt as to how effectively the impact of the teacher was controlled in view of the fact that a significant difference in the test results ($p < .01$) was found between the classes of the two teachers. There are a number of possible reasons why this occurred--one teacher may have been more capable, one teacher may have intervened more directly, or one class may have been superior in ability at the initiation of the study. Regardless of the reason, the significant difference found between the teacher groups suggests that the basic controlling conditions for the experiment were not fully effective. This casts doubt on the findings.

Sibley (1974). This researcher investigated the effectiveness of a simulation game in changing the attitudes of 163 grade 6 students toward the environment. Six groups of students played four different simulations (250 minutes of exposure for each simulation) while approximately 80 students did not take the simulations. Three of the simulation groups had discussion sessions while the other three did not. No significant difference was found between the debriefing and the non-debriefing groups. Sibley concluded that "the findings provided conclusive evidence that debriefing sessions had no effect on attitudes toward the environment" (p. 2076).

As noted earlier in this chapter, research results on the effectiveness of simulations in changing student attitudes have been inconclusive. In this particular study, Sibley (1974) found that "the findings...provided inconclusive evidence that the [simulation] games effected favourable attitude change" (p. 2076). If it was found that the simulation itself did not effect attitudinal change, it is unclear why the researcher can say so definitively that debriefing techniques had no value. The absence of any significant difference in attitude scores between the debriefing groups and the simulation groups may have been a result of the ineffectiveness of the simulation and not a result of the debriefing at all.

How to Debrief

Models Suggested by Simulation Practitioners

Formal Debriefing Models

Fowler (1986) outlined a debriefing model for simulations and games which she identified with the acronym DATA (Description, Analysis, Transition, and Application). The first debriefing activity is a description of the salient parts of the experience. Afterwards, students conduct an analysis of their experience (stage 2), consider this analysis in terms of the real world (transition--stage 3), and then apply what they have learned to their own lives (stage 4). Fowler only briefly outlined this model and no detailed description of it, or evidence of its use by other authors, was found.

Jaques (1985) described an experiential learning cycle that had been employed in a particular debriefing workshop. The cycle had five stages: (a) experience of events; (b) description of events--sharing and collecting observations; (c) interpretation--making sense, interpreting and finding relationships; (d) generalizing --bringing in past events, relating to future; (e) application--preparing for the next experience. Jaques noted that stages b-e would be considered the debriefing activity.

Stadsklev (1974) suggested an experiential learning model (EIAG), used by trainers, which he felt would be appropriate for simulation/games. His model has received some limited support, for example by Bjur (1977) and Thames (1979).

The four components of Stadsklev's EIAG model are Experience, Identify, Analyze, and Generalize. The first stage (Experience) is the precursor to the debriefing activity as it consists of the simulation/game experience itself. The purpose of the second stage (Identify) is to bring to the surface the feelings and reactions that the students had to the experience. Participants may be asked to identify significant things that happened to them during the experience, express what they felt at particular points in the simulation, and identify factors that may have affected their scores.

In the third stage of the model (Analyze), students look for cause and effect relationships. This might be done by identifying problems or obstacles that the groups faced, sharing how they coped with them, and discussing alternative solutions to those obstacles. Finally, the purpose of the fourth stage (Generalize) is to have the students draw conclusions and learn from their experience. This might be accomplished by comparing students' conclusions about the simulation to real life, and determining if real life data support or disprove the conclusion that was formed.

Informal Debriefing Models

Greenblat and Duke (1981) identified three distinct phases of debriefing simulations and games. Their first phase consists of letting students talk about what happened during the game. This is intended to allow students to release any emotions that have been built up during the game. It also serves to encourage students to fully understand the experience by learning how things felt to other participants.

Their second stage continues the emphasis on understanding what occurred during the simulation. They suggested that the group should conduct a systematic examination of the simulation's model from the perspective of the various roles. For example, for various issues that occurred during the simulation, the different players could explain their perspectives of what happened. The purpose of this stage is to facilitate the third stage--an analysis of events.

Hasell (1980) suggested a three stage procedure for debriefing simulation/games. Participants can acquire strong feelings during play and these need to be expressed first. Afterwards, discussions can focus on the similarities between the real world and the game. The final stage is to shift attention to the real world problems simulated in the game.

Moriah (1984) proposed three simulation debriefing stages--airing of feelings, factual chronology, and analysis. The aim of the first stage is to release feelings and the second stage is intended to bring all students to the same knowledge level without analysis. In the final stage, participants draw conclusions from the experience.

Pearson and Smith (1986) discussed debriefing within the context of experiential learning. They summarized their three stages with three questions: "What happened?"; "How did the participants feel?"; and, "What does it mean?"

In the first stage, participants describe what happened to them during the experience. This activity provides a common and non-threatening starting point for discussion.

> Such a beginning allows all participants basic knowledge concerning everyone else's experience. It facilitates comparisons with another's experience and suggests that one person's experience and reaction may be shared by group members. Beginning in this way may well provide the group leader with issues, problems, reactions and feeling that need to be discussed further later in the debriefing session. (Pearson & Smith, 1986, p. 158).

In the second stage, discussing how the participants felt helps to develop an atmosphere of trust, group processing skills, and a sensitivity to the underlying feelings and emotions within the group. Their final stage is to generalize from the experience and the participants' reactions to that experience.

Van Ments (1989) identified three phases for debriefing a role-play activity. The first phase is intended to focus on "what the players thought happened and what their feelings were" (van Ments, 1989, p. 136). In the second phase (analysis), participants are directed to "decide why things happened, analyse interactions, establish sequences, causes, effects, extrapolate to the real world, and draw generalized conclusions" (p. 133). In the third stage (planning action), a future-oriented focus is adopted.

In Wassermann and Ivany's (1988) model of science instruction (play--debrief -replay), three stages of debriefing are identified. The first activity (reflection) requires students to think about the experience and identify their reactions to it. This stage is instrumental in setting a positive climate to the debriefing. "It will indicate to them that it is safe for them to express an idea without fear that what they offer is being judged negatively" (Wasserman & Ivany, 1988, p. 95). This stage is followed by analysis of ideas. The third stage is characterized by challenging responses. These teacher-student interactions require that students extend their thinking into the examination of new issues and ideas.

Theoretical Basis of the Study

Background

Although a fair number of authors have commented on the debriefing activity, few have provided a theoretical framework for it. Miller (1988) suggested that the reason that debriefing has been neglected in both the literature and the practice of simulation/gaming is due, in part, to the absence of theory underpinning practice. Fowler (1986), Jaques (1985), and Stadsklev (1974) suggested formal debriefing models but no ties were made between their models and learning theory.

A learning model that might serve as a foundation for simulation debriefing is Kolb's (1984) model of experiential learning. Simulations are a form of experiential learning and several authors have linked the simulation activity to Kolb's model. Svinicki and Dixon (1987), for example, suggested that simulations could be used in Kolb's first stage to provide firsthand, personal experiences. Thatcher (1986) noted that Kolb's model was "very relevant to the use of games and simulations in education since games and simulations are a type of 'controlled' experience from which learning can come if the whole experience is used effectively" (p. 147). Miller (1988) felt that "the four modes of learning identified by Kolb...form a powerful theoretical basis for simulation and debriefing practitioners" (p. 25).

Overview of Kolb's Experiential Learning Model

Kolb (1984) defined learning as "the process whereby knowledge is created through the transformation of experience" (p. 38). He posited a cyclical model of experiential learning consisting of four learning modes (see Figure 1). In the first stage, learners begin with personal involvement in a **concrete experience**. The next stage is **reflection and observation**, during which they reflect on and observe their experiences from many perspectives. The emphasis in this stage is on "understanding the meaning of ideas and situations by carefully observing...them" (p. 68). In the **abstract conceptualization** stage, learners "create concepts that integrate their observations into logically sound theories" (p. 31). These theories form the basis for subsequent decisions and actions in the final stage of **active**

experimentation. In this stage, the conceptualizations generated in the previous mode are tested and used as a foundation "to make decisions and solve problems" (p. 31). The focus of attention during active experimentation is on applying knowledge and skills to solve real-life problems. This experimentation leads to further concrete experiences and the beginning of a new, more complex, four stage cycle.

According to Kolb (1984), the four modes in the cycle can be considered as "equipotent modes of knowing" (p. 40) arranged dialectically. The vertical axis in Figure 1 represents the acquisition of information and contains two different and opposed processes of grasping experience, that is by concrete or abstract means. This may be done through tangible, immediate, direct experience which Kolb refers to as apprehension or through reliance on detached analysis, conceptual interpretation, and symbolic representation which Kolb refers to as comprehension.

Simply acquiring experience does not result in learning; rather, experience must be transformed or processed before learning can take place. The horizontal axis represents two opposed ways of processing the information that has been acquired. One way is through observation and internal reflection (intention) and the other way is by externally acting upon or testing the conclusions which have been drawn (extension). Kolb (1984) refers to the vertical axis as the prehension dialectic and the horizontal axis as the transformation dialectic.

There is no developmental continuum between modes of learning nor does one mode of learning dominate over another. Rather, as learners progress through the four modes, they have to shift from being actors to observers, and from being directly involved in the experience to being analytically involved. Although some learning can occur if students move through only a few modes, Kolb (1984) contends that the highest level of learning occurs when all four learning modes are experienced.

As noted by Claxton and Murrell (1987), Kolb drew "primarily on the works of Dewey...who emphasized the need for learning to be grounded in experience, Lewin...who stressed the importance of a person's being active in learning, and Piaget...who described intelligence not so much as innate but rather the result of the interaction of the person and the environment" (p. 25).

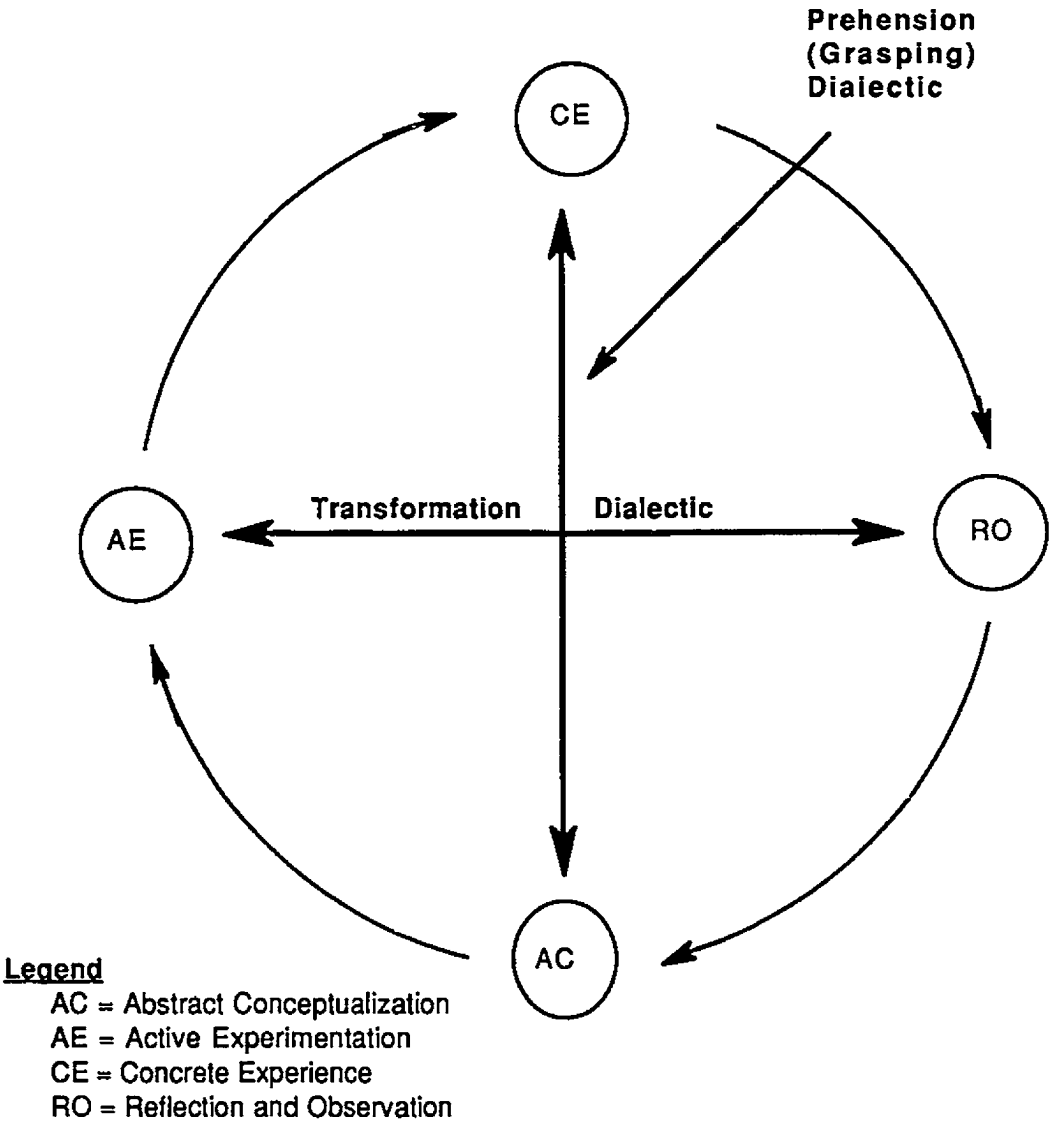


Figure 1: Kolb's Learning Model (Adapted from Kolb, 1984)

Characteristics of Kolb's Model of Experiential Learning

Some of the major characteristics of Kolb's model, as reported by Kolb (1984) and Kolb and Lewis (1986) are described below.

Learning is a process. In experiential learning, the emphasis is on the process of learning. Learning is not defined in terms of its outcomes (e.g., knowledge of facts or behavioural responses to stimuli). Rather, learning is a process in which experience acts to modify previously derived concepts.

Learning is continuous. The process of learning is continuous and is grounded in experience. Knowledge is continuously being created and recreated (i.e., transformed) through the learner's experiences.

Primacy of direct experience. For Hunt (1987), the most important characteristic of Kolb's model is its emphasis on the primacy of direct experience. He noted that other models of learning consider some modes of learning to be superior to others. However, Hunt emphasized that in Kolb's model, concreteness is not "regarded as inferior to abstraction but, rather, placed at the beginning of the sequence of experiential learning, its primacy is redeemed" (p. 161).

Experiential learning is a molar concept. Kolb (1984) considered experiential learning theory not as an alternative to other learning theories but rather as a "molar concept describing the central process of human adaptation to the social and physical environment" (p. 31). He felt that his model was able to provide an "holistic integrative perspective on learning that combines experience, perception, cognition, and behaviour" (p. 21).

Educational Applications of Kolb's Model

Kolb has applied his learning model primarily to the study of learning styles (Claxton & Murrell, 1987), pointing out that "approaches that individualize the learning process to meet the student's...learning style...will pay off handsomely in increased learning" (Kolb, 1984, p. 202). Using the four stages in the experiential

learning cycle, Kolb (1985) developed the Learning Style Inventory (LSI) as a way of determining an individual's preferred learning style. However, there has been some debate in the literature about the validity and reliability of this inventory. Stumpf and Freedman (1981), for example, stated that "there is little readily available empirical evidence that supports the LSI or its underlying theory" (p. 297). Claxton and Murrell (1987), on the other hand, felt that the LSI was extremely useful, as "a means of collecting aggregate data on students' styles" and for purposes of dialogue rather than diagnosis. In addition, both Sugarman (1985) and Wilson (1985), although recognizing the limitations of the LSI, felt that these had not refuted the validity of Kolb's model.

Other authors have considered wider applications of the model. For example, Sugarman (1985) commented on the significant impact that Kolb's model has had in such fields as counselling, teaching, and training. In addition, Atkinson and Murrell (1988) observed that it has been possible to apply the model to meet a wide variety of learning needs because of the abstract quality of the theory, particularly where attention to the process is at least as important as attention to the product.

Kolb (1984) claimed that "the combination of all four of the elementary learning forms produce the highest level of learning, emphasizing and developing all four modes of the learning process" (p. 66). Several other authors have recognized the value of the model in the design of learning experiences. For example, much of Kolb's work had been done with adult students, but McCarthy (1980, 1985) adapted the model for use in K-12 schools with The 4MAT System: A Cycle of Learning. Her cycle is based on the same four learning quadrants identified by Kolb. However, she overlays right and left mode processing techniques on each of these learning modes.

Stice (1987), citing a private discussion with Dixon, claimed that learning (or at least retention) is enhanced if more modes of learning are used.

> According to Dixon, 20 percent is retained if only AC is used; if both RO and AC are used, retention is increased to 50 percent; if one used CE+RO+AC, it rises to 70 percent; 90 percent is retained if all four learning stages are employed. (p. 293)

In attempting to identify the source of these conclusions, it was discovered that Dixon (personal communication, December, 1990) did not herself have firsthand knowledge of the data, having received them from McBer, in the form of

transparencies. She had been unsuccessful in her efforts to determine their source. As a result, Stice's comments must be considered cautiously.

Claxton and Murrell (1987) reported that Kolb's model has been found to be successful in helping students enhance their learning experiences because it can provide a framework within which they can discuss the learning process. They recommended that the four modes of the cycle be used as a guide in the design of learning activities so that students are engaged systematically in each mode. This is essentially the strategy that was adopted for this research.

Kolb's Model and Educational Simulations

Few simulation practitioners or learning theorists have apparently made a direct link between simulation debriefing activities and Kolb's model. As noted earlier, a number of authors have observed the appropriateness of Kolb's model for simulations (e.g., Svinicki & Dixon, 1987). However, only two authors (Thatcher, 1986; Miller, 1988) have talked about debriefing activities in terms of Kolb's cycle. Insomuch as both wrote in British publications which have limited circulation in North America, it is doubtful if their writings have had much impact yet on this continent. An intensive search for information on simulation debriefing was conducted for several years but it was only recently, well after this research had been planned and initiated, and only by good fortune, that the work of Miller was uncovered. No other authors were found who drew upon Kolb's model or even mentioned it incidentally.

Miller observed that "good practice in educational simulations has drawn upon the experiential learning cycle" (Jamieson et al., 1988, p. 204). However, it is doubtful if many practitioners in North America have actually used Kolb's cycle as a springboard for the design of their debriefing activities. Nevertheless, simulation practitioners may have planned debriefing activities that are similar in nature to the experiential learning cycle--this will be explored in depth in the next section of this chapter. For example, it is evident that the simulation activity can represent Kolb's

first stage of concrete experience because playing the simulation provides the students with direct experience. It is suggested that the simulation debriefing activity can be a composite representation of Kolb's remaining three stages.

Practitioner Debriefing Models with High Congruence to Kolb's Model

As shown below, there is a fair degree of congruence among the debriefing models suggested by practitioners that were outlined earlier and Kolb's three stages of observation and reflection, abstract conceptualization, and active experimentation that follow the concrete experience. Perhaps the highest correspondence occurs with the models proposed by Stadsklev (1974), van Ments (1989), and Wassermann and Ivany (1988). The three stages of all of these models are summarized below:

Debriefing stage 1.

Kolb (#2)	Observation and reflection
Stadsklev	Identify significant feelings and factors
van Ments	Establish the facts. What are the feelings? What happened?
Wassermann & Ivany	Reflection

Debriefing stage 2.

Kolb (#3)	Abstract conceptualization
Stadsklev	Analysis
van Ments	Analysis
Wassermann & Ivany	Analysis

Debriefing stage 3.

Kolb (#4)	Active experimentation: Make decisions and solve problems.
Stadsklev	Generalize to real lite
van Ments	Planning action
Wassermann & Ivany	Challenging responses: Examine new issues and ideas.

Practitioner Debriefing Models with Moderate Congruence to Kolb's Model

There is some congruence among Kolb's (1984) stages and the debriefing sequences/models proposed by other authors as well. For example, the first two stages of Jaques' (1985) model (experience, description) are very similar to Concrete Experience and Reflection and Observation. However, Jaques' third and fourth stages (interpretation and generalising) both have elements of analysis. Jaques' fifth stage and Kolb's fourth stage both adopt an application orientation.

The stages in Hasell's (1980) model reflect the same intents as those of Kolb. His three stages of (1) expression of feelings, (2) identifying similarities between the real world and the game, and (3) shifting attention to the real world can be considered examples of reflection, conceptualization, and experimentation.

The correspondence of the other models is less exact. For example, the sequences proposed by Greenblat and Duke (1981), Moriah (1984), and Pearson and Smith (1986), are all similar to each other. Each involves an expression of feelings and a recounting of what occurred during the experience/simulation within the first two of their three stages. According to Thatcher (1986), recollecting the experience and attending to feelings are considered part of the activity of reflection. As such, the first two stages of these practitioners can be seen to fit within Kolb's second stage. The third stages from these three practitioners also have congruence. Pearson and Smith's final activity of generalization or the others' activity of analysis fits within Kolb's abstract conceptualization stage. However, Greenblat and Duke, Moriah, and Pearson and Smith do not appear to have suggested an activity equivalent to Kolb's fourth stage of experimentation.

Fowler's (1986) model (Description, Analysis, Transition, Application) also has a degree of congruence to Kolb (1984). Her model begins with a description of the events--essentially Kolb's reflection and observation stage. Her second stage of analysis is akin to abstract conceptualization. Her third and fourth stages of transition and application constitute the activities found in Kolb's fourth stage. She separates elements of the real world (transition) and problem solving (application) whereas in Kolb's model they are included within active experimentation for the purpose of solving real-life problems.

Kolb's Model Applied to Debriefing Activities

In this section of the literature review, a closer examination will be made of each of Kolb's stages of reflection and observation, abstract conceptualization, and active experimentation in order to demonstrate how they could be applied to debriefing. Each Kolbian stage will first be discussed from a theoretical perspective. Excerpts from the writings of Kolb's proponents as well as from authors who have suggested debriefing models or debriefing sequences will demonstrate the applicability of each Kolb stage to a debriefing stage. A practical perspective will then be adopted. Examples of specific debriefing discussion questions, also drawn from the writings of practitioners, will be provided to illustrate how each of Kolb's stages could be applied practically to a debriefing activity, for example to a large group discussion.

Reflection and Observation Stage

Theoretical perspective. In this stage, a learner "reflects on...experience from many viewpoints, seeking to find its meaning" (Svinicki & Dixon, 1987, p. 141). Observations are made about the experiences just encountered. Svinicki and Dixon have represented this stage by the action verb examine.

Thatcher (1986) observed that reflection learning theory suggests that reflection consists of three stages:

> Returning to the experience which can consist of recollecting the experience, replaying the events or recounting them to others. It is very much, initially, each individual's perception of what happened.
>
> Attending to feelings which involves capitalising on and using the positive feelings which come from the experience, but also not omitting a consideration of the negative feelings, the management of which must be a vital part of the process of reflection.
>
> Re-evaluating the experience which involves re-examination of the experience in the light of the first two stages. (p. 148)

Jamieson et al. (1988) emphasized the need for de-roling--the process by which students are disengaged from the roles they have been playing.

> Unless role-players are given an opportunity to air their feelings and to raise problems which occurred during the activity, these underlying conflicts and anxieties may continue to surface throughout the debriefing session, so making it difficult for the student to focus upon the main learning outcomes. (p. 209)

Elements of the debriefing models discussed earlier that have relevance in this stage are as follows:

- Identify significant feelings and factors (Stadsklev, 1974);
- Establish facts (van Ments, 1989);
- Reflect on their ideas (Wassermann & Ivany, 1988);
- Express feelings (Hasell, 1980);
- Express feelings and recount what occurred (Greenblat & Duke, 1981; Moriah, 1984; Pearson & Smith, 1986); and,
- Describe (Fowler, 1986).

Practical perspective. The following are examples of reflection and observation activities that could be employed during a group debriefing discussion. These questions, or variations of them, have been drawn from articles on debriefing simulations and other experiential-based activities. However, the categorization of these questions within Kolb's reflection stage has been made by this author.

1. Recollect the experience (Bjur, 1977; Brenner & Nichols, 1981; Fennessey,1973; Jaques, 1974; Schuncke, 1978; Stadsklev, 1974)
   - What happened during the event?
   - What did you do/say when...?
2. Attend to general feelings (Chapman, 1973; Stadsklev,1974)
   - What made you feel good or bad?
   - What did you like/dislike about the...?
   - What was your most frustrating/enjoyable experience in the event?
3. Express feelings about specific events (Bjur, 1977; Brenner & Nichols, 1981; Livingstone, 1973; Schuncke, 1978; Stadsklev,1974)
   - How did you feel when...?
   - How were you affected by...?
   - Did anyone in the event...? How did you feel when that happened?

Abstract Conceptualization Stage

Theoretical perspective. In the abstract conceptualization stage, learners use logical thinking to analyse their observations and integrate them into theories. Hunt (1987) illustrated the purpose of this stage with this question: "In terms of your experiences, what are your hunches about how [the object of study] works, i.e. how do you make sense of it?" (p. 117). Svinicki and Dixon (1987) have represented this stage by the action verb explain.

Elements of the debriefing models discussed earlier that have relevance in this stage are as follows:

- Identify similarities between the real world and the game (Hasell, 1980);
- Generalize (Pearson & Smith, 1986);
- Analyse (Fowler, 1986; Greenblat & Duke, 1981; Moriah, 1984; Stadsklev, 1974; van Ments, 1989; Wassermann & Ivany, 1988).

Practical perspective. The following are examples of abstract conceptualization activities that could be employed during a group debriefing discussion. Note that these questions, or variations of them, have been drawn from articles on debriefing simulations and other experiential-based activities. However, the categorization of these question within Kolb's abstract conceptualization stage has been done independently.

1. Analysis of the game (Alder et al. , 1974; Livingstone, 1973; Stadsklev, 1974; Wassermann and Ivany, 1988)

- What do the points you get represent?
- What does the...represent?
- Why do some activities give you more points than other kinds?
- Why did the winners win and the losers lose?
- Why did...[activity, process] result in ...?
- Why did...[feeling, attitude] develop?
- Compare...
- Classify...

2. Analysis of the game strategy (Brenner and Nichols, 1981; Chapman, 1973; Harry, 1967; Jaques, 1974; Livingstone, 1973; Stadsklev,1974)

- What problems did you face in the simulation and how did you attempt to meet them?
- What might have been a better way of coping with this problem?
- What is the best way to get a high score in the game?
- Is it better to take chances or to play it safe?
- Is the best strategy the same for all the players in the game?
- Will the strategy work well all the time?
- Describe and compare strategies that were used. Which worked? Which didn't work? Why?
- What were the various ideas your group had to solve this challenge? Which one did you choose? How did you decide that this was best? What are some other ways that you could have decided which was best?

3. Relationship to the real world (Alder et al., 1974; Chapman, 1973; Fennessey, 1973; Harry, 1967; Hasell,1980; Jaques, 1974; Lederman, 1984; Livingstone, 1973; Stadsklev, 1974)

- What do you think that this represents in real life?
- Was the game like real life?
- Compare the game design with reality. What elements are missing? What rules should be changed? Could the winning strategy be applied to real life?
- Compare the logic of what happened in game play to what would happen in reality.
- Explain the differences between game occurrences and what would happen in reality.
- If you were really...., would you do the same things you did in the game?
- Did anyone in the game...? How do you think people feel when these things really happen to them?

Active Experimentation Stage

Theoretical perspective. In the active experimentation stage learners make decisions and conduct actions. They test the theories generated in the previous mode and use them as a foundation for decision making and problem solving. The focus of attention is on applying knowledge and skills to solve real-life problems. Svinicki and Dixon (1987) have represented this stage by the action verb apply.

Elements of the debriefing models discussed earlier that have relevance in this stage are as follows:

- Generalize, that is, draw conclusions about the learning derived from the game (Stadsklev, 1974);
- Plan action (van Ments, 1989);
- Examine new issues (Wassermann & Ivany, 1988);
- Shift attention to the real world (Hasell, 1980);
- Transition and application (Fowler, 1986)

Practical perspective. The following are examples of active experimentation activities that might be employed during a group debriefing discussion. Note that these questions, or variations of them, have been drawn from articles on debriefing simulations and other experiential-based activities. However, the categorization of these questions within Kolb's active experimentation stage has been made independently.

1. Apply knowledge to solve a problem (Alder et al, 1974; Chapman, 1973; Fennessey, 1973; Schuncke, 1978; Stadsklev, 1974; Wassermann & Ivany, 1988)

- What does this tell you about...?
- Apply the principles learned in this game to....
- How would you confirm that...?
- What do you suppose would be the result if...?
- What are the implications of...?
- How might this affect...?
- What would happen if...? Predict...

CHAPTER 3: RATIONALE, DEFINITIONS, AND RESEARCH QUESTIONS

Rationale

This study was intended to continue the recent investigations conducted by Woodward (1985), and Rivers and Vockell (1987) into how teachers can increase the effectiveness of microcomputer simulations in the classroom through the sequencing of learning activities. As the focus of attention was on those activities that follow simulation play, it was also an extension of the work of Gokhale (1989).

Although many authors have written on the subject of debriefing, few have applied learning theory to explain practice. The sequencing of debriefing activities in this study, along lines suggested by Kolb's (1984) Model of Experiential Learning, has opened up three lines of investigation. First, it has provided, apparently for the first time, an investigation into the applicability of Kolb's model for simulation debriefing. Second, it has allowed an examination of the effects of a full simulation experience--simulation play followed by debriefing--on the achievement and attitude development of students. Typically, simulation studies have concentrated on the value of the simulation activity in isolation from any other learning activity. Third, it has reopened inquiry into the value of the debriefing activity itself. Previous work conducted by Chartier (1972), Livingstone (1973), and Sibley (1974) has suggested that debriefing was not necessary, a contention that has not corresponded with the views of either early or contemporary simulation practitioners.

In addition, this study has included design features that may provide insights into two, heretofore, relatively neglected areas in the research. First, most simulation studies have involved quite brief interventions. In this study, all the students in the experimental groups were exposed to the simulation for a minimum of 10 class periods. Second, qualitative data were collected during simulation play as well as at the end of the study. Typically studies have focussed solely on the collection of quantitative data.

Definitions

Simulation. Several definitions of the term simulation were appropriate to this study (e.g., Brownell, 1987; Butler, 1983; Kinzer et al., 1989; Smith, 1986). However, a definition of the actual simulation used in the study (O Emigratsii) was prepared for the purposes of this study. It was based, in part, on the definition of Mandell and Mandell (1989) cited earlier.

> The O Emigratsii simulation is a representation of the life of three types of Ukrainian immigrants to Canada in the early 1900's. It allows students to learn through experience about the life of Ukrainian immigrants in particular, and the life of immigrants to Canada in general, and to take risks without actually suffering the consequences of poor choices.

Debriefing. The definition of debriefing that is used within this study is that of Thatcher (1986), namely, debriefing is the "process by which the experience of the game/simulation is examined, discussed and turned into learning" (p. 151).

Observation and reflection debriefing activities. As used within this study, the observation and reflection debriefing activities were comprised of two main intents--to allow students to recall what happened during the simulation and to release emotions generated by the experience.

Abstract conceptualization debriefing activities. As used within this study, the abstract conceptualization debriefing activities focussed student attention onto three levels of analysis: identification of cause-effect relationships, priorization within sets of variables, and determination of overall strategy for playing the simulation.

Active experimentation debriefing activities. In this study, the debriefing activities representing this stage of Kolb's cycle consisted of a replay of the third role of the simulation.

Student attitudes. Where used in this study, student attitudes refer to student opinions about Ukrainian immigrants and the hardships they faced during their initial years in Canada, as measured by scores on the instrument in Appendix J.

Student achievement. Where used in this study, student achievement refers to student learning of facts and concepts of Ukrainian immigration during the simulation unit, as measured by scores on the tests in Appendices K, L, and M.

Research Questions

Student achievement. Data will be collected to address five broad questions related to student achievement. Statistical significance will be established at the .05 level (two-tailed).

1. What will be the effect of the instructional unit on student achievement? Will students who participate in the unit achieve significantly different scores on the achievement tests than students who do not receive any simulation experiences or debriefing exposure? Will similar results be found on achievement tests given 1 month later?

2. What will be the effect of debriefing activities, in general, on student achievement? Will students who participate in debriefing achieve significantly different scores on the achievement tests than students who do not receive debriefing? Will similar results be found on achievement tests given 1 month later?

3. What will be the effect of the specific debriefing stages on student achievement? Will students who participate in various debriefing activities achieve significantly different scores on the achievement tests than students who engage in other debriefing activities? Will similar results be found on achievement tests given 1 month later?

4. What will be the effect of the sequential order of a full cycle of debriefing activities on student achievement? Will students who participate in one sequence of debriefing achieve significantly different scores on the achievement tests than

students who engage in the same activities but in a different sequence? Will similar results be found on achievement tests given 1 month later?

5. Will there be any relationship between gender and achievement?

Student attitudes towards immigrant Galicians. Data will be collected to address five broad questions dealing with student attitudes towards the Galicians. Statistical significance will be established at the .05 level (two-tailed).

1. What will be the effect of the instructional unit on student attitudes? Will students who participate in the unit achieve significantly different scores on the affective measure than students who do not receive any simulation experience or debriefing? Will similar results be found on an attitude measure given 1 month later?

2. What will be the effect of debriefing activities, in general, on student attitudes? Will students who participate in debriefing achieve significantly different scores on the affective measure than students who do not receive debriefing? Will similar results be found on an attitude measure given 1 month later?

3. What will be the effect of the specific debriefing stages on student attitudes? Will students who participate in various debriefing activities achieve significantly different scores on the affective measure than students who engage in other debriefing activities? Will similar results be found on an attitude measure given 1 month later?

4. What will be the effect of the sequential order of a full cycle of debriefing activities on student attitudes? Will students who participate in one sequence of debriefing achieve significantly different scores on the affective measure than students who engage in the same activities but in a different sequence? Will similar results be found on an attitude measure given 1 month later?

5. Will there be any relationship between gender and attitude development?

Student activities during simulation play. Data will be collected to address four broad questions about the involvement of students in the simulation.

1. What will be the general level of involvement or lack of involvement of students in the simulation?

2. For students who are involved in the simulation, in what kinds of learning activities will they typically be engaged?

3. For students who are not involved in the simulation, in what other kinds of activities will they typically be engaged?

4. Are there any general differences in the students' pattern of involvement (or uninvolvement) between different treatment groups? Similarly, are there any apparent changes in student behaviour from one role of the simulation to another role, from the first day of simulation play to the second day, or from the first half of a period to the second half of a period?

Opinions about the instructional unit. Quantitative and qualitative data will be collected to address three broad questions dealing with the opinions of the participants about the unit. Student opinions will be gather from questionnaires and teacher reactions will be collected through interview format. Statistical significance will be established at the .05 level (two-tailed).

1. How interesting will the participants find the unit and its component parts? Will there be any significant differences between experimental groups, or between genders, in the measures of student interest in the entire unit, the simulation, or the debriefing?

2. How educationally valuable will the participants find the unit and its component parts? Will there be any significant differences between experimental groups, or between genders, in the measures of student perceptions of educational value in the entire unit, the simulation, or the debriefing?

3. What strengths and weaknesses of the instructional process will be identified by the participants?

CHAPTER 4: METHOD

Overview

The participants in this study were assigned to 10 groups, each group consisting of two grade 5 classes. The topic of the unit of study was Ukrainian/Galician immigration to Canada in the early 1900's. Eight groups experienced some form of debriefing after exposure to the simulation-- these were the experimental groups. The ninth group participated in simulation activities but received no debriefing--this group was identified as the "non-debriefed control group". The tenth group did not receive any lessons on the topic whatsoever-- this group was designated the "nil exposure control group". One of the purposes of the study was to examine the effect of the type of learning activity on four dependent variables: achievement; attitude development; retained achievement; and retained attitude development. The relationship of a second independent variable (gender) to these dependent variables was also examined. A second dimension to the study was a qualitative assessment of the learning unit. Data were collected on how students were involved during the simulation lessons and on how teachers and students felt about the unit as a whole.

Pilot Study

A pilot study was conducted during the 1990 spring term with 18 grade 5 students whose instruction in social studies was temporarily assumed by the author. During that time, a draft learning unit was field tested. This testing covered the simulation itself, the sequencing of the learning activities, the demonstration lessons and materials, the debriefing lessons and materials, the achievement tests, and the attitude survey. Subsequently, revisions were made to all components of the unit.

Initial Participants

During the spring, 1990, the elementary schools in the local rural and urban areas were surveyed to determine which had the necessary Macintosh hardware to present the simulation unit. Permission to conduct research was then sought from the principals of those schools. Where approval was granted, meetings with the grade 5 teachers were then arranged, at which time a description of the research study was given. From these meetings, 18 teachers were identified who were willing to take part in the research. Most of the participants had been identified by the end of June, however due to unforeseen changes in teaching loads in some schools, the list of teachers was not finalized until early September, 1990. During that interval, formal authorizations to conduct research were requested and received from the University of Victoria and the Superintendents of the two school districts involved. The two grade 5 classes which were to serve as control groups were identified during the fall. These classes did not need access to the Macintosh hardware.

The 18 classes with Macintosh hardware were assigned randomly to one of the nine experimental groups, two classes per group. One restriction to this assignation was imposed. It was felt that some problems might result if students in one class in a school were given one set of lessons while students in another class in the same school were given a different type of debriefing. Sharing of insights between students and/or changes in teacher delivery of content might result and it was thought that this could be controlled by assigning the same treatment to classes in the same school.

Initially, the participants in the study consisted of 20 grade 5 classes in 13 different schools. Of these classes, 14 were straight grade 5's while the remainder were split classes. Students who were required to work closely with adult aides were not included in the study. Permission for students to participate in the study was sought from parents and 100% approval was received in the experimental groups. Eight students in the control group were excluded as their parents did not grant permission for testing to be conducted.

The initial sizes of study classes are shown in Table 1. In this and subsequent tables, the treatment groups are identified by a code number representing the learning activities delivered to the students, and the order in which they were presented. The

number "0" signifies the nil exposure control group--no activity. The digits 1-4 each stand for one of the modes of Kolb's learning model, namely:

1 = concrete experience (the simulation);

2 = reflection;

3 = analysis; and

4 = application.

The presence of multiple digits in a code indicates that several activities were provided. Thus, "Group 13" experienced the simulation and then analysis activities.

Table 1

Class Sizes at Study Initiation

Treatment Group	Grade(s)	Grade 5 Enrolment
0	5	24
0	5	25
1	5	27
1	5	26
12	5	27
12	5	27
13	5	20
13	4/5	19
14	5	23
14	5	24
123	4/5	18
123	5	29
124	5	29
124	5/6	20
134	5	28
134	5/6	7
1234	5	29
1234	5/6	18
1432	5	29
1432	5/6	8
Total	20	457

Procedure

Inservice

Prior to the implementation of the unit, all of the teachers of the experimental groups received an introduction to the learning package. This 3 hour inservice consisted of demonstrations of the various roles in the simulation, descriptions of the teaching activities required in the unit, discussion of the teacher's role in the research, and an overview of the data collection processes. Teachers were given a copy of the simulation and an instructor's manual. This manual contained an outline of the unit, detailed lesson plans for each day of the unit, as well as master copies of overhead transparencies and student handouts. Customized manuals were prepared for each experimental group so that teachers only received information pertaining to their prescribed set of activities.

Inservice was provided well ahead of time so that teachers would have ample time to become familiar with the simulation and their role in the delivery of the unit. Twelve of the 18 teachers received their training in one of three separate weekend sessions. The remainder were unable to attend on the weekend and received the inservice in a series of individual sessions given at their school after school hours.

Delivery of the Learning Unit

The starting date of the unit and the scheduling of each lesson were determined by each teacher, according to how easily the necessary lab time could be arranged, how soon preceding social studies units would be completed, and which days and periods were available for social studies lessons. Teachers were free to begin the unit at any time during the fall so long as the first data collection period was completed before Christmas holidays. One teacher began the unit in the second week of September but most delayed until October. By the third week of October, 17 of the 18 classes were studying the unit. The last class to participate began in the first week of November. Typically, each teacher scheduled 3 social studies periods per week, however, holidays and special school functions (e.g., professional days, parent-teacher interviews) occasionally caused some disruptions to their schedules.

All experimental groups received the same sequence of learning activities for the first 10 lessons of the unit. In the first lesson, the classroom teacher presented an introduction to the immigration unit. Three linked lessons followed--1 period for the demonstration of simulation role #1 and 2 periods for student play. In a similar manner, role #2 was covered during periods 5-7 and role #3 in periods 8-10.

The demonstrations for each of the three roles were presented in large group sessions. If the school's computer lab was equipped with screen sharing capabilities, these demonstrations took place in that facility. If not, the necessary equipment was loaned to schools so that teachers could demonstrate the simulation in their classrooms.

In most cases, students played the simulation in groups of two. Dyads were formed by the classroom teacher in such a way that weaker students were paired with stronger students. At least one member of each group was a competent reader and was responsible for reading lengthy text screens out loud. During simulation play, students took turns controlling the mouse so that both were kept involved in the activity.

Following the completion of the 10 day simulation section, debriefing activities were provided as required by the nature of the experimental group. These activities ranged in duration from 1 to 3 additional days for each stage of debriefing and consisted of a mixture of student seat work and large group discussion. One day of reflection activities was provided to five groups (12, 123, 124, 1234, and 1432). Appendices A and B contain excerpts from the teacher's manual that describe the teacher and student reflection activities that were scheduled during this stage of debriefing. Three days of analysis activities were given to four groups (13, 123, 1234, and 1432). Excerpts from the teacher's manual summarizing the analysis activities are provided in Appendices C through F. Two days of application activities were given to four groups (14, 124, 1234, and 1432). This activity consisted of having students replay role 3 of the simulation. Debriefing lessons were delivered by the classroom teacher in all but one case. It became necessary for the author to conduct the debriefing for one of the classes in group 1234.

Testing

Following the completion of the simulation and the debriefing, teachers administered data collection instruments. These consisted of five individual student measures spread over 3 periods (on 3 different days). In the first period, students completed a questionnaire about the learning unit as well as the first part of the achievement test. The second period was used for the completion of an attitude survey and the second part of the achievement test. The third and last part of the achievement test was completed on the third day of testing. These measures were designed to be completed quickly (approximately 10 minutes each) and consisted of multiple choice and short-answer questions. The battery of tests (excluding the questionnaire) was re-administered one month later, again over 3 periods of testing. Further details about data collection are provided later in this chapter.

Exposure to the Unit

For the experimental groups in the study, the length of time required for the simulation, debriefing, and data collection ranged from 16 to 22 periods. The length of time that each group was exposed to the unit is shown in Table 2.

Table 2

Exposure to the Learning Unit by Treatment Group

Treatment Group	Simulation Periods	Debriefing Periods	Testing Periods	Total Periods
0	0	0	6	6
1	10	0	6	16
12	10	1	6	17
13	10	3	6	19
14	10	2	6	18
123	10	4	6	20
124	10	3	6	19
134	10	5	6	21
1234	10	6	6	22
1432	10	6	6	22

Materials

The materials used in the research consisted of the simulation, a teacher's manual, and a battery of data collection instruments. Information on the first two of these is provided below. The data collection instruments are described in the next section of this chapter.

Simulation

The simulation used in the study, O Emigratsii, is a representation of the life of Galician settlers in Alberta in the early 1900's. The background information and the general development of events depicted in the simulation were obtained from reference books on the subject of Ukrainian immigration to Canada. (Note: The word "Galicia" and its derivatives were used in place of references to "Ukraine" and its derivatives in the student materials since those were the terms in use in 1900.) These sources are listed in Appendix G. Prior to the initiation of the research, the validity of the content in the simulation was confirmed by V. A. Green, a local expert in the area of grade 5 social studies and co-author of the teacher guide book accompanying one of the prescribed texts for the British Columbia grade 5 social studies curriculum (Green & Nicol, 1985).

The simulation was intended to provide students with experience in overcoming the obstacles that commonly faced immigrant homesteaders in Alberta in the early 1900's. In O Emigratsii, the students play the role of Galician immigrants who are attempting to develop a homestead site and/or earn money at an outside job. A number of different roles may be played but, for each of them, the students have a specific goal to achieve within two simulated years. Through striving to achieve their goal, the students gain some insight into the life of the immigrants, for example awareness of their sources of food, the difficulty of clearing land, the importance of livestock, and the support available from other settlers.

In the process of playing the simulation, students make a number of monthly decisions for their characters and, at the end of each simulated month, they see the results of those decisions. They are told not only what happened to their character(s) during the month but they are also able to see the effect of those events on the

immigrant(s). Four character values are tracked: spirit, health, worldliness, and knowledge of English. As events transpire, the values of these attributes increase or decrease, thus providing the students with an indication of the success of their decisions. Other indicators of success are the amount of money earned and the number of acres of land cleared.

In order to succeed in the simulation, the students must be able to make the correct decisions at the appropriate time (e.g., when to plant crops, how to earn extra money). However, they must realize the importance of the four character attributes as well. As the students become more aware of the importance of all of these character attributes, they become more adept at making appropriate plans and decisions.

The simulation was programmed by the researcher in Lightspeed Pascal for use on Macintosh computers. The necessary files (simulation, text files, temporary data storage folder, and startup folder) were placed on individual 3.5" floppy diskettes. A sufficient number of these disks was given to teachers in the experimental groups so that each student pair had access to its own disk. These were distributed to the students at the beginning of each period by the teacher.

Teacher's Manual

As indicated earlier, customized teacher manuals were provided to teachers in each experimental group, the most comprehensive consisting of approximately 50 pages. Common elements in all manuals were: an introduction; a description of the educational goals of the unit; suggestions for the effective use of the simulation in the classroom; lesson plans for simulational use; lesson plans for debriefing activities; master copies of student handouts; references; and, additional background information on Galician immigration.

Excerpts from the debriefing section of the teacher manual, as previously described, have been included in Appendices A-F. Excerpts from one of the simulation lessons (Demonstration of Role 1) are provided in Appendix H to provide an indication of the support provided to the teacher for that section of the unit. Also, a modified version of a data collection sheet for role 1 is shown in Appendix I.

Data Collection and Treatment

Loss of Study Classes/Groups

Three problems were encountered before or during the data collection stage which reduced the number and size of the groups in the study. First, irregularities in applying testing procedures were discovered with the smaller class in Group 124 (n = 20) and the entire exam set for that class had to be disqualified as a result. Second, delays in completing the debriefing lessons were so lengthy for the larger class in Group 134 (n = 28) that it was necessary to exclude that class from the study. Since the other class in the group was considered to be too small (n = 7) to stand on its own, the entire 134 group was dropped from the study as a consequence. Finally, a teacher's serious illness interrupted the post-testing of one of the two nil exposure control classes. Arrangements were made for the substitute teacher to administer the measures but a teacher strike in the district delayed this testing. Too much time had elapsed by the time students returned to school for the data from this class to be included. Due to these three problems, the total sample size was reduced by 80 students, from 457 to 377.

Achievement Test, Reading Test, and Attitude Survey

Method. The achievement test consisted of 33 questions in the following formats: 8 true/false, 9 multiple choice, 13 short answer, and 3 multiple choice and short answer combinations. These questions were organized into three separate tests, each of which was to be completed during a different class period.

Student progress in reading was assessed by the Gates-MacGinitie Reading Test (Level D, Form 1). This consisted of two parts, word knowledge (45 items) and reading comprehension (43 items), and was administered by classroom teachers over the course of 2 periods. The test had been normed for Canadian students in November, 1978. The level and form used in the study had a Kuder-Richardson Formula 20 reliability coefficient of .90 (vocabulary) and .89 (comprehension).

Student attitudes towards Galician immigrants, the life they led, the obstacles they faced, and their treatment by others were surveyed through the use of a 5-point

scale containing nine questions. For each question, students were asked to circle one of five responses. These responses were couched in different words but ranged in tone from very supportive to very non-supportive. The middle answer in each case allowed the student to indicate neutrality or ignorance about the issue. The order of responses was reversed a number of times so that the positive responses were not always on the same side of the instrument.

Prior to the initiation of the study, the validity of the achievement test and the attitude survey was confirmed by Dr. T. Riecken, a social studies expert and a member of the supervisory committee. The four instruments are provided in Appendices J-M. Changes in format have been made for inclusion in this report (e.g., by reducing the space originally allotted for student responses).

The total number of marks for the achievement test was 29. True/false questions were worth 0.5 marks each. All other questions were worth 1 mark each, with partial marks awardable in some cases. A preliminary marking scheme was applied to the first 150 tests (approximately) that were completed. Attention in particular was focussed on refining the guidelines for the evaluation of the short answer questions and the assignment of partial marks. Marking guidelines were then formalized and applied to all of the achievement tests, including those that had been marked previously. The accuracy of the data scoring and entry was checked in three ways: an analysis of the responses to each question was performed and this provided confirmation of the correct assessment of each item; the total mark on each student's test was checked; and, the correct entry of student scores into computer data files was confirmed.

Attitude survey answers were given a numerical score ranging from 5 for the most supportive response to 1 for the most unsupportive. Marks on the nine questions were then totalled to give a composite score. The accuracy of the data scoring and entry was confirmed through a reassessment of each test, a recalculation of test totals, and a check on the correct entry into the computer data files.

Reading tests were assessed manually with the aid of a scoring mask. Test scores were calculated twice in order to ensure accuracy. The table of norms in the teacher's manual was used to convert each student's total raw score to a standard I score. On the I scale used in this instrument, 10 marks represented one standard

deviation and a score of 50 was equivalent to the 50th percentile. I scores were used to reflect student reading progress because they represented equal units and were suitable for computing averages and making comparisons across the whole data range.

Statistical treatment. A set of analyses of covariance (ANCOVA) was applied to the data obtained from these tests. The test scores from the immediate post achievement test, the immediate post attitude survey, the retention post achievement test, and the retention post attitude survey served as the dependent variable in four separate ANCOVAs (2x8). The covariate in each case was the reading test scores and the independent variables were treatment groups and student gender. Statistical analysis was performed using the SPSS/PC software program. As this program did not provide for multiple comparison techniques directly from a covariance analysis, adjusted means were acquired whenever the presence of statistical significance indicated that further analysis was warranted. Fisher's Least Significant Difference Test was applied to the adjusted means to determine the presence of significance between individual groups. A significance level of $p < .05$ (two tailed) was adopted for all analyses.

Classroom Observations

Method. Observations were made of student activity during the play of simulation roles 1-3. Observations were also made during the replay of role 3 that was part of the debriefing process for some groups. For ease in interpretation, the replay of role 3 will be referred to as "Role 4" from now on. Over the course of the study, 11,309 observations of students were made.

Due to the large number of classes in the study, it was common for two or more teachers to have scheduled simulation play at or about the same time in the day. This made it impossible for one person to observe every period of simulation play by every class. However, an attempt was made to visit each class during at least 50% of their simulation periods. Efforts were also made to ensure that data were collected from all four simulation roles and from both periods of simulation play (each

role required 2 periods of play).

Information on the frequency of the classroom visitations is presented in Tables 3, 4, and 5.

Table 3

Frequency of Classroom Visitations: by Class

Class	Visitations Made	# of Simulation Periods
1a	3	6
1b	5	6
12a	3	6
12b	3	6
13a	5	6
13b	5	6
14a	3	8
14b	3	8
123a	3	6
123b	2	6
124a	4	8
1234a	4	8
1234b	4	8
1432a	7	8
1432b	3	8
Total	57	104

Table 4

Frequency of Classroom Visitations: by Role

Visitations	Role 1	Role 2	Role 3	Role 4
Visitations Made	15	17	19	6
Visitations Possible	30	30	30	14

Table 5

Frequency of Classroom Visitations: by Day of Simulation Play

Visitations	Day 1	Day 2
Visitations Made	27	30
Visitations Possible	52	52

Student activity was categorized into one of the following seven types.

1. Involved: Simulation play. This category was used for students who were actively engaged in playing the simulation. This encompassed such behaviour as operating the mouse, observing the screen, reading text (silently or out loud), listening to one's partner reading the text, and recording simulation information.

2. Involved: Within group. Student behaviour was coded into this category if the members of the group were discussing aspects of the simulation within their group, for example talking about results or strategies. The specific student under observation could be either making or listening to these types of comments.

3. Involved: Between groups. This category was used for students who were talking with another student outside of their own group. The topic of the discussion had to be about the simulation, for example in relating an event that had just occurred or asking about scores or results.

4. Involved: Teacher. Teacher interaction with students in a dyad was reported in this category, for example when the student under observation was either talking or listening to the teacher.

5. Distracted: Verbal. This category was used to record instances when a student was engaged in a conversation that was not related to the simulation.

6. Distracted: Non-verbal. Student behaviour that was not related to the simulation, and not associated with another student, was recorded in this category. Instances included attention being focussed elsewhere while the partner was involved in play, and doodling on paper.

7. Other. This category was used to record activities that did not fall within the above criteria, for example being out of the room at the time of observation.

In each class period, data collection was begun after the class had entered the lab, had loaded the simulation, and had played the assigned role for several minutes. Students were then observed briefly, one at a time, and the type of activity of each was recorded. The length of time necessary for each individual observation was approximately 2-5 seconds. When the categorization of a student's activity was not clear cut, the duration of the observation was extended. Observations of students were made in an organized, but nonsequential fashion so that there would be a time lapse between the observations of dyad members. After everyone in the class had been observed, a further round of data collection was begun. This sequence was continued until nine sets of data were collected. Typically, observation rounds were begun 3 minutes apart. However, the interval between observation rounds was adjusted if it appeared that a full set of observations would not be completed, for example due to the late arrival of the class, or an impending early departure.

Statistical treatment. Extensive statistical treatment of the observational data was not conducted. For example, inferential statistics were not used to determine if there were any significant differences in the degree of active involvement between groups, or from one role to the next. Although a large amount of data had been collected, and although an attempt had been made to collect this data in a representative fashion, there were many instances where information from some classes had not been collected under every possible situation, for example for every role. These omissions would have resulted in empty cells in the data matrix and, as a result, comparisons by techniques based on an analysis of variance model would have been precluded. In addition, the small number of cases in some of the cells would also have hindered analysis. However, descriptive statistics of the data were used to support trends noted during classroom observations.

Student Questionnaires

Method. The student questionnaire was composed of two parts. In the first section, six questions were posed on the total learning unit. Two of these asked the students to rate the unit on its interest and educational value using 5-point scales. In the third question, students indicated their preferences for either traditional instruction or instruction with a simulation.

There were three open-ended questions in the first section. These gave the students an opportunity to indicate the most important thing that they learned from the unit, to say why they preferred the simulation to traditional instruction (or vice versa), and to make any additional comments they desired. All experimental groups (i.e., all groups exposed to the simulation) responded to this first section ($N = 323$).

The second section of the questionnaire contained four questions. These asked the students to indicate, again on 5-point scales, their rating of the simulation's interest, the simulation's educational value, the interest provided by the debriefing lessons, and the educational value of the debriefing lessons. This part of the questionnaire was administered only to those experimental groups which had participated in debriefing lessons ($N = 229$). Excluded were the non-debriefed control group (Group 1) and Group 14 which had only played the simulation during the unit.

The questionnaire may be seen in Appendix N. Format changes have been made, for example by reducing the space originally allotted for student responses.

Statistical treatment. Descriptive statistics were used to summarize student responses to the open-ended questions as well as their preferences for either the simulation or normal instruction. Two sets of MANCOVA analyses were also used (2x7 in the first, and 2x6 in the second) to look for any significant differences in responses on the 5-point scales by gender or by experimental group. Data from all of the students exposed to the learning materials were used to examine their perceptions of the interest and the educational value of the entire unit. In addition, data from only the students who had been exposed to the debriefing lessons were used to examine student perceptions of the interest and educational value of the components of the unit, the simulation and the debriefing lessons.

Teacher Interviews

Method. The reactions of 13 of the participating teachers to the unit were obtained through personal interviews. Fourteen questions were posed, five on the overall unit, five on the simulation, and four on the debriefing lessons. An outline of the questions posed in the interview is provided in Appendix O.

Statistical treatment. Comments of the teachers were recorded, transcribed, and examined for commonalities and differences. Where appropriate, descriptive statistics were used to summarize the data.

Attrition

Since two sets of tests were administered, and since both required 3 days to complete, some student attrition occurred during the testing phase of the study. For example, some students were absent for most or all of one set of tests, generally due to illness. Also, those classes which were tested in December experienced some absences by students leaving early for Christmas holidays. As a result of these difficulties, 11 students missed most or all of the first testing period and a further 19 students presented similar problems in the second testing period. The data for these students were not included in the study. The changes in group sizes as a result of attrition due to extended absences are summarized in Table 6.

Instances of occasional student absences were also experienced. Some students were away during one or two of the testing periods over the course of the entire study. These students should have been tested upon their return to class but unfortunately, this was not always done. As a result, there were further cases of students having incomplete data sets. For example, a student could have completed all four of the immediate post tests but could have been absent for only three of the four retention post-tests. The failure to administer the missing test had the potential to disqualify the entire set of data from that student.

Table 6

Attrition due to Excessive Absences

During the Testing Period

Group	Number before Testing	Attrition Stage 1 Testing	Attrition Stage 2 Testing	Final Number
0	24	0	0	24
1	53	0	2	51
12	54	3	4	47
13	39	1	2	36
14	47	1	3	43
123	47	5	6	36
124	29	0	1	28
1234	47	0	0	47
1432	37	1	1	35
Total	377	11	19	347

In cases where the data set was almost complete, predicted scores were used to replace the missing data due to occasional absences. Correlations between each of the four test measures in the immediate post testing and the same measures in the retention post testing were determined for each of the nine experimental and control groups. The appropriate regression formula was then used to calculate a predicted score for a student with missing data.

Regression formulas were used to predict scores on the attitude survey but were employed in only certain cases with the achievement measures. As noted earlier, a student's score on the achievement test was a summation of his/her scores on each of the three parts. Regression was only used to predict a missing score in cases where a student was missing just one part of the achievement data set (i.e., two tests out of three were complete in one set and all three tests were complete in

the second set). It was thought that any error stemming from the prediction would have minimal impact since it would be applied to only one-third of the actual measure. If two parts of the achievement test were missing, the student was considered to have been absent too much and was dropped from the study. (The figures in Table 6 included those students who had too many missing test scores for prediction to be applied.) A total of 18 scores were predicted with the regression formulas. The frequencies of predictions made for each group and each type of test are summarized in Table 7.

Table 7

Frequency of Predicted Test Scores

Group	Attitude Survey	Achievement Part 1	Achievement Part 2	Achievement Part 3
0	0	0	0	0
1	0	1	1	3
12	0	0	0	1
13	1	2	0	0
14	1	0	0	0
123	1	0	1	1
124	0	0	0	0
1234	1	1	1	2
1432	0	0	0	0
Total	4	4	3	7

At the initiation of data analysis, the number of students in the study was 347. This reduced figure reflects all of the students and classes which had been dropped from the study. Data on the demographics of the final study sample (age as of December 31, 1990) are shown in Table 8.

Table 8

Student Demographics: Final Study Sample

Group	Gender		Age (Year:Months)				
	M	F	<10	10:0 10:4	10:5 10:8	10:9 10:12	>11
0	16	8	1	12	5	6	0
1	29	22	0	16	19	10	6
12	23	24	0	15	19	7	6
13	20	16	0	10	12	9	5
14	23	20	0	11	9	11	12
123	21	15	1	9	12	13	1
124	15	13	0	8	6	9	5
1234	21	26	0	11	15	18	3
1432	21	14	1	7	14	11	2
Total	189	158	3	99	111	94	40

Effectiveness of Random Assignment of Classes

During the course of the study, it became apparent that the random assignment of classes had not been completely effective in minimizing differences between groups. The composition and abilities of Group 14 were found to be substantially different from the other groups. Both classes in Group 14 were drawn from the same school, a school serving a relatively large number of special needs students. One of the classes, in particular, reflected the unique nature of the school. Group 14b was composed of a large number of students who were recent immigrants to Canada and who were still having difficulty with the English language. In addition, a number of other students who were experiencing difficulty in learning were in the class. This unique composition is reflected in the data seen previously in Table 8 insomuch as Group 14 had considerably more older students than any other group in the study.

The testing of reading skills provided evidence that Group 14 was considerably different from the other groups. The classes in this group had the two lowest averages on this covariate measure and the average for one of the classes in the group was almost one full grade equivalent below the next highest score. In addition, scores on the achievement and attitudinal measures followed the same apparent pattern. The achievement test average for Group 14, for example, was much lower than the averages for the other experimental groups.

Analyses of the data revealed the significance of these differences. A Oneway Analysis of Variance (ANOVA) was conducted on the covariate scores to determine if there were any significant differences between groups. A significant finding, $F = 5.0$ (8, 361), $p < .001$, prompted the application of a Scheffé test. As can be seen in Table 9, Group 14's average was significantly different from the averages of three other classes. Furthermore, preliminary analyses of the achievement and attitude data revealed the presence of several patterns of significance, patterns that were consistent across most of the study groups. Not only did the results from Group 14 not fall within these patterns, but Group 14 generally achieved significance in the opposite direction to every other group.

In summary, it appears that the random assignment of classes to experimental groups was not fully effective in ensuring the absence of systematic differences between groups. Given the evidence that Group 14 was uniquely different in composition from the other groups in the study, and since this difference could have implications on the interpretability of the results of the study, it was decided to separate the data from Group 14 from the other groups for the purposes of analysis and interpretation. Accordingly, the results and discussions found in Chapter 5 are based on data from groups 0, 1, 12, 13, 123, 124, 1234, and 1432 only. This reduced sample consists of eight groups totalling 304 students. The results from Group 14 were not discarded, but are summarized and discussed in Appendix Q.

Table 9

ANOVA of Reading Test Data by Groups

Post Hoc Test Results

Group	M	Post Hoc Findings
0	51.1	No significance found
1	57.0	1 > 14 ($p < .01$)
12	55.2	12 > 14 ($p < .05$)
13	56.4	13 > 14 ($p < .05$)
14	47.2	14 < 1 ($p < .01$)
		14 < 12 ($p < .05$)
		14 < 13 ($p < .05$)
123	50.4	No significance found
124	52.6	No significance found
1234	53.9	No significance found
1432	53.9	No significance found

CHAPTER 5: RESULTS AND DISCUSSION

Achievement Tests

Introduction

An immediate post test and a retention post test were administered to measure student achievement. Each served as a dependent variable (DV) in two separate 2x8 ANCOVA analyses. In all cases, the covariates were scores on the reading measure and the independent variables (IVs) were gender and group. The sample consisted of 304 students (Groups 0-1432 excluding Group 14).

Test of Assumptions for Analyses

On the basis of guidelines proposed by Tabachnick and Fidell (1983), data were examined for evidence that any of the assumptions underlying the use of an Analysis of Covariance (ANCOVA) had not been met. No datum was missing on any of the dependent variables nor were instances of extreme scores found. Homogeneity of variance appeared to be present. Although sample sizes did vary, it was determined that this did not invalidate the use of ANCOVA, since sample sizes were large and two-tailed tests were employed. Accordingly, it was concluded that there was no evidence that serious violations of the assumptions underlying an ANCOVA were present.

Results

The ANCOVA results revealed that, on each achievement test, there was a significant relationship between the nature of the groups and the test scores. However, no significant relationship was found between gender and test scores or in the interaction between the two independent variables. These findings are displayed in Table 10.

Table 10

ANCOVA Results: Achievement Tests by Group and Gender

Effects	*F*	*df*	*p*
Immediate Post Achievement Test			
Group	43.10	7, 287	.000
Gender	1.21	1, 287	.271
Interaction between IVs	1.95	7, 287	.062
Retention Post Achievement Test			
Group	35.95	7, 287	.000
Gender	1.35	1, 287	.246
Interaction between IVs	1.21	7, 287	.295

In order to further examine the significant relationships found between the IV (Group) and each of the DVs, a series of protected *t* tests (Fisher's least significant difference test) was applied. Forty significant differences within the two DVs were found. Summaries of the group means on the achievement tests are shown in Table 11 and the results of the protected *t* tests are given in Tables 12 and 13.

Table 11

Achievement Test Means

Before and After Adjustment by Covariate

		Immediate Post Testing			Retention Post Testing		
Group	*n*	*M*	*SD*	*M* (adj.)	*M*	*SD*	*M* (adj.)
0	24	6.97	2.78	7.63	7.98	2.33	8.63
1	51	17.51	3.53	16.84	17.22	3.80	16.57
12	47	18.27	2.97	17.97	17.97	2.93	17.67
13	36	19.78	3.62	19.22	19.65	3.20	19.10
123	36	18.59	3.22	19.26	17.45	3.71	18.12
124	28	15.45	4.17	15.68	14.98	3.91	15.21
1234	47	18.54	3.67	18.51	19.07	3.61	19.04
1432	35	19.46	3.00	19.43	19.11	3.37	19.09
All	304	17.38	4.68	17.31	17.22	4.52	17.14

Table 12

Protected t Test Results

Immediate Post Achievement Test

Group	0	1	12	13	123	124	1234
1	13.25***						
12	14.68***	1.99*					
13	15.66***	3.89***	2.01*				
123	15.72***	3.96***	2.08*	0.06			
124	10.30***	1.76	3.42***	5.00***	5.06***		
1234	15.44***	2.94**	0.93	1.15	1.21	4.22***	
1432	15.86***	4.20***	2.33*	0.32	0.26	5.27***	1.47

Notes: Degrees of Freedom = (7, 287); Error Mean Square = 7.89; N = 304
* = p < .05; ** = p < .01; *** = p < .001

Table 13

Protected t Test Results

Retention Post Achievement Test

Group	0	1	12	13	123	124	1234
1	11.14***						
12	12.52***	1.90					
13	13.81***	4.01***	2.24*				
123	12.52***	2.49*	0.71	1.44			
124	8.22***	2.00*	3.60***	5.36***	4.01***		
1234	14.42***	4.25***	2.30*	0.09	1.44	5.57***	
1432	13.71***	4.00***	2.21*	0.01	1.42	5.31***	0.08

Notes: Degrees of Freedom = (7, 287); Error Mean Square = 8.28; N = 304
* = p < .05; ** = p < .01; *** = p < .001

Correlations between variables. It was revealed in the ANCOVA analyses that the covariate had a significant relationship with both the immediate post achievement test (Beta = .56, t = 11.38, $p < .001$) and the retention post achievement test (Beta = .54, t = 11.02, $p < .001$). The relationships among the covariate and the DVs were examined further with correlation measures. These are summarized in Table 14.

Table 14
Bivariate Correlations among Covariate and Achievement Test Measures

Test Measure	Reading	Immediate Post Achievement
Immediate Post Achievement	.46	
Retention Post Achievement	.47	.84

Note: All correlations significant at $p < .001$, two-tailed.

Discussion

Research question #1: Effect of the unit on achievement. As noted in Chapter 2, the conclusions about the ineffectiveness of debriefing, reached earlier by Chartier (1972) and Sibley (1974), were discredited because of the questionable value of the learning materials that were used in those studies. Both researchers concluded that debriefing had no effect on learning or attitude development. However, it was unclear if this lack of effect was due to the ineffectiveness of the debriefing activities or to the questionable educational value of the simulation itself. If a simulation does not have pedagogical value, then it is not likely that much will be gained by conducting debriefing exercises on that valueless experience. Accordingly, it was reasoned that before the effectiveness of the debriefing activities in this study

could be considered, it was necessary to first determine whether some learning had occurred. Was the simulation, either by itself, or in conjunction with the debriefing activities, effective in promoting learning? Comparisons of the achievement test scores between the experimental groups (Group 1 - Group 1432) and the nil exposure control group (Group 0) suggest that the unit did promote such changes.

In the immediate post achievement test, every experimental group scored significantly higher ($p < .001$ in all cases) than the group which had no exposure to the activity package. In fact, the t values ranged from 10.2 to 15.6, scores which represented high levels of significance considerably lower than .001. Except for a slight decrease in the range of the t values, the same results were found in the retention post achievement tests. These results suggest that, in terms of the learning objectives measured by the achievement tests, students did acquire and maintain learning from their interaction with the simulation and/or its associated lessons.

Research question #2: General effect of debriefing on achievement. Although it appears that learning did occur during the unit, this might have been achieved solely as a consequence of interaction with the simulation. It is appropriate to consider whether the debriefing was effective in increasing student learning. To answer this question, the achievement scores of the six groups receiving some form of debriefing (Groups 12-1432) were compared to the non-debriefed control group which participated only in the simulation (Group 1).

The results suggest that debriefing did contribute to student learning. On the immediate post achievement test, higher scores were found for the debriefing groups in five out of six cases. The majority of these were at the .001 level of significance. A similar pattern was found in the retention test with significance being obtained in four out of six cases. A fifth fell just below the level needed for significance.

One contradictory finding was encountered. The scores for Group 124 fell significantly below the control group on the retention test ($t = 2.00$, $p < .05$). However, this very borderline finding should be considered within the context of the results from the other groups. The debriefing groups were generally superior to the non-debriefed control group on both sets of tests and in most cases, this superiority was at an extremely significant level.

In summary, classes which engaged in debriefing activities generally scored significantly higher than the non-debriefed control group which was exposed only to the simulation. This superiority was found immediately after the activities had been concluded as well as one month later. These results suggest that debriefing activities, in general, promoted student learning.

Research question #3: Effect of debriefing stages on achievement. Given the apparent effect of the debriefing activities in general, it is appropriate to examine the stages of debriefing more closely to determine if there were any relationships between the three stages of debriefing (reflection, analysis, and application) and student achievement. Since there were six experimental groups which differed only in the type of debriefing they gave their students (Groups 1, 12, 13, 123, 124, 1234), comparisons of their achievement results provide insight into the effect of specific debriefing stages. For example, comparing the results of Group 12 with Group 1 reveals the effect of the reflection activity (#2). In all, 15 paired comparisons among these six groups were possible. These can be categorized into three types of comparisons.

In the first type of examination, the results of each of the five experimental groups on the immediate post achievement test were compared to Group 1 which participated in the simulation but did not receive debriefing (the non-debriefed control). This provided some insight into the relative value of the three debriefing modes. The results of the ANCOVA analysis suggest that one debriefing activity was particularly effective. Groups which engaged in the analysis activity (#3), either by itself or in combination with other activities, scored significantly higher than the non-debriefed control group every time. Groups 13, 123, and 1234 all scored significantly higher than Group 1, the majority of time at the $p < .001$ level. The reflection activity (#2) was related to significantly higher scores three quarters of the time, namely for Groups 12, 123, and 1234 but not for Group 124. However, the strength of the significance was much less, particularly if analysis was not present (e.g., Group 12 > Group 1, $t = 1.99$, $p < .05$). Application (#4) was effective in one out of two times, but this may have been due to the presence of the analysis activity. (Group 1234 scored significantly higher than Group 1 but Group 124 did not.)

The second set of comparisons were made between those groups exposed to similar sequences of debriefing, (e.g., Group 123 and Group 1234) allowing each debriefing activity to be examined in isolation. For example, two comparisons were available which isolated the effect of the analysis activity (#3): Group 123 to Group 12; Group 1234 to Group 124. In both cases, ANCOVA results reveal that the scores from the group exposed to the analysis activity were significantly higher than the group without analysis. Isolation of the reflection activity was possible in only one case (Group 123 to Group 13). No significant difference was found. Two comparisons were possible which isolated the application activity (Group 124 to Group 12; Group 1234 to Group 123). In one case, no significant difference was found, and in the second, the group exposed to the application activity achieved scores significantly lower than the group without that exposure.

The third set of relationships involved comparisons between relatively different sequences of debriefing, for example Group 12 with Group 134. The pattern of significant ANCOVA findings suggest that analysis was more effective than reflection (Group 13 scored significantly higher than Group 12) and more effective than application (Group 123 scored significantly higher than Group 124). Analysis also appeared to be superior to reflection and application combined (Group 13 scored significantly higher than Group 124). The relatively low effect of reflection and application, even when combined, was demonstrated by the absence of a significant difference between Group 13 and Group 1234. The loss of Group 14 and Group 134 from the study eliminated the possibility of comparing reflection to application (e.g., Group 12 to Group 14; Group 123 to Group 134).

The pattern of significance on the retention post achievement tests was very similar. No major differences in the overall pattern of results were present, although t values did change, resulting, in a few situations, in the loss or addition of significance. Again, the analysis activity was found to be particularly effective. Students who had experienced this form of debriefing, either singly or in combination with other forms, maintained significantly superior scores in almost every situation. Similarly, the findings associated with the application activity remained the same--no evidence of a significant relationship with higher achievement scores.

The inconclusive results of the reflection activity were not changed either, although individual cases of statistical significance may have been affected by the one month interval. In the immediate post test results, the superiority of Group 12 over Group 1 was indicated by a very borderline t value of 1.99. On the retention post achievement test, Group 12 still scored higher than Group 1, but the t value slipped to 1.90, slightly less than significance. A pattern of decreasing significance however was not found in the other comparisons involving this group. The effect of this activity on learning would still have to be considered inconclusive.

In summary, the large number of comparisons that could be made between the six experimental groups in the study permitted three kinds of analyses to be done: comparisons of debriefing activities to no debriefing; identification of the impact of an isolated debriefing activity; and, comparisons between different debriefing activities. In both the immediate and retention tests, a strong indication emerged from these comparisons, namely that the analysis activity was effective. In almost every case where analysis was part of the debriefing lessons, significant differences in student learning (favouring the analysis activities) were present. The next most effective debriefing activity was reflection. This form of debriefing may have had some limited effect on learning, as indicated by the borderline significance found with the comparison of Group 12 to Group 1. However, other comparisons involving the reflection activity were inconclusive. Analysis of the effectiveness of the application activity was hindered by the loss of Groups 14 and 134. There was no indication from the comparisons between the remaining groups that application activities had any effect.

Research question #4: Effect of the order of debriefing activities. The presence of Group 1432 in the study permitted a limited inquiry into the importance of the sequence of debriefing activities. Was the order in which the debriefing activities were experienced related to higher achievement scores? A direct comparison between Group 1234 and Group 1432 revealed that there was no significant difference between the scores of these two groups on the immediate post achievement test. For these two groups, the order of debriefing activities did not appear to have had an effect.

The same conclusions were reached when indirect comparisons were used. The pattern of results was not notably different when Group 1432 was substituted for Group 1234 in the set of comparisons to each of the other experimental groups. In all but one case, if there was a significant difference (or a non-significant difference) between Group 1234 and some other group, the same level of significance was found with Group 1432 and that other group. This suggests that the order of debriefing activities had no relationship to achievement.

This pattern of equivalence between Group 1234 and Group 1432 was found to be even stronger in the retention post achievement exam. The difference between the achievement scores from the two groups was almost nil ($t = 0.1$). In addition, as indicated by the broad levels of significance found in the group comparisons, their relationships to the other groups in the study were virtually identical. The results from this inquiry, albeit limited, suggest that the order in which debriefing activities are presented was not as important as the actual presence or absence of a debriefing activity.

Research question #5: Relationship of gender and achievement.

As noted earlier, no significant relationship was found between gender and achievement, either independently or in interaction with the treatment variable.

Other relationships. As indicated in Table 14, significant relationships were discovered between scores on the covariate (reading) and both sets of achievement tests. These likely reflect the degree of reading that the simulation required. It should be noted that although a high level of significance was present, the correlation values were relatively weak ($r < .50$).

A much stronger correlation (.84) was found between the scores on the immediate post achievement test and the retention post achievement test. This suggests that the reliability of this instrument was relatively strong.

Attitude Surveys

Introduction

An immediate post test and a retention post test were administered to measure student attitudes towards immigrant Galicians. Each served as a dependent variable (DV) in two separate 2x8 ANCOVA analyses. In each case, the covariate was reading and the independent variables (IVs) were gender and group. The sample consisted of 304 students (Groups 0-1432 excluding Group 14).

Results

The ANCOVA results revealed that, on each attitude survey, there was a significant relationship between the nature of the groups and the survey results. However, no significant relationship was found between gender and survey scores or in the interaction between the two independent variables. These findings are displayed in Table 15.

Table 15

ANCOVA Results: Attitude Survey by Group and Gender

Effects	*F*	*df*	*p*
Immediate Post Attitude Survey			
Group	119.93	7, 287	.000
Gender	15.45	1, 287	.191
Interaction between IVs	11.19	7, 287	.278
Retention Post Achievement Test			
Group	117.59	7, 287	.000
Gender	3.86	1, 287	.536
Interaction between IVs	7.42	7, 287	.640

In order to examine the significant relationships found between the IV (Group) and each of the DVs, a series of protected *t* tests (Fisher's least significant difference test) was applied. Summaries of the group means on the attitude surveys are shown in Table 16 and the results of the protected *t* tests are given in Tables 17 and 18.

Table 16

Attitude Survey Means

Before and After Adjustment by Covariate

		Immediate Post Testing			Retention Post Testing		
Group	n	M	SD	M (adj.)	M	SD	M (adj.)
0	24	30.29	2.82	30.62	30.67	3.90	30.96
1	51	36.65	3.43	36.32	37.18	2.81	36.88
12	47	37.53	3.09	37.39	38.30	2.73	38.16
13	36	37.22	2.32	36.95	37.72	2.66	37.47
123	36	38.14	3.03	38.47	38.06	3.60	38.36
124	28	36.07	3.36	36.19	36.32	3.13	36.43
1234	47	36.40	3.62	36.39	37.00	3.92	36.99
1432	35	35.63	2.96	35.62	36.20	3.40	36.19
All	304	36.32	3.65	36.28	36.79	3.76	36.75

Table 17

Protected *t* Test Results

Immediate Post Attitude Survey

Group	0	1	12	13	123	124	1234
1	7.7***						
12	9.0***	1.8					
13	8.0***	1.0***	0.7				
123	9.9***	3.3	1.6	2.2*			
124	6.7***	0.2	1.7	1.0	3.0**		
1234	7.7***	0.1	1.6	0.8	3.0**	0.3	
1432	6.3***	1.1	2.6***	1.9	4.0***	0.8	1.2

Notes: Degrees of Freedom = (7, 287); Error Mean Square = 9.1; N = 304

* = $p < .05$; ** = $p < .01$; *** = $p < .001$

Table 18

Protected t Test Results

Retention Post Attitude Survey

Group	0	1	12	13	123	124	1234
1	7.6***						
12	9.1***	2.0*					
13	7.8***	0.9	1.0				
123	8.9***	2.2*	0.3	1.2			
124	6.2***	0.6	2.3*	1.3	2.4*		
1234	7.6***	0.2	1.8	0.7	2.0*	0.7	
1432	6.3***	1.0	2.8*	1.7	2.9**	0.3	1.1

Notes: Degrees of Freedom = (7, 287); Error Mean Square = 10.0; N = 304
* = p < .05; ** = p < .01; *** = p < .001

Correlations between variables. It was revealed in the ANCOVA analyses that the covariate had a significant relationship with both the immediate post attitude survey (Beta = .28, t = 5.00, p < .001) and the retention post attitude survey (Beta = .26, t = 4.51, p < .001). The relationships among the covariate and the DVs were examined further with correlation measures. These are summarized in Table 19.

Table 19

Bivariate Correlations among Covariate and Attitude Survey Measures

Test Measure	Reading	immediate Post Achievement
Immediate Post Attitude	.29	
Retention Post Attitude	.27	.67

Note: All correlations significant at p < .001, two-tailed.

Discussion

Research question #1: Effect of the unit on attitude. As noted previously in this discussion of achievement test results, a determination that some attitudinal development had occurred during the exposure to the unit was thought to be necessary before investigating the relationship between debriefing and attitude. Was the simulation, either by itself, or in conjunction with the debriefing activities, effective in promoting attitude change? Comparisons of the attitude survey scores between the experimental groups (Group 1 - Group 1432) and the nil exposure control group (Group 0) suggest that the unit did promote such changes.

Every experimental group scored significantly higher on the immediate post attitude survey than the nil exposure control group ($p < .001$ in all cases). This same pattern was repeated on the retention post attitude survey with similar significance levels. These results suggest that, in terms of the attitudes measured in the survey, students did develop and maintain a more positive attitude toward Galician immigrants through their interaction with the simulation and/or the associated lessons.

Research question #2: General effect of debriefing on attitude. Although it appears that attitude change did occur during the unit, this might have been achieved solely as a consequence of interaction with the simulation. It is appropriate to consider whether there was a relationship between debriefing and attitude development. To answer this question, the attitude scores of the six groups receiving some form of debriefing (Groups 12-1432) were compared to the non-debriefed control group which participated only in the simulation (Group 1). As reported in Tables 17 and 18, a total of only 13 significant findings (out of 42 possible comparisons) were present in the two post attitude surveys. Furthermore, no pattern associated with the debriefing activities could be discerned. Instead, the majority of the significant findings were associated with a single group--Group 123. The attitude scores from this group were the highest in the study, and were significantly higher than four of the five other experimental groups. These high scores were maintained over the one month period so a degree of reliability appears to have been present.

Further examination of the data was conducted to discover reasons for the significantly higher scores from Group 123. This examination revealed that both classes in that group had high scores (ranking = 1st & 3rd on the immediate post survey out of 13 classes; ranking = 2nd & 3rd on the retention post survey). This general equivalence between the two classes reduces the likelihood that their high results were due to inequal treatment. In addition, although both of the classes had lost some students from the study, selective attrition did not appear to have played a part. Some attitude scores from students who had been dropped from the study (those with incomplete data) were available for examination, but their results averaged slightly higher than the group itself. Finally, both classes were drawn from one of the two rural schools in the study. The teachers of these classes suggested that the superior scores of their students may have been related to the general positive attitude towards different races in that community. Students from their classes may have had very positive attitudes towards other nationalities before the study had even begun. However, the relatively low scores from the other class in that community (rankings of 8/13 and 9/13) did not support that explanation.

In summary, no obvious explanation for the superior attitude scores from Group 123 could be determined. However, this anomaly does not detract from the overall results. The general pattern of equivalence between the debriefing groups and the non-debriefing group suggests that there was no relationship between debriefing and attitude scores either immediately after completion of the unit or after an interval of time. It is clear from the comparisons to the nil exposure control group that the learning package did promote attitudinal change, but given the apparent ineffectiveness of the debriefing, it appears that this attitude growth was related primarily to the initial simulation activity.

Research question #3: Effect of debriefing stages on achievement. Since no significant relationship between debriefing and attitude growth was found, this research question was not pursued.

Research question #4: Effect of the order of debriefing activities. Since no significant relationship between debriefing and attitude growth was found, this research question was not pursued.

Research question #5: Relationship of gender and attitude. As noted earlier, no significant relationship was found between gender and attitude growth, either independently or in interaction with the treatment variable.

Other relationships. As indicated in Table 19, a significant relationship was discovered between scores on the covariate (reading) and both sets of attitude measures. It should be noted that although a high level of statistical significance was present, the correlation values were quite weak (< .30) and considerably lower than the correlation of reading with the achievement tests.

A stronger correlation (.67) was found between the scores on the immediate post attitude survey and the retention post attitude survey. Again, this correlation was less than that found with the achievement tests indicating that the reliability of the attitude survey was somewhat weaker than with the other tests.

Classroom Observations

Research Questions #1-3: Levels of Student Involvement in the Simulation

Results. A total of 10,203 observations were made of students playing the simulation (11,309 observations minus those of Group 14). Student behaviour during these observations can be classified under three main categories--INVOLVED, DISTRACTED, or OTHER. Displayed in Table 20 is a summary of the percentage of time over the full sampling period that the activities of the students in the various experimental classes fell within each of those main classifications.

Table 20

Percentages of Main Types of Student Activity During Simulation Play by Class

Class	Activity Type		
	Involved (%)	Distracted (%)	Other (%)
1a	99.2	0.8	0.0
1b	99.7	0.3	0.0
12a	99.6	0.3	0.1
12b	100.0	0.0	0.0
13a	93.9	5.9	0.2
13b	98.8	1.0	0.3
123a	97.9	1.6	0.5
123b	96.8	2.6	0.6
124a	98.1	1.5	0.4
1234a	97.8	1.7	0.6
1234b	99.5	0.2	0.3
1432a	99.6	0.4	0.0
1432b	100.0	0.0	0.0
All	98.5	1.3	0.2

The data in Table 21 are a summary of the percentage of time that students in the various experimental classes were involved in simulation play. Four categories of involvement are employed: SIMULATION PLAY, WITHIN GROUP interaction, BETWEEN GROUP interaction, and TEACHER interaction.

Table 21

Percentages of Types of Student Involvement During Simulation Play by Class

Class	Student Involvement			
	SIM. PLAY (%)	WITHIN GROUP (%)	BETWEEN GROUP (%)	TEACHER (%)
1a	65.9	25.2	3.1	5.2
1b	63.4	30.2	2.9	3.3
12a	65.8	26.1	5.6	2.0
12b	71.8	17.1	6.1	5.0
13a	62.2	22.9	3.6	5.2
13b	63.0	30.9	1.4	3.6
123a	66.2	22.6	5.0	4.1
123b	59.1	29.6	2.2	6.0
124a	66.5	22.6	4.6	4.4
1234a	64.6	26.4	3.9	2.9
1234b	66.8	28.6	1.1	2.9
1432a	57.4	35.6	4.0	2.7
1432b	63.9	28.3	6.1	1.7
All	63.9	27.1	3.7	3.7

Finally, a breakdown of activities representing uninvolvement in the simulation is provided in Table 22. These activities were socializing with others in the class (DISTRACTED: VERBAL), or being distracted on one's own, for example apparent, non-purposive behaviour (DISTRACTED: NON-VERBAL).

Table 22

Percentages of Types of Student Uninvolvement During Simulation Play by Class

Class	Student Uninvolvement	
	VERBAL (%)	NON-VERBAL (%)
1a	0.2	0.7
1b	0.0	0.3
12a	0.3	0.0
12b	0.0	0.0
13a	1.4	4.5
13b	0.3	0.7
123a	0.7	1.0
123b	0.6	2.0
124a	0.5	0.9
1234a	0.4	1.3
1234b	0.0	0.2
1432a	0.0	0.4
1432b	0.0	0.0
All	0.3	1.0

Discussion. Research question #1 was an inquiry into the general levels of student involvement in the simulation. Conspicuous throughout the observation period was the high degree of involvement of the students in the simulation activity. As seen in Table 20, on the average, students were directly involved in the simulation 98.5% of the time, a very high degree of involvement for students of this age.

Research question #2 was an inquiry into the manner of student involvement. About two-thirds of this involvement were found in SIMULATION PLAY (e.g., reading the screens, manipulating the mouse) while slightly more than one quarter of the involvement was evident in discussions WITHIN the GROUP. The substantial discussion within groups indicates that students did work together to determine strategy and consider results. In summary, students were observed to be directly engaged with the simulation activity within the confines of their group 91% of the time.

The other types of simulation involvement were observed infrequently. Some student interaction did occur between groups, however this was relatively uncommon. Typically such interaction consisted of one member of a group checking out how a nearby group was faring while his or her partner was interacting with the simulation. These interruptions were generally quite short. At times, one or both members of a group would react spontaneously to an incident that befell their simulation family and this would draw the attention of nearby groups briefly. Occasionally, BETWEEN GROUP interaction included strategy suggestions (e.g., "take a mine job, it pays the best"). This advice was generally unsolicated. No lengthy discussions that dealt with strategy issues were observed between groups.

The frequency of interaction with the TEACHER was also minimal. Typically, teachers spent most of their time simply observing. Their most common form of interaction was listening to spontaneous accounts of student experiences. Some teachers required students to report their final point totals and this constituted a fairly large percentage of observations in this category. Teacher assistance was requested only occasionally. This assistance generally took the form of helping students to interact with the computer and/or the simulation (e.g., saving simulations). In some cases, teacher help was requested to get past a frustrating part of the simulation, for example in increasing the mother's low spirit in role #2 or preventing families from being sent back to Europe early in role #3. Teacher assistance at these times consisted of helping the student to analyse the problem as opposed to providing them with the correct solution or strategy.

Research question #3 dealt with the kinds of activities generally found with uninvolved students. Instances of uninvolvement were extremely rare with only 134 identified in over 10,000 observations. Cases of distraction were generally scattered with the exception of one class where two students (in separate dyads) were uninvolved for many of their simulation periods. These two students were not disruptive to others but their combined instances of distraction constituted approximately 25% of the total uninvolvement of all of the experimental groups.

Behaviour that did not fit within the first two categories was very infrequent with only 23 cases of OTHER activity being recorded. These consisted almost entirely of occasions where a student had left the room.

Caveats. A number of cautionary statements should be expressed about the observational data. First, the data that were collected constitute observations of behaviour within a restricted time period insomuch as data were not collected during start up or wind up portions of the period. Furthermore, the behaviour of the class was sampled only. Continuous observations of a student or a dyad were not made.

Second, student oral behaviour was at times difficult to classify. Due to the nature of the flooring, chairs, walls, size of room, etc., some classrooms were very noisy and it was not always possible to remain unobtrusive and still hear clearly what students were saying as they played the simulation. In such cases, additional clues such as the content of the text on the screen at the time, the activity of the other student, and body language were used to classify the activity.

Third, it was occasionally noted that some students were playing the simulation in a non-purposive manner. Although their actions were ostensibly directed towards their simulation, at times a few were simply going through the motions with no concentrated effort being made to achieve the goals of the simulation. This behaviour was quite difficult to discern since it appeared infrequently and inconsistently. Although a few extreme cases did become apparent, it is likely that some gradations of effort existed for other groups, at one time or another. The data collection method that was employed was intended to provide a global picture of the students' activities. However, sampling students' behaviour quickly and repeatedly unavoidably reduced the depth to which behaviour could be observed, for example in terms of their intensity of effort. As a result, the high frequency of active play does not necessarily reflect active and purposive play 100% of the time.

Finally, care should be taken in interpreting the data associated with TEACHER interactions since teacher behaviour was constrained by the research nature of the activity. For example, teachers were asked to refrain from providing direct instruction during the simulation. Data collected from the teacher interviews revealed that some teachers were not affected by this guideline at all. They reported that they would have dealt with their students in this fashion anyway. However, normal teacher behaviour was altered to a degree at least since other teachers reported that they felt constrained, wanting at times to intercede but reluctant to violate the guidelines.

Research Question #4: Variations in the Pattern of Involvement

Was the pattern of student involvement identified above consistent throughout the first 10 days of the unit? Or, did student involvement vary by experimental group, by simulation role (roles 1-4), by simulation play day (day 1 or day 2), and by class period half (first half or second half). Since statistical analysis of the data was not possible, only trends noticeable in the data collection phase will be addressed.

Variations by experimental group. No major differences in involvement patterns of the experimental groups were noted during data collection. This is supported by the data in Table 23 summarizing the degree of total involvement in the simulation for each experimental group. With one exception, the involvement rate for each group is within 1.3% of the overall mean. The score for Group 13 is somewhat low at 2.5% below the mean but the main cause for this lower rate is the relatively high frequency of NON-VERBAL DISTRACTION for one of the classes in this group. As noted earlier, this was mainly the result of repeated indifference by only two students in the class.

Table 23

Variations in Student Activity by Experimental Groups

Group	TOTAL INVOLVEMENT (%)	DISTRACTION NON-VERBAL (%)
1	99.5	0.4
12	99.8	0.0
13	96.3	2.6
123	97.6	1.4
124	98.1	0.9
1234	98.6	0.7
1432	99.7	0.3
All	98.5	1.0

Variations by simulation role. During data collection, several trends were noted in the way that students participated in the various roles in the simulation. The percentage of total involvement remained at an extremely high level for all roles. Insomuch as this part of the unit extended over at least 10 class periods, the motivational appeal of the simulation can be considered to be quite strong. However, the make-up of this total involvement changed after the initial role. In role #1, relatively little student discussion was observed. Students quickly began their attempts to make the goal, and changes in strategy from one simulated month to the next appeared to be adopted with little discussion within the group. However, the amount of interaction between students in the group increased considerably in role #2. Students appeared to spend more time talking within their group and less time interacting with the computer. These changes seemed to remain for later roles as well. The data in Table 24 support these observations.

Table 24
Variations in Student Activity
by Simulation Role

Role	TOTAL INVOLVEMENT (%)	SIMULATION PLAY (%)	WITHIN GROUP (%)
1	98.7	71.7	18.2
2	98.8	59.7	32.7
3	98.3	61.6	29.5
4	99.1	63.9	30.9
All	98.5	63.9	27.1

There are a number of explanations for this change in the style of simulation play after role #1. Interactivity within a group could have increased naturally. Some time may have been necessary for group members to become comfortable with each other. This "breaking in" period may have coincided with role 1.

However, the most probable explanation can be found in the differences between the difficulty levels of the simulation roles. Students playing role 1 seemed to treat the simulation as a game. They focussed on earning money, they talked about winning, and little consideration appeared to be given to developing the most effective strategy. Data on the various jobs were rarely collected and recorded for later analysis although data collection sheets were available. Instead, various jobs were tried until a high paying one was found and the simulation character then remained there as long as possible, with little consideration given to the other characteristics of the job and their impact on the character. Since success in role 1 was quite easy to obtain, this type of strategy was sufficient to succeed at this level.

However, roles 2-4 were much more difficult. Many more decisions had to be made and more variables had to be considered in making decisions. Since success in these later roles was more elusive, students had to work together to analyse their failure and to determine new strategies. This resulted in more discussion within the groups and a corresponding decrease in actual time spent playing the simulation. As evident by the constancy of the overall involvement figures, the change in difficulty after role 1 was generally not sufficient to deter the students from remaining involved. However, they did have to spend more time discussing their play.

A subtle shift in student attitude was perceived as students moved from role 1 to role 2. Students appeared to interact with the simulation in role 1 as though it was strictly a game to be won. However, in role 2, it appeared that they began to identify more with the simulation characters. Although succeeding in the simulation was still very much a primary goal, students began to make comments about the events of the simulation and the impact of those events on their characters. In role 1 for example, it didn't appear to matter to most students if the character had a dishonest boss. But in role 2, negative events had much more of an impact and became more important as a result. In addition, students began to discuss the concepts underlying the simulation (e.g., spirit, worldliness) whereas in role 1 they focussed strictly on how much money had been earned and how much more was needed. It appeared that students began to focus more on learning why things happened rather than just on winning.

Variations by simulation play day. Several trends were noted during data collection in the way that student participation changed from one day of simulation play to the next. Although the rate of total involvement appeared to remain at an extremely high level on all days, as students moved into the second day of play, their interaction within their group seemed to decrease while their frequency of simulation play increased. The data in Table 25 support these observations.

Table 25

Variation in Student Activity by Simulation Play Day

Day	TOTAL INVOLVEMENT (%)	SIMULATION PLAY (%)	WITHIN GROUP (%)
1	98.9	62.6	29.9
2	98.4	65.4	25.0

Although the TOTAL INVOLVEMENT of students in the simulation appears to be consistent from one day of play to the next, it is possible that it may have varied between roles. For example, increased student frustration in the higher roles could have resulted in decreased participation on the second day of simulation play. However, as can be seen in Table 26, the level of involvement remained consistent from one day of play to the next no matter how difficult the role.

Table 26

Rate of Involvement of Students by Day and Role

Day	Role 1	Role 2	Role 3	Role 4
1	99.5%	98.7%	98.4%	99.3%
2	98.2%	98.9%	98.2%	99.6%

Variations by period half. Did student behaviour change from the start of the 40 minute class period to its end? The total involvement in the simulation remained consistently high. However, as shown in Table 27, in the last half of the lesson, on the average, students appeared to spend slightly more time on playing and less time on discussions within their group. Also, discussions between groups seemed to be slightly more frequent in the second half of a period than in the first half.

Table 27

Variations in Student Activity by Period Half

Period Half	TOTAL INVOLVEMENT (%)	SIMULATION PLAY (%)	WITHIN GROUP (%)	BETWEEN GROUP (%)
1	99.1	63.2	29.5	2.9
2	98.2	65.4	24.9	4.3

Although the TOTAL INVOLVEMENT of students in the simulation appears to be consistent from the first half of a class period to the last half, it is possible that it may have varied between roles. For example, increased student frustration in the higher roles could have resulted in decreased participation during the 40 minute period. However, as can be seen in Table 28, the level of involvement remained consistent throughout the class period no matter how difficult the role.

Thus, with respect to total involvement in the simulation, no noticeable decrease in the high level of participation was found, either from one role to the next, between experimental groups, from one period to another, or from the first half of a period to the last half. Given these observations, it would be appropriate to conclude that students found the simulation to be highly motivating and that its appeal endured through the first 10 lessons. As discussed later, these conclusions are substantiated by the qualitative data collected from the students as well.

Table 28

Total Involvement of Students by Role and Period Half

Period Half	Role 1 (%)	Role 2 (%)	Role 3 (%)	Role 4 (%)
1	99.1	99.0	99.1	99.4
2	98.3	98.6	97.5	99.0

As seen previously in Table 27, in general, simulation play increased and discussion within the group decreased over the course of the 40 minute period. These changes likely occurred because most of the major decisions had to be made early in the simulation, for example, the allocation of personal characteristics, the selection of a homestead site, and the type of store purchases to be made. These decisions required group interaction. Since there was less need for interaction afterwards, more time was spent on actual simulation play in the second half of the period.

Finally, there has been no discussion yet of the very low frequency of interaction that occurred between different student groups. The low level of interaction between groups did not reflect a lack of interest in the simulation and how everyone had done. Teachers reported that students were keen to talk about the simulation during the following class period. During simulation play itself however, it appeared that their concentration was on the simulation and not on what was occurring around them. This low level of interaction is particularly noteworthy since many classes in the study were conducted under learning conditions that hindered concentration. In some labs for example, computers were placed so close together that there wasn't enough space to have two chairs at each computer. In addition, the labs were frequently very noisy, partly due to the large number of students crowded into a restricted space but also due, in some cases, to extremely poor acoustical conditions. However, in general, students appeared to be concentrating completely on simulation play, apparently oblivious both to a fairly high level of noise in the computer lab as well as to what the group one arm's length away was doing.

Student Questionnaire: The Unit and its Parts

Introduction

Students were asked to rate the total educational unit on two 5-point scales, one for interest, and one for educational value (see Appendix N for the full questionnaire). These were the DVs in a 2x7 MANCOVA analysis. The IVs were gender and group while the covariate was scores on the reading test. The sample of 280 students consisted of those students who had been exposed to the simulation (Groups 1 to 1432, excluding Group 14). Wilks' Lambda criterion was employed.

In a similar fashion, students were asked to use two 5-point scales to rate the two components of the unit. The interest and educational value of the simulation were assessed as were the interest and educational value of the debriefing. These four scales served as the DVs in a 2x6 MANCOVA analysis. The IVs were gender and group while the covariate was scores on the reading test. A smaller sample of 229 students was employed-- those students who had been exposed to the simulation as well as to some form of debriefing lesson (Groups 12 to 1432, excluding Group 14).

Results

Group means were fairly high on all six measures. On the average, students rated their interest in the learning unit as a whole at 4.3 on a scale of 5. They also assessed the educational value of that unit at 4.3. Mean scores on the ratings of the components of the unit were also high. On the average, students who participated in both simulation and debriefing lessons rated their interest in the simulation at 4.4 and their estimation of its educational value at 4.3 (both out of 5). For the debriefing lessons, their mean scores on the interest and educational value scales were 3.8 and 4.1 respectively. Group means, including the adjustments made for the impact of the covariate, are shown in Tables 29 through 31 for these six measures.

Table 29

Questionnaire Results: Unit as a Whole

Before and After Adjustment by Covariate

Group	n	Interest			Educational Value		
		M	SD	M (adj.)	M	SD	M (adj.)
1	51	4.37	0.77	4.35	4.40	0.70	4.35
12	47	4.34	0.64	4.33	4.50	0.73	4.48
13	36	4.19	0.49	4.17	4.29	0.62	4.25
123	36	4.33	0.80	4.36	4.43	0.75	4.50
124	28	4.21	0.79	4.23	3.89	1.13	3.92
1234	47	4.45	0.72	4.45	4.46	0.65	4.46
1432	35	4.12	0.67	4.12	4.06	0.77	4.06
All	280	4.30	0.70	4.30	4.32	0.78	4.32

Table 30

Questionnaire Results: The Simulation

Before and After Adjustment by Covariate

Group	n	Interest			Educational Value		
		M	SD	M (adj.)	M	SD	M (adj.)
12	47	4.36	0.74	4.35	4.34	0.82	4.32
13	36	4.28	0.78	4.26	4.14	0.83	4.10
123	36	4.49	0.60	4.52	4.47	0.70	4.52
124	28	4.32	0.95	4.33	4.21	0.88	4.23
1234	47	4.43	0.62	4.42	4.43	0.68	4.42
1432	35	4.29	0.57	4.29	4.19	0.73	4.14
All	229	4.37	0.70	4.37	4.30	0.77	4.30

Table 31

Questionnaire Results: The Debriefing

Before and After Adjustment by Covariate

		Interest			Educational Value		
Group	n	M	SD	M (adj.)	M	SD	M (adj.)
12	47	3.75	0.74	3.76	4.19	0.71	4.20
13	36	3.67	0.68	3.69	3.89	0.75	3.90
123	36	3.67	1.04	3.64	4.03	0.81	4.02
124	28	3.75	0.84	3.74	3.86	1.15	3.85
1234	47	4.00	0.78	4.00	4.13	0.88	4.13
1432	35	3.63	0.91	3.64	4.14	0.81	4.14
All	229	3.76	0.83	3.76	4.06	0.84	4.06

The MANCOVA analysis of the data on the unit as a whole revealed that there was no significant relationship between group or gender and the two DVs, nor was any significant interaction found between the two IVs. Similar results were found with the data on the components of the unit. Even though every group had different debriefing experiences, the MANCOVA analysis of the four DV's revealed no significant relationships between the two IVs and the DVs. These findings are displayed in Table 32.

Table 32

MANCOVA Results

Questionnaire Data by Group and Gender

Effects	E	df	p
Multivariate Tests of Significance: The Unit as a Whole			
Group	1.6	12, 528	.078
Gender	0.9	2, 264	.429
Interaction between IVs	1.3	12, 528	.224
Multivariate Tests of Significance: The Components			
Group	1.1	20, 707	.383
Gender	1.3	4, 213	.264
Interaction between IVs	0.9	20, 707	.640

Discussion

The most noteworthy aspect to the questionnaire data is the high ratings that students gave on most of the scales. For example, on the scales dealing with the unit and with the simulation component, more than 90% of the students gave a rating at or above a "4". The high means found in the data on the simulation are consistent with student impressions of the overall unit since students spent most of the unit doing the simulation. Such high means are not easy to achieve on a narrow scale since many high scores are required to compensate for a single low score.

The reactions to the debriefing were not as positive. Student impressions of the educational value of the debriefing (mean = 4.1) were quite high. However, they rated their interest in the debriefing lessons at 3.8, a score that is considerably lower than their reaction to the simulation or to the unit. Lower scores on this measure were present in all groups. No matter what kind of debriefing lesson was given, student interest did not match that of the simulation itself. Given the game-like environment afforded by the simulation and the normal classroom environment in

which debriefing took place, this is understandable. It should be noted that, while interest in the debriefing was reduced, the actual ratings were still quite positive. The general "low" score on the interest measure appears noteworthy only because the students' interest in the unit and in the simulation were extraordinarily high.

Although no significant results were found in the MANCOVA analyses, it should be noted that the restricted nature of the 5-point scale that was employed may have resulted in a ceiling effect being present. This may have restricted the range of mean scores that were obtained from each group, thus influencing the level of significance that was obtained on the MANCOVAs. The absence of any significant difference between treatment groups, and the pattern of high scores that was obtained, suggests that the students gained their very positive impressions from the simulation activity. Although there was less interest in the debriefing, this was not sufficient to detract from the attractiveness of the prior activity.

Test of Assumptions for Analyses

On the basis of guidelines proposed by Tabachnick and Fidell (1983), questionnaire data were examined for evidence that any of the assumptions underlying the use of a MANCOVA had not been met. No datum was missing on any of the dependent variables and homogeneity of variance appeared to be present. Although sample sizes did vary, it was determined that this did not invalidate the use of MANCOVA, since sample sizes were large and two-tailed tests were employed. However, a number of extreme scores were found in the data dealing with the unit as a whole, five on the interest scale and five on the educational value scale. Trial analyses were done with and without transformed data and it was determined that these extreme scores did have an impact on the levels of probability that were obtained. For example, the probability levels associated with one F value were $p < .10$ with extreme scores included in the data instead of $p < .08$ with transformed scores. Accordingly the ten extreme scores were adjusted so that each fell within three standard deviations from the appropriate individual group's mean. This procedure was adopted from suggestions made by Tabachnick and Fidell. No evidence of any other violations of the assumptions was found.

Student Questionnaire: Most Important Thing Learned

Introduction

Students were asked to respond to the following question. "What did you learn from the unit? Complete the sentence below. The most important thing that I learned from this unit was that ...."

Results

Of the 280 students exposed to the simulation (Group 14 excluded), 265 identified one or more concepts, facts, or impressions that were gained from the simulation. A total of 300 comments were classified under five categories (some students provided multiple comments). The frequency of these comments is displayed in Table 33.

Table 33

Student Questionnaire: Most Important Things Learned

Comment Category	Frequency	Proportion
Insights into ...		
Harshness of Immigrant Life	159	53%
Historical Facts and Events	51	17%
The Galicians	30	10%
Life in General	30	10%
Simulation Details and Strategies	30	10%

Analysis

Harshness of immigrant life. A majority of comments were related to the harshness of life that Galicians (or immigrants in general) faced. Most of these comments focussed on life in Canada but a few also made reference to life in the homeland. Sample comments are shown below. (Note, student comments in this and in later sections have been edited for grammar and spelling.)

> It wasn't easy then, and if you were lazy, you wouldn't make it.
> It was very hard to succeed in Canada if you were an immigrant.
> It was very hard for the Galicians to live in a different country that had none of the same customs.
> It was not easy to be a Galician coming to Canada and it took a lot of hard work to be able to get what you wanted.
> Not all immigrants had a good time with lots of fun. I learned that many of them died and had a lot of very, very hard work.
> People in the 1900's had a very hard life, but the immigrants had a harder life.
> Settling in Canada in the early 1900's was not as much fun as I thought it would be. You had to do loads of work.
> It was not at all easy to survive back then. I thought it was easy to survive back then, but it's not.

Although the general harshness of life was the main focus for most, some students specifically mentioned the unfair treatment that Galicians received. These constituted 8% of the total categorized comments.

> The people made fun of them a lot.
> When Galicians came to Canada they were mistreated and cheated. Also, other Canadians always got the best things.
> It was very shocking to be called names like "Bohunk".

Twelve comments on the harshness of life made some comparison to life today.

> It was harder to live way back when it was pioneer days.
> They had to do a lot more work than we do now.
> It was very hard for people coming from Germany to cope with life. I see how lucky I am.
> It wasn't easy in those days and we should be grateful for what we have.

Only two comments made reference to the harshness of life that the Galician women had to face. This low number was somewhat surprising since, in the second role, students played the part of a Galician mother on her own. This was the most challenging, and potentially frustrating, role in the simulation. Also, references were made in the other roles to the large amount of homestead work that Galician women assumed. The paucity of comments in this area does not necessarily mean that students did not appreciate the part played by Galician wives. Rather, the students' appreciation of the hardships faced by the women may have been superseded by their impression of the harsh life faced by all members of the family.

Historical facts and events. While the harshness of living conditions was the focus of many students, a large number of comments (51) made reference to other aspects of Galician life. Some of these were very general in nature, for example simple acknowledgements that students had learned about the life of Galician settlers.

> I discovered how Galicians lived many years ago.
> It showed me how the Galicians settled in Canada.
> I learned a lot about how the Galician immigrants would have lived in Canada during the early 1900's.

Other students made more specific comments about aspects of settler lives, for example the trip to Canada, homestead tasks, types of work, etc.

> Now I understand how the Galicians got to Canada.
> How they lived and where they lived and how they cleared land.
> How they managed to live through the winter in a sod house, what kind of choices they made.
> I learned they could get really sick.
> That some immigrants moved back and some stayed in Canada.
> That money was worth a lot.

The Galicians. 10% of the comments focussed on the Galician settlers themselves, rather than on the life that they experienced. Students reported, for example, that they had learned about the character of the settlers.

> Galicians were hard workers.
> The Galicians were very trusting and could get cheated very easily.

A fairly large number of comments within this category however went beyond just reporting on some knowledge about the Galicians that had been gained. The tone of many comments indicated that the students had identified closely with the Galician settlers and had gained emotional awareness of immigrant life.

> How they felt when they were coming here.
> What the Galicians were feeling and what they went through.
> I know how Galicians feel when they have to leave their country.
> How difficult it would be to move away from your friends and family.
> How hard it would be to come to a country with no friends or anything.
> I learned how it feels to be an outsider and how hard life was for them.
> How it was to actually be in the place of an immigrant or immigrants. Before, all I knew was that some people came to Canada from all over the place.
> Galicians just feel like Canadians in another country and they definitely are not "bohunks" and should be treated just like other Canadian citizens.
> The most important thing that I learned was what it was like to be a Galician immigrant.

Life in general. In 19% of the comments, students reported that they had learned about life in general, for example about honesty, hard work, wise use of money, and treatment of other people.

> I learned that life really does go on like this and I learned lots from it.
> I learned how to use money wisely.
> I learned that you shouldn't trust everyone and to take care of your family.
> It is very hard to emigrate to a country where you don't know the language.
> You should not pick on people because they are a different kind of people.
> You should show kindness to others who live here and in other countries.
> Sometimes making sure you have lots of food and comfort is more important than money.
> It is hard to live alone and you have a very big responsibility to stay alive and help other people, and you're never always happy.
> It is not easy to support a family of 8 people and not every person in the world is nice.
> You have to work hard to get somewhere and you can't always make the best choice.
> You have to help each other to survive.

Simulation details and strategies. Not every student generalized about immigrant life, the Galicians, etc. In 10% of the cases, students focussed on the simulation itself and not on what it represented. Comments ranged from very specific reports on game "rules" to more general statements about strategy.

> You can't clear land in the winter or dig snakeroot.
> You must take it seriously or your family will die.
> You always need to be organized. In role 3 the father had to have high health or he would be sent back. You always need to read the screen.
> You have to pay attention in this game because if you don't you might mess up.
> You need to know how to plan and buy the right stuff so your family won't die.
> It won't help their health or spirit if you work them too hard or continue a job that hurts your health.

Student Questionnaire: Instructional Mode Preference

Introduction

Students were asked to select the mode of instruction that they preferred (normal or simulation) and then to explain why they answered the way that they did.

Results

Of the 280 students exposed to the simulation, 92% preferred learning social studies by simulation rather than by normal means (see Table 34). There were 278 students who explained their preference in a comment section. However, 14 of these did not actually answer the question (e.g., "Because that's the way i feel about it.") or provided an answer that could not be interpreted (e.g., "Because the game is about a simulation because it's talking about people."). From the answers of the other 264 students, 11 comment categories were identified. A total of 372 distinct thoughts were classified (some students identified more than one reason for liking the simulation). The frequency of these comments is displayed in Table 35.

Table 34

Student Questionnaire: Simulation Mode Preferences

		Pro Simulation Mode		Pro Normal Mode	
Group	n	#	%	#	%
1	51	49	96	2	4
12	47	47	100	0	0
13	36	33	92	3	8
123	36	30	83	6	17
124	28	24	86	4	14
1234	47	44	94	3	6
1432	35	31	89	4	11
All	280	258	92	22	8

Table 35

Student Questionnaire: Mode Preference Comments

Category	Frequency	Proportion
Motivational Effect	132	35%
Better Learning	48	13%
Experiential Education Benefits	39	10%
Attraction of Computers	39	10%
Control of One's Own Learning	29	8%
Novelty of the Experience	22	6%
Better Than the Alternative	22	6%
Explanations of Negative Responses	20	5%
Opportunity to Work with Others	11	3%
Challenge	9	2%
Unclassified Positive Responses	5	1%
Total	376	

Analysis

Over 90% of the students preferred the simulation to traditional instruction. The high percentage of students preferring the simulation mode is consistent with the students' rating of the unit as a whole. As noted earlier, the high interest scores resulted from over 90% of the students rating the unit at 4 or 5 on a scale of 5. The reasons why they preferred one mode over the other varied, but 11 categories of comments were identified. These are discussed below.

Motivational effect. Interpretation of the results on this question should be tempered by the fact that "normal" instruction had not really been explained and that students had just completed an activity that was predominantly gamelike in nature. Also, although the unit did extend over several weeks, a Hawthorne effect may have been present. It is understandable therefore that many comments from the students focussed on the simulation's motivational value--35% of the students'

comments described their preference for the simulation with words expressing "fun", "interest", or "enjoyment". If reference was made in general terms to traditional instruction, it was generally characterized as "boring". Sample comments are:

> Doing it this way was fun. It made me want to learn.
> It became exciting.
> It's WAY more interesting, definitely more interesting.
> It's easier to learn when having fun.
> I think it is much more exciting doing the simulation and I don't get tired of it very easily.
> It was fun and the normal way was boring. I'd like to play the role or simulation again.
> When you do the normal way, it is sort of boring. When you do it on the computer simulation, I was looking forward to it.
> It was different on the simulation because it wasn't like work. It was really fun. I always used to look forward to computer time.

Better learning. There were 13% of the students who rated the simulation positively because they felt that they had learned more from it or that learning was easier. Many of these comments were combined with expressions of higher interest/enjoyment as well. Some comments which focussed on the effect on learning are shown below.

> It helped me understand it better.
> It's easier to understand.
> Because if it was the normal way, it would be a bit harder.
> In the simulation you learn more about how immigrants were treated and how they acted.
> You can learn a lot more from the computer than from a book. Reading from a book for this is quite boring.
> Some children, when they copy off the board, they tend to forget. This way we can learn and also can have fun.

Experiential education benefits. Characterizations of the simulation as more interesting or better for learning were found in other responses as well. However, many students expanded on why they thought the simulation was more fun or easier to learn from. In such cases, their comments were categorized under a more specific heading. Thus, this section contains comments from students who explained, for example, that they learned better from the simulation or found it more fun, because they were able to pretend they were the Galicians. Other comments in this section represent students who expressed the advantages of experiential education in other ways, for example in terms of the realism of the experience or because they were able to identify with the characters.

> I felt like I was really that person so I got a better idea on it.
> You got to experience it yourself and you're more into it.
> It was fun because all these things could happen to you, it was so real.
> It let me feel the way the families felt.
> It makes me feel that I am a Galician going through good and bad times.
> You get to see what being poor really is.
> Instead of learning from the text books, it was me in the game.
> You really felt like you were there.
> It's better to be them instead of learn about them.
> It was like you were a different person and you lived a totally different life and there were lots of details that made the game fun.
> I find that social studies from a text book is much more boring and this way you were one of the people you were learning about. From a textbook you can only read it.
> It was a really good idea to pretend we were immigrants because we could see very clearly how hard it was for them.
> I don't think its fun to read about history. I liked it when I kind of got to be in history.

Attraction of computers. The reason that 10% of the students preferred the simulation was because it was on a computer. For these students, it appears that the simulation itself was not as appealing as the fact that it was on a computer. Two students expressed this quite simply. "I like playing on computers." "I liked it because it's on computer."

Control of one's own learning. Another apparent advantage to the simulation was that it gave students control of their own learning. This was not how the students expressed it themselves, describing instead the enjoyment they experienced in making decisions for themselves, working on their own, or being actively engaged in the learning experience.

> You got to make decisions.
> Because I like the idea of making my own decisions.
> It's fun because you have to make your choices.
> You would have to work out the problem yourself.
> This way you are doing it at your own pace, not the teacher's pace.
> Because you are going through it your way and you learn more by making mistakes.
> Because you got to play the game and you got to do something, but the normal way you mostly listen.
> I like the simulation better because you're really doing it for yourself and by yourself.
> It helps you make important decisions and get you ready for when you make decisions when you're older.

Novelty of the experience. There were 6% of the students who explained that they liked the simulation because it represented a novel experience.

> It was a fun change.
> I think that people should use different ways of learning.
> It intrigued me because I'd never seen anything like it.
> Some times, personally, I like a change in my work.
> Using books gets boring after four years, so I liked the simulation for a change.
> I like trying new things and this was one of my favourite ways of learning

Better than the alternative. For some, this style of instruction was attractive, not because of what the simulation provided, but rather because of what the students didn't have to do. The simulation altered the way that instruction normally was provided and there were aspects of that normal instruction that some students did not like. Approximately 6% of the students indicated that the absence of some unpopular activity was their main reason for liking the simulation. For example, 15 complaints about writing or notetaking in social studies classes were made while 9 objections to reading or working with books were expressed.

> Didn't have to do writing.
> We don't have to take notes that go on and on.
> I don't really like to write unless I have to.
> It's more fun than reading out of books and writing notes.
> It's boring that you sit in this desk and just read and read.
> When someone is just reading it out of the book you get very bored.
> With the textbooks and notebooks it's boring, because the teacher goes "we will read to page 12", and the class moans.
> Because in the normal lesson you read from a boring book and try to stay awake while you copy things off the board.

Opportunity to work with others. Eleven students preferred the simulation because of the benefits that were gained through working with a partner.

> You didn't just learn social studies but you also learned how to communicate with other people better.
> My partner and I had really talked about what house we were going to buy, and what food we were going to buy, etc.

Challenge. For a few students, it was the difficulty of the simulation that was attractive.

> It's much more fun than the normal way because you have to concentrate.
>
> It was hard and challenging.

Preference for traditional instruction. The most common reason cited by proponents of traditional instruction related to the difficulty of the simulation. Half of the 20 negative comments referred to the normal way of learning social studies as being easier. It should be noted however that these comments constituted less than 3% of all of the respondents to this question.

One other noteworthy pattern to these comments was that for almost every category of comments in favour of the simulation, there was at least one student who felt the opposite. For example, two students found the simulation to be boring after a while, one student disliked computers, one student disliked the realism reflected during the simulation, one liked the teacher doing the explaining, one disliked the social aspect of working with a partner, and two students liked the opportunity of working with books.

> The simulation doesn't explain as much as the normal way
>
> Because it's easier than the simulation. I understand it more.
>
> The game was boring a bit when you had to do role three a lot of times.
>
> Because I don't like computers and it was sort of boring to me.
>
> Because at the store I had problems and when I wasn't sure about something I wanted to read them and I couldn't read it because I didn't learn enough English.
>
> The teacher explains everything to you and it's easier to understand.
>
> Some partners go good together, but my partner was fussy.
>
> You get to read books and write on paper.

Teacher Questionnaire: The Simulation

Introduction

Eleven teachers responded to five questions about the simulation. These questions examined its motivational effect, its pedagogical effect, its attributes, its weaknesses, and the teacher's role during its play.

Motivational Effect

Teachers rated the students' interest in the simulation very highly, on the average at 4.8 on a scale of 5 (1 being very boring and 5 being very interesting). The mean student response to this question was 4.4. It should be noted that on this and other questions which were posed to both students and teachers, the differences in the format of the questionnaire may have had an impact on the responses. Students answered privately, in written format. Teacher responses were given in an oral interview format, directly to the designer of the program. As such, they may have felt pressured to give more positive comments than they might have anonymously.

Sample teacher comments are provided below. In these and other teacher comment sections, some editing has been done to improve the clarity of the message, for example by removing superfluous phrases such as "you know".

> They were intensely involved the whole time.
>
> There was never any question from the moment I mentioned computer simulation that they were dying to get into it and that level was sustained all the way through.
>
> For the most part, I think they found it good. They really liked it. There was one part where it got quite boring for them because it was too hard.

Educational Value

The teachers' ranking of the simulation's pedagogical potential was extremely high, 4.9 on a scale of 5. The mean student response to this question was 4.3.

> During the debriefing they brought up a lot of points that I didn't think they would have gotten--I was surprised. So I think that they did learn quite a bit out of it.
>
> It showed how difficult it was for the immigrants to come over and they ran into situations that had to be solved....in some cases, tragedy, death. No, it was really good, excellent.
>
> I'm going to say "5", and not because it's just that I think that the content is important, but because of the problem solving....They had to think before they acted....I would say that the problem solving is really good.
>
> I would give it a top rating because, although it's not a contemporary issue, it...can be applied to what's going on in Canada right now. It would be very easy to start from this point and look at different immigration problems in Canada, look at what country those immigrants are coming from, what they were faced with there, what they're faced with here. I see it as a really good educational tool.

Strengths of the Simulation

Teachers identified a wide range of strengths of the simulation, both in this question and in their explanations of the previous rankings. Many of their comments were similar to those given by students in their question on instructional mode preference. For example, the interaction between the partners was a strength for three of the teachers and the challenge of the experience was also mentioned positively three times. Two teachers thought it was good that students were able to put themselves in the shoes of the immigrants and identify with their experiences. Two other teachers commented upon the students being able to control their own pace, to manipulate the variables, and to make decisions. The novelty of the experience and the attraction of the computer also were noted. All of these were advantages identified by students as well.

However, teachers also identified additional areas of strength. The organization of the roles in a step by step progression and the need for students to develop and use problem solving skills during the course of the simulation were both mentioned frequently. Also mentioned several times were the benefits of addressing this topic, the fit of the content of the simulation to the curriculum, and the ease with which teachers could grasp the intent of the simulation and use it in the classroom.

> I thought that the kids were very interested in learning about these things and especially interested in being able to manipulate the variables and take an active role in the immigrant's life. They were able to make changes. I've never seen anything like it. The kids were very enthused, very motivated.
>
> I like the way it was organized, role 1, role 2, and then role 3 which was a culmination of both roles. I think the level of difficulty was very well structured, and the kids had no difficulties doing role 3 because the concept was well presented to them.
>
> Problem solving, it seemed to be really solid on the problem solving. They were talking about it, they were making a few mistakes, going back, checking it over. So I would put that very high.
>
> I think it gave them more of a flavour for what life was really like than just out of a textbook or me standing up there talking about it.
>
> I liked the fact that I didn't have to immerse myself in a whole thing about learning about computers before I could use it. If I can use it, I feel that any teacher could probably use it.

Weaknesses of the Simulation

The only common concern about the simulation was its complexity. Three teachers mentioned that parts of the simulation were too difficult for some of their students. An associated area was the concern by one teacher that some vocabulary had to be pretaught. She felt that it would have been helpful to have on-screen clarification of some words and concepts (e.g., what fertility is, what 1/100 of an acre represents). Other suggestions were to include graphics and animation, and to increase the ease of exiting.

> There was one major thing that we ran into a lot of trouble with during the demo and that was you couldn't get out of a game without going to the end of a month.
>
> I thought it might have gotten too complex for some of them.
>
> Well, the only thing I want to see more was more graphics, more animated things. The kids never mentioned anything about that, they were very satisfied with what they saw on the screen with their results. Probably because I'm visual, I'd like to see more images.

Role of the Teacher During the Simulation

Teachers were asked if they had felt uncomfortable in their role during the simulation, particularly in not being able to give students direct assistance. The reactions were fairly evenly split into three camps. About one third of the teachers admitted that they had found their somewhat passive role difficult to maintain. At times they had wanted to give specific help and direction. Another third of the group had felt some discomfort but they had recognized that the students would learn best if they had to work their way through their problems. The last group expressed little to no concern.

> I found it hard having to hold myself back all the time and step out of it, and say "Well, go back and explore some more", and stay so neutral and not become involved in it.
>
> I would rather have gone in and played with them because I enjoyed the simulation playing, actually doing it with them. And I felt that I was sort of cheating them too a little bit because I wasn't able to get in there. I think right now we're supposed to be helping guide children to discover answers for themselves, so I think that might have been OK. I'm trying to adjust my style to that but I definitely would be more specific.

> I didn't find it so hard if I saw that they were learning through the process. Some children, by nature, they're spontaneous, and very impulsive, and so when they're working on the computers, something may appear and they just don't put the 2 and 2 together, and it takes a long time for them to actually work through the process. And, sometimes you'd like to step in there and say, "Well, look. It's pretty obvious what the computer's trying to tell you." That I find difficult. But on the whole, letting them learn through the process is fine.
>
> I found it very hard on occasion to bite my tongue, but I could appreciate that that was the way it should go.

> No, it wasn't too bad. One little child asked-- the health of the baby was going down--was there anything they could do? And I felt their despair a little bit--you wanted to make it OK. So there were moments, but it wasn't unpleasant.
>
> Well, I rarely give answers anyway, I usually ask another question such as "What do you think?" or "How do you think you could solve the problem?"

Teacher Questionnaire: The Debriefing

Motivational Effect and Educational Value

Teachers rated the interest of the debriefing activities at 3.7 on a scale of 5. The mean student response to this question was 3.8. The pattern established by the students of rating the pedagogical value of debriefing activities higher than their inherent motivation was maintained by the teachers. Their pedagogical value of the debriefing was 3.9 (4.1 by the students).

Teacher ratings of the debriefing varied quite widely (scores ranged from 2 to 4.5 on these two questions). This is likely because the teachers delivered quite different debriefing activities. As such, the interpretive value of the mean scores is quite minimal. Some benefits may be derived however from a rough analysis of their comments.

The most positive ratings tended to be given by teachers whose debriefing consisted, in part or in its entirety, of analysis activities. There were three teachers who gave high scores on both of these questions. One of these teachers was in the experimental group that presented the full Kolb cycle of activities in its proper order. The other two teachers provided analysis activities only. The importance of this form of debriefing had been identified earlier in the quantitative results. Excerpted comments from these teachers are shown below.

> I found most of my students were very keen on discussing. Discussions were very heated and there was a lot of involvement.
>
> I think it was very, very good. The discussions changed a lot of kids' ideas about what they thought was right. For example, when we did the one about priorizing, there was a lot of changing sides into whether it was health or money. I think they learned a lot right then.
>
> I think that it made a big difference. When they came to do the tests, I would doubt whether they could have done as well without the debriefing.

Somewhat lower scores were given by the teachers who were involved in reflection, or reflection and application activities.

> It helped emotionally that they felt, "Oh yeah, somebody else went through that". There was some catharsis to that.
>
> I wasn't happy the way our debriefing went because I felt that I wanted to have more direct instructions to give to them so they could have a better chance to be successful.
>
> I think there could be more information offered.

However, the most interesting comments were expressed by the two teachers whose debriefing activities were given in reverse order to Kolb's cycle. Both of these teachers expressed concern, independently of each other, that the students showed no real interest in the debriefing after the first couple of periods. The students knew that they would not be playing the simulation again and this apparently reduced their motivation. Unfortunately, as an inducement to work harder, one teacher promised her students that they would be able to play the simulation again in the spring and they then buckled down to the task. The other teacher found that student interest continued to wane. He speculated that had they been given the opportunity of replaying the simulation, the students would have remained interested.

The incentive value associated with the application activity was reinforced by a comment from one of the teachers who had used the full Kolb cycle in the correct order. "They were really anxious to get back to the computers and play the game again after they had done all the debriefing." Although the quantitative results suggest that the interest in the debriefing were the same for both Group 1234 and Group 1432, the teachers' comments contradict these findings. It appears that the presence of the opportunity to replay the simulation may have had a large motivational effect. This effect might have been revealed by the quantitative data had the promise to replay the simulation not been made. The debriefing interest scores for the two classes in this group were quite different, 3.9 from the much larger, artificially motivated class and 2.7 from the smaller, correctly treated class. This 2.7 rating was more than 0.75 points below the next lowest class. It is not likely however, that this difference in motivation affected achievement or attitude scores. There was very little difference between the two classes in Group 1432 on either of those immediate post test measures.

Strengths of the Debriefing

Some of the previous comments demonstrate some of the strengths that teachers noted in the debriefing lessons, for example the opportunity for catharsis and the keenness of students to engage in discussions. Other benefits of the debriefing that were mentioned were: the opportunity for students to focus on the problems that they encountered and to draw everything together; the variety of activities provided; the opportunity for students to work in groups and to remember what had happened before moving into large group discussion; and, the logical and sequential presentation of the analysis.

Weaknesses of the Debriefing

The Kolb cycle. Teachers in the study had been given no insight into the model of learning on which the debriefing activities were based. However, a number of teachers who had been required to work with an incomplete Kolb cycle appeared to recognize intuitively the incorrectness of the activities that they were delivering. With regards to reflection for example, one teacher, whose debriefing package did not contain this activity, suggested that students be exposed to some activities in which they had to think about how their characters were feeling. Another teacher who had presented the debriefing in the incorrect order (i.e., reflection last) suggested that the last activities were a waste of time because the students had already talked about all of the events that had occurred to their characters.

Similarly, the importance of analysis activities was spotted by one teacher who was unhappy with the lack of opportunity his students had been given to learn more from the unit. He suggested the provision of a number of activities that were, in part, the analysis lessons that his class had missed. He wanted his students to examine, for example, how they could maintain their characters' spirits and how they could increase health.

With regards to the application activity, it has already been noted how the two teachers with the reverse order of activities had perceived the motivational benefits of being apply to apply what the students had learned from the other debriefing lessons. In addition, another teacher, who had delivered only analysis activities, suggested that students be given a chance to replay the simulation.

Extending the unit. A second theme that was found with a large number of the teachers was their desire to expand the unit and integrate it with other activities and other subject areas. They were not necessarily unhappy with the seat work and the discussions that formed the basis for the debriefing, but rather they wanted to see other modes used as well. Role playing and reflective writing, for example, were suggested. But, the major focus of these suggestions was not on changing the type of activity that was used but rather on integrating the unit with other subject areas. Art and language development were mentioned frequently.

> I would integrate the social studies aspect of it with language development and art....I've got Ukrainian art in mind and we have a Ukrainian dancer in the school who we could have brought in. All of that would have added to the interest of the whole topic and made debriefing even more interesting.
>
> I could have done some creating writing...from the point of view of the character they were, like how was the person feeling. We could have written letters. Then, art. We could have done oral presentation, it's actually endless what we could do.

Teacher preparedness. Finally, a number of teachers expressed discomfort with their own ability to conduct the debriefing lessons. Insufficient personal exposure to the simulation, and all of the events that were possible within it, left them feeling insecure about their ability to steer the discussions in the appropriate way.

> I felt that I was in deep water when I was doing the debriefing and I didn't know whether or not the program had or hadn't offered certain responses that the kids were giving me. I had played the role through a couple of times [but] I hadn't really explored all the roles so when they came up with answers, I couldn't say to myself "Is that right?" "Is that really what happened?"
>
> I felt that I wasn't prepared to make it as successful as it should have been....I wasn't as familiar with the simulation as perhaps I should have been and certainly, I would be much more prepared if I was going through it again.

Teacher Questionnaire: The Unit as a Whole

Motivational Effect and Educational Value

As would be expected from the results in the two previous sections on the simulation and the debriefing, teachers generally rated the unit as a whole very highly. Mean scores were 4.5 for interest and 4.8 for educational value. Student means were 4.3 on both scales. Two teacher comments are provided to illustrate the general opinion about the unit.

> There wasn't one time when I said, "Right, it's socials", that I didn't get "Oh great! Socials!". They were excited all the time.
>
> I'm going to give it a really high ranking. There are some students who were less enthused but I know that they were the ones who didn't seem to have learned as much. However, their little bit of reluctance was sort of swept along by the other, great group of kids who were just so keen to do this--so keen that they wanted you to market this game so that they could have a copy at home, or could I lend them the disk to take home, or could I lend them a disk so that they could show it to their buddy in the next class. When kids want to do this on their recreational time at home, to my mind, it's way up there.... I think it appealed more to the majority of students because it was challenging, and that the ones who were having the struggle were the ones who were the less enthused because it was difficult, which is normal.

Immigration Concepts

Teachers were asked to identify the most important concepts, dealing with immigration, that students stood to gain from the unit. A large majority of responses focused on the empathy and understanding that students gained about the difficulties that the immigrants faced and how hard they had to work. Some also commented about the value of students learning about what Canada was like back then (e.g., that prejudice did exist) so as to be able to understand Canada better today. Teachers also felt that a benefit to the unit was the insight that was gained into the different values that another culture can bring to a country.

> I think some empathy and understanding for the tremendous task that was in front of these people when they arrived and how very difficult it was for them to succeed and how strong emotionally and physically they had to be and how they really forged our country....I think the children are greatly impressed with what maybe some of their ancestors did that they hadn't even thought about.
>
> I think the overall difficulties the immigrants faced when they arrived, the hardships they had to face and overcome, and in some cases, didn't overcome very well. I think it presented...a good picture of what life must have been really like and I think it also presented some different values. I think of the idea of the forests and the trees as being so valuable to them at that time and not realizing the hardships it would create. So we had some introduction of different cultures which is a real strength.
>
> The thing that pleased me the most...was that they realized that those people were working hard and making an effort and how hard they had to work in order to make it in Canada. And I thought that all you have to do is transfer that learning to the next time that you meet a new Canadian and this will all be worth it.

Indirect Benefits

Teachers were asked to identify any indirect benefits that the unit promoted. The most common response focussed on social skills. It appears that students generally worked well together, shared the decision making, and practiced cooperative learning skills. This was important for many teachers, especially for a few who indicated that their classes were not particularly adept in this area. Improvements in general learning strategies were mentioned by a few teachers as well. One commented that it was valuable for students to realize that they could learn social studies in a different way. Several teachers liked the way that the simulation forced the students to slow down, to organize their thoughts, to plan ahead, and to evaluate what had occurred. They were not penalized for making mistakes but could instead learn from them.

> The most important concept that I think they learned was that to stop, evaluate before proceeding.
>
> I liked the amount of discussion it stimulated in the computer lab for a class who doesn't like to talk to each other very much....They are an unusual group--I can't get them to say anything, and that was one situation where they were bubbling, and I liked that aspect.
>
> They were always very thoughtful with each other...in working with partners, so they always made sure that they took their turns....They learned to be patient, because some times you just can't rush along....They started slowing down, reading the screen more, because they were more involved. And also, they had discussed the problems more. They sat down, they made decisions, like in role 3. Giving them all those decisions to make I think made them more confident, gave them greater independence, and allowed them to make mistakes, but learning through their mistake that they were making better decisions. I don't think that we can do that otherwise. I mean this simulation really gave us that opportunity which I wouldn't be able to do in my class otherwise.

Advice to Other Teachers

The last question in the interview asked teachers to suggest advice that could be given to other teachers thinking of doing the unit. Three teachers recommended without any qualifications that other teachers should use the unit. Three others recommended the unit but suggested that teachers should be sure to become familiar with it before beginning. Suggestions were also made to integrate the unit more effectively, for example by leading up to it properly and following up afterwards.

> Become familiar enough with the unit so that the debriefing session has more meaning.
>
> I would just say trust that it is very well laid out and that it will carry you through and don't spend a lot of time worrying--enjoy it.
>
> I've never had a piece of software this successful with the class. I mean, they do word processing, and I think a lot of teachers and principals at the elementary school level have seen that as the sole role of the computer lab is to teach word processing. After a while, my gosh, you've got to think of something else to do. And when you get a piece of software like this and see how successful the computer can be in...social studies or whatever, it's really exciting. Now I have to convince the principal that we can spend money on software not just on word processing.

CHAPTER 6: CONCLUSIONS

Summary of the Findings

Student Achievement

Five research questions related to student achievement were examined. These examined the effect on student achievement of: the instructional unit, the debriefing in general, specific debriefing activities, and the order of the debriefing activities. Also examined was the relationship between student gender and achievement.

There was very strong evidence that students learned from the unit. Every experimental group which had been exposed to the unit scored significantly higher ($p < .001$) on the achievement exam than the nil exposure control group.

In general, the debriefing activities had a positive effect on student learning. In most cases, experimental groups which received various debriefing activities scored higher on the achievement exam than the non-debriefed control group which participated in simulation activities only. In most cases, their superiority was at a very significant level ($p < .001$) and was maintained over a one month period.

Examination of specific debriefing activities revealed that every group which received analysis activities achieved significantly higher scores ($p < .001$ generally) on both of the immediate and retention post achievement exams than other experimental groups. Reflection activity findings were inconclusive. Although there were some indications that reflection may have been effective, no overall trend supporting this activity could be discerned. No evidence was found that the third debriefing activity, application, had any effect on the achievement scores.

There was no evidence that the sequencing of the debriefing activities had any effect on student learning. It should be noted, however, that the investigation into this research question was quite limited.

There was no evidence that there was any relationship between student gender and achievement in the unit.

It should be noted that differences in student achievement may have been related to the time that students were exposed to the materials. Time on task did vary from one group to another. This issue will be addressed later in this chapter.

Student Attitudes Towards Galicians

Five research questions related to student attitudes towards Galicians were examined. These examined the possible effect on this measure of: the unit itself, the debriefing in general, the specific debriefing activities, and the order of the debriefing. Also examined was the relationship between student gender and attitude.

Again, there was strong evidence that the unit had an effect. Every experimental group which had been exposed to the unit scored significantly higher ($p < .001$) on the attitude survey than the nil exposure control group.

No evidence was found that debriefing activities had an effect on the attitudes of the students. This lack of effect was present in both testing periods, with all types and sequences of debriefing, as well as with both genders. These results suggest that the significant changes in attitude that were evident were produced through the students' interaction with the simulation.

Student Activities During Simulation Play

Student activities during simulation play were classified within six categories of involvement/uninvolvement. An extensive set of observations provided a broad, general picture of student behaviour. Several patterns were apparent, the most important being the extremely high degree of student involvement that was present. On the average, students engaged in some form of simulation activity 98.5% of the sampled time. This high involvement was found consistently, with each group, no matter what role was played, whether it was during the first or second day of play, or whether it was in the first half or in the second half of each period.

The main type of student involvement was simulation play. However, a substantial amount of discussion within each group also took place. Interaction with other groups, or with the teacher, was very limited and quite short in duration.

Some variations within the different types of involvement were discernible. For example, students generally engaged in less discussion and more play in the first role than in later roles. Similarly, the ratio of simulation play to group discussion varied somewhat by play day or by period half. However, this was likely a reflection of the characteristics of the simulation being played.

Opinions about the Instructional Unit

Three general issues about the learning unit were examined through student questionnaires and teacher interviews. The interest and educational value of the unit and its component parts were rated on 5-point scales while the unit's strengths and weaknesses were obtained through open-ended questions. Some care has to be taken in interpreting the teacher opinions since these were not obtained anonymously.

Interest in the instructional unit. Students were highly interested in the unit as a whole and in the simulation although their reaction to the debriefing was less enthusiastic, but still positive. A similar pattern was found with the teacher responses, namely very high interest accorded to the unit and the simulation, and a positive but lower rating for the debriefing.

Analysis of the ratings suggest that the unit was equally interesting to both genders. Furthermore, there was no relationship between the type of experimental treatment (the debriefing lessons) and student interest. High interest in the simulation apparently formed the basis for the positive impressions of the unit as a whole, no matter what or how many debriefing activities were provided. The lack of significant difference between the ratings of the experimental groups suggest that all forms of debriefing were perceived to be of equal interest.

Educational value of the instructional unit. Students considered the unit and both of its components to be of high educational value. All ratings were above 4.0/5, with the assessment of the debriefing just slightly below the other two. The teachers' responses followed the same pattern.

Statistical analyses of these ratings revealed a similar pattern to that found with the interest scales. The unit was perceived to be equally valuable by both genders. Furthermore, students' appreciation for the unit was not influenced by the type of debriefing given to the classes. The high rating of the simulation apparently formed the basis for the positive impressions of the unit as a whole, no matter what or how many debriefing activities were provided. The lack of significant difference between the ratings of the experimental groups suggest that all forms of debriefing were perceived to be of equal value.

Strengths and weaknesses of the instructional unit. Students and teachers provided their impressions of the unit's strengths and weaknesses through their responses to a number of questions. For example, students overwhelmingly favoured the simulation to learning by normal means. Their most common explanation for this preference was that the simulation was more interesting. However, the pedagogical benefits of the simulation also were identified by many students, for example by those citing such advantages as easier learning, better understanding through identification with the characters, and increased realism from experiencing the events themselves.

Very favourable impressions were also gained when the students identified what they had learned from the unit since 90% of them were able to generalize beyond the simulation itself, identifying such benefits as appreciation for the harshness of immigrant life, increased knowledge of historical facts and events, insight into the character of the Galician immigrants, and additional perceptions of life in general as it applied to them. Teachers perceived similar strengths, but in addition, discussed such pedagogical benefits as the unit's ties to the curriculum and its problem solving focus.

The most common concern about the unit from both students and teachers was the complexity of the simulation. However, this complaint was infrequent and was counterbalanced somewhat by comments from both groups praising the challenge afforded by the experience. It was difficult to discern common elements in the teachers' comments about the debriefing activities since their opinions were based on different experiences. However, it was interesting to note that some made suggestions for improvement that were parallel in intent to the elements of Kolb's cycle that had been left out of their treatment.

A particular area of interest was the teachers' degree of comfort with the low key role that they had to assume during simulation play. Approximately one-third of the teachers indicated that they had found it difficult to avoid giving students direct assistance during simulation play. The remainder, however, either had been comfortable with this role or had been able to assume it without undue difficulty.

Group 14

As noted at the end of Chapter 4, Group 14 was found to have significantly lower reading skills than all other groups in the study and consequently, their data had to be considered apart from the main sample. (See Appendix Q for a summary and discussion of their results). Some differences between the results from this group and the data from the main sample were noted, but since it was impossible to determine if these were a result of the debriefing activity to which the group had been exposed, or a consequence of the unique nature of the group, interpretations of these differences must be considered very cautiously.

Students in Group 14 did achieve a significant amount of learning and attitude change, as evidenced by the superiority of their test scores over the nil exposure control group. However, their achievements in these areas were significantly less than those found with the other experimental groups. The students' lower ability may have played a major role in the reduced growth, but the possible effect of an apparently unsuccessful form of debriefing must also be considered.

The levels of involvement of Group 14 in the simulation were consistent with the high rates established by the main sample. No major departures from the pattern of observations described earlier were observed.

Relatively high scores on the interest and educational value scales were found for Group 14. The ratings, as well as the pattern of scores, were comparable to those obtained from the main sample for the unit as a whole, the simulation, and the debriefing. Similarly, the qualitative data that had been collected (e.g., strengths and weaknesses of the unit) followed the same pattern as with the main sample. These results suggest that the students' motivation towards the activity, their active involvement, and their perceptions of what they had gained from the unit, were relatively comparable to those from the main group. The results further suggest that the simulation mode was equally appealing and rewarding to students of all abilities. Lower ability students in this study may not have achieved the same amount of success as higher ability students, but their interest levels did not appear to have been factors in this lesser degree of achievement.

Implications

Implications for Researchers

The results from this study could have serious implications for simulation researchers. Although there has been tacit agreement that debriefing simulations is important, acknowledgement of that value has neither been verified by research nor has it been translated into common research practice.

However, the results from this study provide evidence that simulation debriefing is effective in increasing student achievement. Students who were exposed to debriefing generally scored significantly higher than students who only played the simulation. In light of this new evidence, much of the previous simulation research should be re-examined. Results from that body of research have generally been inconclusive and/or disappointing. However, since students in those studies generally only played the simulation and did not engage in any debriefing, the amount of student learning that was achieved likely was less than what was possible. The disappointing and inconclusive results from previous research, particularly comparisons of the simulation to some other mode of instruction, are understandable in light of the possibility that researchers may not have utilized the full potential of the simulation mode. The simulation may be more powerful than suggested by previous research.

Implications for Theorists

One of the purposes of this study was to examine the applicability of Kolb's model to educational simulations. Clearly, forming any conclusions on the applicability of a general model of learning from the results of a single study is not appropriate. The effectiveness of the model may have been influenced by the type of simulation used in the study, the design of the data collection instruments, the form of activities applied, and the age/ability of the students. Many more studies would have to be done, with different simulations, students, instruments, etc., before a clear picture of the appropriateness of the model could emerge. However, this line of inquiry is considered to be promising because both the presence and the absence of significant findings in this particular study can be explained in terms of the model and the specific conditions under which it was applied.

Reflection. Since this activity was found to have had only marginal effect on learning in this study, one might question why reflection was not as effective as Kolb's model suggests it would be. Theorists (e.g., Thatcher, 1986; Jamieson et al., 1988) have contended that reflecting on experiences and feelings is necessary to provide all students with a common base of experience and to release emotions that may obstruct learning. However, it is possible that the study's design eliminated the need for a reflective debriefing activity. For example, it is possible that reflection was not needed to establish a common base of experience since the students had ample exposure to all facets of the simulation before debriefing was initiated.

An analysis of the results on each of the achievement exam questions provides some support for this possibility. For example, as part of the achievement test, students had to list four factors associated with a good homestead as well as five types of jobs away from the homestead. The length of the lists, and the relative obscurity of some of the answers should have made these questions relatively difficult to answer. However, every experimental group answered these questions extremely accurately, for example the groups' mean scores on the job question ranged from 94% to 99% correct. It is possible that all of the students had been exposed to the simulation so many times that they were able to answer some difficult test questions quite easily, without needing to share their experiences with other students in a reflection activity.

Similarly, the length of exposure to the simulation can explain why reflection was not needed to provide emotional release. Students had sufficient opportunity to talk about the simulation informally that, by the time the reflection activity occurred in their classroom (several weeks after the first exposure), no strong emotions remained. The problem students faced was likely not so much in releasing their emotions as it was in remembering what emotions had been felt. It is possible that if the simulation had been shorter, and if the debriefing had followed immediately after simulation play, reflection may have been necessary and may have had an effect on the DVs as a result. Thus, in summary, the extensive exposure to the simulation, while necessary to enable the students to play the most complex role, may have had the unintended consequence of reducing the effect of the reflection activity.

Analysis. This debriefing stage was extremely valuable in increasing student achievement. However, the simulation used in the study was quite complex--there were many variables to understand and many interrelationships to discover. For students to succeed, attempts at the simulation had to be carefully planned and analysed. Since this is difficult for many students of this age, the value of teacher assistance, in the form of debriefing, is increased accordingly. If the simulation had been less complex, or if the simulation had been used with older students, the value of teacher-lead analysis activities might have been far less. Moreover, if a different type of simulation had been used in the study, for example one that focussed more on the affective domain, the analysis activity might not have had the same effect.

Application. As suggested earlier, the removal of several study groups, each incorporating application exercises within their procedures, may have contributed to the lack of evidence supporting this debriefing activity. In addition, the apparent unimportance of the application activity may have resulted from a research design decision. A number of different application activities had been contemplated. For example, consideration was given to having student transfer the concepts underlying Ukrainian immigration to a study of a contemporary immigrant group. However, this idea was dropped because sufficient control of the necessary variables (e.g., prior student knowledge of the targeted immigrant group) was doubtful. Also, it would have been difficult to design an activity that all teachers could deliver with comparable effectiveness without making their work load or need for inservice unmanageable. Instead, the application activity that was ultimately adopted used simulation replay since student and teacher variables were more controllable.

However, the narrowness of this activity may have limited the potential growth from this stage of debriefing. Given the number of previous plays of the simulation, students may have already learned as much as could be expected from the simulation itself. Perhaps replaying the simulation was ineffective because there was relatively little more that could be gained. On the other hand, it is likely that a lot more could have been learned if the focus of the activity had been broadened beyond the simulated experience. In effect, the application activity in the study could have been ineffective because it did not make use of the full potential of Kolb's fourth stage.

Sequence of debriefing activities. In this study, there were no significant differences in achievement when the sequence of learning experiences, as suggested by Kolb's model, was varied. There are several plausible explanations. The limited nature of this investigation has already been mentioned. This aspect of the study was based on the data from Group 1432 and more groups of this kind would have been valuable. Moreover, the research design considerations noted above may also have had an effect. For example, Group 1432 received its debriefing in reverse order; however, since the need to reflect may have been eliminated by the extensive exposure to the simulation, there would be little difference if that activity came first or last. Similarly, if students had already achieved as much as could be gained from playing the simulation, the value of further play would be minimal no matter when it was delivered. In effect, since the value of both of the reflection and application activities may have been reduced by factors related to the design of the study, the value of the sequence in which they were arranged should also have been reduced.

Attitude development. Exposure to the simulation was sufficient to promote growth in this area but there was no apparent effect from any debriefing activity. A number of explanations can be suggested. As explained earlier, the need for debriefing may have been reduced by factors related to the design of the study. For example, the extensive exposure to the simulation may have eliminated any gains that might have resulted from a shorter exposure followed by a debriefing activity.

Factors related to the simulation may have played a part. For example, the experiences in the simulation that could contribute to attitude change may have been presented so clearly and forcefully that student growth was achieved by simulation play alone. It is possible that no further growth was achievable because students had already clearly appreciated the implications of the events in the simulation. However, if students had had a different simulation, one in which they hadn't understood what had happened to their characters, debriefing might have been necessary to help the students understand the implications of the characters' experiences.

The lack of effect of debriefing on attitude change may also have stemmed from the type of debriefing activities that were designed for the study. For example, seat work and large group discussion were the two forms of debriefing activity chosen for

this study and the focus of these activities was, by and large, cognitive in nature. Perhaps, an effect on attitude could have been found if the debriefing activities had been designed to involve the students more emotionally and less cognitively. For example, the use of a role play activity to act out what had happened to the family, or the completion of a journal reporting the presumed emotional reactions of characters to simulation events could have served as reflection activities. These might have resulted in different effects on the achievement and/or attitude measures.

Formal versus informal debriefing. Although attempts were made in this study to prepare separate learning activities based on each of Kolb's four learning modes, in fact, lines of demarcation between the modes may be difficult to establish in actual classroom practice. For example, in performing a formal, analytical exercise (e.g., determining the best job), students might also engage in unplanned, informal reflection (e.g., sharing different job experiences). Or, as part of an assigned application activity (replay), the students could decide on their own to reconsider the merits of particular jobs (an analysis activity). Thus, it is possible that a debriefing activity, designed for a particular learning mode, could also stimulate learning activity in another mode. In instructional practice, the borders between Kolb's four modes of learning may be quite vague.

Related to this problem of isolating the impact of specific learning activities is the virtual impossibility of restricting student debriefing to the formal, planned, learning activities that were delivered by the teacher. Students very likely also engaged in informal, unplanned debriefing activities, such as comparing experiences or sharing strategies after the class was over.

Thus, it is likely that the formal, planned debriefing activities were accompanied by informal, unplanned debriefing activities. As such, it is probable that the debriefing that occurred in this study was not restricted to the set of formal learning activities, nor was it practically possible to establish the clear demarcations between the learning modes that are implied in the theoretical model.

Appropriateness of the model. As indicated earlier, Kolb's model is only partly supported by the data from this research, although explanations for the lack of support can be suggested. The inconclusive results may have been due to the lengthy period of play (impact on reflection) or the type of learning activities chosen to represent various stages (e.g., simulation replay). These, in turn, could explain the negligible differences found when varying the sequence of activities.

However, there is another explanation for the limited support for Kolb's model. Consideration must be given to the possibility that the model is inappropriate to explain the way in which children were engaged in the learning task. Lack of support for the model is suggested by two elements of the study.

First, although Kolb claimed that the highest level of learning is achieved when all four learning modes are engaged, this contention was not supported by the data in this study. Not only did the reflection and active experimentation stages not contribute significantly to achievement, but neither was the sequencing of these activities important. In addition, no effect was found on the attitude measure from any of the three debriefing stages. As such, it is possible that the hierarchical approach inherent in Kolb's model may not be appropriate for all learning experiences. All four stages may not be required to produce the highest level of learning, nor may it be necessary always to present them in the sequence suggested by the model.

Second, consideration also should be given to the impact that such factors as the nature of the task and the ability of the learner might have on the application of the model in classroom situations. In Chartier's (1972) study, sophisticated students were able to learn successfully from a simple simulation without being exposed to learning activities beyond the first stage of Kolb's model (simulation play alone). In this study as well, observational data suggest that students were able to achieve success in the first role of the simulation (a relatively easy task) without having to engage in formal reflection, analysis, or application activities. These results raise the question of whether Kolb's model is appropriate across all levels of task complexity and for all ability ranges.

Further research is needed to examine the relationships between different types of learning tasks, various task complexities, ranges of student ability, and the presence and sequence of instructional activities representing Kolb's learning model.

Implications for Practitioners

Simulation practitioners. Results from this study reinforce the claims that many practitioners have made previously about the value of simulations in the classroom (as summarized in Chapter 2). For example, the results support the contention that a simulation can be effective in promoting achievement and attitude change over an extended period of time. Furthermore, the data collected during the study and upon its completion provide evidence that students of both genders and of varying abilities can be highly motivated by the experience and that both teachers and students perceive the simulation to be interesting and educational.

Potential disadvantages to the simulation mode were also summarized in Chapter 2, but these were not reflected in the data collected from students and teachers. However, it should be noted that the nature of the study may have promoted a biased, positive viewpoint. There was little opportunity for teachers to become unhappy since most of the preparatory work involved in designing a simulation unit was done for them--for example, acquiring a usable simulation, identifying objectives, planning a unit, designing lesson plans, creating exams, etc. In addition, potential problems during the delivery of the unit were greatly reduced since the logistics of equipment provision, the elimination of software problems, and the evaluation of tests were all done for them. Thus, it could be argued that teachers were very positive about simulations because they had been exposed to their benefits without having to deal with many of their inherent difficulties.

Debriefing practitioners. The results from this study reinforce the support for the value of debriefing, as summarized earlier in the literature review. Since students who received debriefing did show significantly increased achievement, this study provides a rebuttal to Chartier's (1972) and Livingstone's (1973) findings that debriefing had no effect on learning.

However, care should be taken to avoid indiscriminate statements about the need for debriefing or the form that it should take. As outlined below, debriefing may not always be necessary. Furthermore, since its value can be affected by different factors, the optimal debriefing activity may vary from one simulation to another.

As noted in Chapter 2, a number of debriefing models have been proposed. This research was based on Kolb's (1984) model and, as noted earlier, encouraging results were obtained. However, since commonalities were found between Kolb's general model and the sequences of debriefing activities proposed by simulation practitioners such as Jaques (1985), Stadsklev (1974), and van Ments (1989), these other models are also promising. The results from a single study can not prove or disprove the validity of any particular model--this particular research used one type of simulation, a single grade of student, and a particular sequence of learning activities. What the results of this study do suggest however, is that a model of debriefing should be sufficiently general in nature to permit the design of debriefing activities that fit varying needs and purposes. The debriefing activity that is needed for one simulation experience may be different from the debriefing activity needed for another. As described below, the model should provide for flexibility in creating various sequences based on the impact of a number of variables.

1. Hunt (1987) considered the most important characteristic of Kolb's model to be its emphasis on the primacy of direct experience, an emphasis that finds support in the educational use of simulations. It is suggested that the potential value of a simulation-based activity is tied very directly to the value of the simulation itself. Debriefing can help to fulfill that potential, but since it draws from the experiences of the direct experience, it cannot create something from nothing. Thus the potential value of the debriefing is limited by the value of the simulation itself.

A number of factors can affect the quality of the direct experience. For example, the simulation should be relevant, well designed, and it should provide a beneficial and valuable educational experience. As noted in Chapter 2, research conducted by McKenzie and Padilla (1984), Okey and Oliver (1987), Shaw and Okey (1985), and Waugh (1986) likely suffered from reliance on simulations with limited value. However, the presence of a quality simulation is not sufficient. The simulation must also be used within the classroom in such a way that learning can take place. Insufficient exposure to the experience or inadequate involvement by the students, for example, can reduce or eliminate the potential learning, as was likely the case in research conducted by Birkenholtz et al. (1989), Kinzer et al. (1989), McKenzie and Padilla (1984), and Shaw and Okey (1985).

2. The planning for an effective debriefing activity should take into account the complexity of the concepts presented in the simulation, and the clarity with which they can be understood by the students. A simulation that is overly simple, in relation to the target audience's abilities, will require a different amount of debriefing than a simulation which leaves the students perplexed. For example, Chartier (1972) found debriefing to be inconsequential in his study. That conclusion was likely quite valid since his very capable students had been exposed to a very simple simulation. It is likely that they had no need for debriefing since they were able to achieve the learning objectives of the experience through exposure to the simulation alone.

3. The design of a sequence of debriefing activities should take into account the nature and intent of the simulation that has been used. A simulation which has been designed primarily to help students identify with the characters in the simulation may need a preponderance of reflection activities to help them appreciate the impact of events on the characters. Or, a simulation that is very complex in nature may require an emphasis on analytical activities so that students can grasp the relationships inherent in the simulation. Finally, a simulation that is relatively simple to understand, but which has been intended to stimulate students to think beyond the confines of the simulated experience, may need an emphasis on application activities to achieve the learning objectives.

4. The selection of specific debriefing activities may also depend upon the nature and intent of the simulation. A cognitively oriented simulation may be debriefed best by cognitively oriented activities, such as work sheets and group discussions that focus on interrelationships, priorities, strategies, etc. However, a simulation with an emphasis in the affective domain may still require reflection, analysis, and application activities, but these might need to be structured in such a way as to emphasize the feelings of the characters.

5. The design of an effective debriefing should take into account other factors as well, not just the type of simulation that was used. To illustrate, the amount of exposure that students are given to the simulation may increase or decrease the need for certain debriefing activities. Reflection activities, for example, may be extremely important if students have had insufficient time to thoroughly explore the simulation on their own. The intensity of this exposure can also have an effect. If the

entire unit has been presented in a very condensed time frame, there may be an increased need for reflection activities to release generated emotions. However, if the unit has been presented over an extended time period, it is possible that informal debriefing by the students themselves will have provided for that cathartic effect.

6. As with any learning activity, the design and selection of debriefing sequences and activities should take into consideration the characteristics of the student users. For example, the results from this study suggest that lower ability students can be highly enthused about the simulation mode and can learn from the activity. However, to maximize their learning, it may be necessary to provide them with a different debriefing than would be used with more able students. Woodward et al. (1988) suggested that structured instruction in how to play a simulation was successful with mildly handicapped students. The same strategy may be useful in designing post-simulation activities. A finer, simple-to-complex sequence of debriefing activities, additional activities, or more structure to the activities could all be tried.

Limitations of the Study

In planning this research, attempts were made to overcome specific design weaknesses that had been perceived in simulation studies conducted by previous researchers (as noted in the parentheses below). The primacy of the concrete experience was recognized and priority was giving to exposing students to a sound simulation experience. A true simulation activity was used (McKenzie & Padilla, 1984; Shaw & Okey, 1985) which had learning potential (Sibley, 1984) and which had sufficient complexity to require debriefing (Chartier, 1972). Plans were made to verify that the simulation had been effective in promoting student growth (Okey and Oliver, 1987; Waugh, 1986). Also, care was taken that the learning was enabled by ensuring students had sufficient exposure to the materials (Birkenholtz et al., 1980), and sufficient interaction with them (Kinzer et al. 1989; Shaw and Okey, 1985). Notwithstanding these efforts, it is recognized that this research may have had a number of potential weaknesses that could have affected the validity of the findings.

Threats to Internal Validity (as discussed by Cates, 1985)

Selection Interaction. The most serious threat to internal validity in this study is the possibility that groups were influenced by a non-treatment variable. As reported in Table 2, the groups differed not only by treatment, but also by the length of time that they were exposed to the instructional materials. It can be argued that the significant differences in group scores that were found may not have been related to the treatment itself but rather were related to the length of time that students were exposed to the learning materials. Examination of the Protected *t* Test results (Tables 17 and 18) reveals that generally, where significance was found between two groups, the superior group did have a longer exposure to the materials.

This hypothesis was examined statistically through two ANCOVA analyses, one with the results of the immediate post achievement test serving as DV and the other with the data from the immediate post attitude survey as DV. Based on exposure to the materials, there were six groups in the study, namely Groups 6, 16, 17, 19, 20, and 22 (the group number = the number of days of exposure). In the analyses, the length of exposure and student gender served as the IVs while scores on the reading test were used as the covariate.

The analyses revealed significant relationships between length of exposure and achievement ($F = 51.31$, $df = 5, 291$, $p < .001$) and between length of exposure and attitude ($F = 18.25$, $df = 5, 291$, $p < .001$). No significant relationship was found between gender and either of the DVs, nor was there any significant interaction between IVs. These results are displayed in Tables 37 and 38, Appendix P.

Protected *t* tests were applied to both DVs to determine which lengths of exposure were significantly different. On the attitude survey, significance was found between Group 6 (exposure to testing only) and every experimental group (#'s 16, 17, 19, 20, and 22). Within the experimental groups, there was support for the contention that groups which had been exposed to the unit for longer periods of time developed more positive attitudes. Four intergroup comparisons were significant and, in each case, the group with the longer exposure was superior.

However, the degree of exposure was not consistently related to more positive attitudes. Large differences in exposure were associated with significantly

more positive attitudes with Group 22 versus Group 17 and with Group 20 versus Group 16 but not with Group 22 versus Group 16. Similarly, medium differences were related to significantly more positive attitudes with Group 20 versus Group 22, but not with Group 17 versus Group 19 or with Group 19 versus Group 22. Finally, small differences in exposure that were related significantly to positive attitudes with Group 20 versus Group 19 were not related significantly with Group 16 versus Group 17. These results are displayed in Table 39, Appendix P.

Similar results were found in the analysis of the achievement data. Every experimental group achieved considerably higher than the nil exposure control group (Group 6). Moreover, within the experimental groups, five intergroup relationships were significant and, in each case, the group with the longer exposure had superior achievement. However, no consistent pattern was found. Large differences in exposure were associated with significantly higher achievement in one case (e.g., Group 16 vs. Group 22) but not in another (e.g., Group 17 vs. Group 22). Smaller differences in exposure were related to significantly higher achievement in some cases (e.g., Group 17 vs. Group 20, Group 19 vs. Group 20), but not in others (e.g., Group 16 vs. Group 19, Group 16 vs. Group 17).

The contrast between the pattern of results from the analyses of debriefing groups and the pattern of results from the analyses of exposure groups is revealing. Consider the analyses by debriefing activity. First, a pattern of significance was identified that could be related to certain levels of the IV. Second, insomuch as the analysis activity had an effect whenever it was present, results were consistent. Third, when significance was not found, plausible explanations for this absence could be put forward. On the other hand, when the findings were analysed by exposure time, no pattern of relationships associated with certain levels of the IV could be identified. Significant relationships were found inconsistently and did not appear to be related to the magnitude of the differences in exposure time. Occasionally, significant differences on the DVs were associated with groups with similar exposure times and occasionally they were associated with dissimilar exposures. The presence of such inconsistent results, and the absence of a plausible explanation for these vagaries, suggest that exposure time was not a major factor in promoting student learning and attitude growth in this study.

Experimental mortality. The next most serious threat to internal validity in this study was experimental mortality. As shown earlier in Table 6, due to absences during the testing periods, 30 students (8% of the sample) were dropped from the study. The question has to be raised whether the loss of these students had an effect on the results of the study.

It is suggested that the effect of this attrition should have been ameliorated by the large size of the overall sample and the reasonably large numbers in each group. Furthermore, there is no indication that there was a consistent pattern to the losses. The reading scores of the deleted students, for example, were wide ranging (36-75) and they fell below the mean score of the main sample about as often as they fell above (45%-55%). The number of weak, deleted students (i.e., those who scored more than one standard deviation below the test mean) was exactly the same as the number of strong, deleted students (5). It may have been possible that the loss of students had an impact on certain groups, particularly since some groups lost more students than other groups. However, since most of the statistical results of the study were extremely significant, and since the conclusions were based on the presence of a pattern of findings and not on isolated comparisons, this attrition should not have had a major impact on the validity of the conclusions that were drawn.

The loss of entire classes and groups may have been more serious. For example, the loss of groups 14 and 13[illegible] prevented a number of analyses from being completed, particularly in regards to the value of the application activity. Different conclusions might have been reached if these two groups had been retained. The loss of one class from Group 0 and one class from Group 124 meant that reliance had to be placed on the results from the remaining classes. This increased the likelihood of external invalidity, such as a single class not being representative of the population. Also, there was further opportunity for the expertise of the teacher to have an effect on group results when the group consisted of only one class.

Neither of these problems was likely with the control group. The teachers in these classes delivered no instruction, for example. Also, examination of the test results that were available from both control classes showed no notable differences between them, particularly if they were considered in relation to the scores from the other groups. The mean scores of the control classes were 30.3 and 30.7 on the

immediate post attitude test, and 7.0 and 8.4 on the immediate post achievement test. The results of the experimental groups on these two measures were all much higher, averaging 36.5 and 17.6. The control class that remained is considered to be representative of the original control group.

The equivalence of the two classes in Group 124 could not be determined since reliable test results from both classes were not available. The results from that group might have been different if it had not been necessary to drop one of the classes. As such, the conclusions about the value of the application activity, and the reflection activity as well, could have been affected.

Differential selection. As discussed earlier, a problem of differential selection appears to have been encountered since one of the groups was found to be significantly different from the others. Group 14's scores on the reading measure were found to be significantly different from all other groups in the study and the data from this group were considered separately as a consequence. A number of measures had been taken to reduce the threat of this kind of invalidity, including random assignment, the inclusion of two classes in each group, and the use of covariance. However, other sources of invalidity were not eliminated. For example, intact groups were used. Classes were not selected randomly but were drawn instead from schools which possessed certain hardware resources. Random assignment was generally used but not with the second class from a school.

Threats to External Validity (as discussed by Cates, 1985)

Measurement of the dependent variables. The most likely threat to external validity stems from the instruments used to measure the DVs. As noted in Chapter 2, the results from their meta analysis of simulation studies prompted Dekkers and Donatti (1981) to suggest that developer bias was a concern in those studies that had used developer-made instrumentation. Their concern may be applicable in this case as well since most of the data collection measures employed were designed specifically for this study. For example, potential limitations of the

student activity instrument have already been noted-- the absence of a measure of intensity, the difficulties in collecting and categorizing some data, the artificial nature to the data on teacher behaviour, and the reliance on sampled behaviour.

Concerns also can be raised about the other developer-made instruments. For example, two achievement test questions were frequently misinterpreted. Question 1, Part 1, asked the students to identify what the Galicians did not like about life in their homeland. Approximately 13% of the students listed problems in Canada that the Galicians faced. Question 3, Part 2, identified three job factors and asked which of these was the most important. Approximately 18% of the students discussed the desirability of all three of these elements. (Discriminant Function Analyses were conducted to determine if there were any relationships between the group of students misinterpreting these questions and their reading test scores. Canonical correlations of .08 and .10 suggest that they were not related.)

Some achievement test questions were found to have been very effective in demonstrating the value of debriefing. For example, the question about Galician reaction to working underground (Part 1, #8) was answered particularly well by classes exposed to reflection (generally in the 80%-100% range) and particularly poorly by classes which hadn't had that activity (generally in the 12%-22% range). Although that degree of dichotomy was rare, its presence raises the question of what kind of results would have been obtained if the test had consisted of a few more questions with that level of discrimination. Might reflection then have proven to be a very significant activity, for example?

The student questionnaire is also open to concern. Student responses on the interest and educational value scales were very high and analysis revealed that these positive responses were not changed significantly by debriefing. However, that apparent stability may have been a function of a ceiling effect related to the narrow 5-point scale that was employed. Perhaps different results would have been obtained if a 7-point scale had been used since this would have given more room for students to show varying degrees of interest.

The previous comments are not intended to suggest that the design of the instruments was so poor that all conclusions must be subject to doubt. The potential for developer bias and/or error in creating these instruments must be recognized.

However, it is thought that, in general, the different measures were designed reasonably effectively. For example, the presence of true/false and multiple choice questions raises the possibility that student guessing could have affected the accuracy of the results. However, there were four multiple choice questions which also required students to explain their answers. On two of the questions, only 2% and 3% of the students getting the right answer demonstrated no understanding of the concepts. There may have been a lot of guessing on the third question since 18% of those getting it right were unable to explain the concepts. However, the fourth question had only 5% inaccuracy. (It should be noted that in the third and fourth questions, a large amount of the guessing originated from the nil exposure control group.) While some guessing undoubtedly took place on all exams, the analysis of these four questions suggests that test items were likely quite effective in separating those who knew the answer from those who did not.

Experimenter effect. Since the use of different instructors in the study had the potential to influence the results, efforts were made to minimize this effect. According to Kinzer et al. (1989), research studies have shown that instructor variables are largely mitigated by training in implementation procedures. As noted earlier, an inservice component was part of the study procedures. Furthermore, all groups of students were taught similarly. Specific learning activities were established for each group and detailed lessons plans were provided to teachers. These included student worksheets, outlines of chalkboard notes, and sequences of discussion questions. In addition, in most cases, groups consisted of two classes in order to minimize the impact of the individual teacher.

However, differences between the teachers certainly remained, for example in their previous exposure to computers, their comfort with the research study, and their teaching skills. Also, although teachers were not given information on the contents of the tests, it is possible that some direct teaching of the concepts and/or some variations from the lesson plans may have taken place during the debriefing. Observations of these lessons were not made and, as a result, the degree of consistency with which teachers followed the lesson plans cannot be confirmed.

Opportunity existed for a second type of experimenter effect to be present.

As noted earlier, the debriefing lessons for one of the classes in the study (Class 1234b) were provided by the researcher and not the classroom teacher. It is possible that since the researcher was much more familiar with the simulation and the debriefing lessons than the other instructors, this particular class may have received better instruction and could have scored higher on the achievement tests as a result.

If this effect had been present, it would have been most visible in the analytical section of the achievement test since that mode of debriefing has been shown to have had the most influence on learning. To investigate this possibility, class 1234b's scores on the 10 analysis questions in the achievement test were compared to the other seven classes in the study which had received those types of debriefing lessons. As can be seen in Table 36, class 1234b's scores on these questions ranked all the way from first to eighth and averaged fourth out of the eight classes receiving the analysis lessons. This suggests that no noteworthy advantage appears to have been given to class 1234b by their instructor's familiarity with the simulation and/or the specific debriefing lessons.

It is also possible that class 1234b could have received inequal treatment if the experimenter had gone beyond the lesson plans and inadvertently had provided the students with additional insight into the test questions. This was possible since the experimenter had advance knowledge of the test questions that was not shared by the other instructors.

If this effect had been present, it would have been most visible in the last part of the achievement exam. This contained the hardest questions and no class had received direct instruction of any kind for the questions in this section. To investigate this possibility, class 1234b's scores on the last nine questions in the test were compared to the other experimental classes in the study. As can be seen in Table 36 however, the scores from class 1234b ranked all the way from 1st to 13th and averaged 6th out of the 13 experimental classes in the study. This sixth place ranking is entirely consistent with the placement that would be expected from the type of debriefing lessons that this class received--they were one of eight classes to have received the most effective lessons. No noteworthy advantage appears to have been given to class 1234b by their instructor's advance knowledge of the test items.

Table 36
Rankings Achieved by Experimenter Taught Class

Analysis Questions	Ranking / 8	Hardest Questions	Ranking /13
1	4	1	2
2	3	2	12
3	5	3	8
4	2	4	3
5	8	5	13
6	3	6	6
7	1	7	3
8	3	8	4
9	6	9	1
10	4		
Mean	4/8	Mean	6/13

Population validity. Although students were drawn from both rural and urban schools, they may not be typical of other students in other locales. Also, they represented a very limited age range. The conclusions reached in this study may not be applicable for students outside of this range.

Hawthorne and novelty effects. It can be argued that these effects had minimal impact since little special attention was given to the students and the duration of the study should have reduced any potential effect from the novelty of the materials. However, 6% of the students did indicate that they liked the simulation because it was different. A further 10% of the students liked the simulation because it was on a computer. As such, there is evidence that the novelty provided by the simulation and/or the computer had some influence. Some caution in generalizing from the results should be exercised.

Post test sensitization. It was anticipated that the one month interval between testing was sufficient to minimize any effect from students taking the initial set of tests. If students had shared insights after the immediate post achievement exam, it is likely that these would have been forgotten before the retention post test. However, it is possible that the test experience itself may have promoted learning, for example through the thinking that was stimulated by the application questions. Again, the one month interval should have minimized this effect. Although there was nothing to suggest that learning had taken place between exams, the potential for the questions posed in the exam to have had an effect on learning should be noted.

Interaction of history and treatment effects. This study took place during a time of tension and threats to world peace stemming from Iraq's invasion of Kuwait. The students' awareness of these events could have been sufficient to affect their attitudes towards the Iraqi people in general. It is not likely that any transfer of this would have taken place to Galicians or to Canadian immigrants in general; however, since times of war can bring about xenophobia, the potential of this source of invalidity being present should be mentioned.

Future Research

Although the value of debriefing activities in increasing achievement has been suggested by the results of this study, further research is needed to confirm this basic hypothesis. Further studies are also needed to examine the appropriateness of Kolb's model of learning when used as a structure for debriefing. That model has to be tested under many different conditions before a reasonably accurate assessment of its value with educational simulations can be obtained. On a more general level, the overall question of how debriefing activities can be made more effective could be pursued. Other debriefing models can be examined, different strategies of structuring debriefing activities and integrating them with simulation play can be explored, and various classroom techniques can be considered. Examples of these research avenues are discussed briefly below.

With the same simulation. Many different studies could be initiated to pursue questions raised in this research. For instance, variations could be incorporated into procedures and materials to determine if the same pattern of results was obtained under different conditions. Older students could be used, a wider focus on the application of concepts could be developed, less exposure to the simulation could be tried, a different covariate could be employed, debriefing activities could be developed that required equal exposure time, and improved data collection instruments could be utilized.

The sequencing of debriefing could be examined further. This study utilized an entire series of exposures to a simulation followed by an entire series of debriefing activities. If these two sequences were integrated, would the same pattern of results be obtained?

Investigations into the appropriateness of various debriefing activities with different abilities of students could be conducted. For example, one could investigate if the achievement of weaker students (or stronger students) was influenced by different types and sequences of debriefing. One research thrust could build off the work of Woodward et al. (1988) and Rivers and Vockell (1987) who had explored the use of structured/guided instruction in simulation play to increase learning. The same technique might be applicable for debriefing.

With different simulations. Parallel studies could be conducted with different simulations to determine the effect of the different debriefing stages and the effect of different debriefing activities. For example, is the value of analytical debriefing activities consistently found with all types of simulations? Does the value of reflection vary by type of simulation? Are some debriefing activities (e.g., group discussion) more effective with certain kinds of simulations? Various simulations could be examined which ranged in complexity or length of play, for example.

Along the same vein, further investigations could be conducted into the value of debriefing for attitude growth. Different types of simulations could be tried. Different types of debriefing activities, within the same model, could be investigated, for example reflection activities that focussed students onto the characters' feelings rather than simulation events.

Different debriefing models could be examined and compared. Many different models have been proposed. Are they generally effective? In terms of student achievement, how do they compare with Kolb's? Do they work better or worse with different students, different types of simulations, etc.?

With different DVs. Any of the above suggestions could incorporate different dependent variables and/or data collection measures. For example, instead of collecting general information on student activity during simulation play, one or two groups of students could be closely observed. Intensive interviews could be conducted with students to determine what they had learned, for example immediately after the unit, one month later, and one year later.

More focus could be placed on the teachers. What kinds of debriefing activities would they structure if left to their own devices, for example with no awareness of a model? Would their debriefing activities fall within the general outlines of Kolb's model? What kind of debriefing activities would they design if they had had previous exposure to a model? Would they develop unique activities?

REFERENCES

Alder, D. D., Lindhardt, S., Robertson, J., Star, H. R., Baxter, D. V. C., & Christensen, K. (1974). Strategies for increasing student interest: Visual literacy, structured debriefing, direct experience, and simulation. The History Teacher, 7(3), 343-355.

Alessi, S. M., & Troilip, S. R. (1985). Computer-based instruction: Methods and development. Englewood Cliffs, NJ: Prentice-Hall.

Atkinson, G., & Murrell, P. H. (1988). Kolb's experiential learning theory: A meta model for career exploration. Journal of Counseling and Development, 66, 374-377.

Bacon, W. N. Jr., & Newkirk, M. G. (1974). Uses of simulation in teaching history. Contemporary Education, 46(1), 38-41.

Birkenholtz, R. J., Stewart, B. R., McCaskey, M. J., Ogle, T. D., & Linhardt, R. E. (1989). Using microcomputers in education: Assessment of three teaching strategies. Journal of Agricultural Education, 30(1), 51-59.

Bjur, W. (1977). So you want to try a simulation game? Here are "getting underway" suggestions. Simulation/Gaming, 4(2), 4-6.

Bottinelli, C. A. (1980). Energy and environmental quality games and simulations: An evaluation. In R. H. Horn & A. Cleaves (Eds.), The guide to simulations/games for education and training (4th ed.) (pp. 86-97). Beverly Hills, CA: Sage.

Bredemeier, M., & Greenblat, C. S. (1981). The educational effectiveness of simulation games: A synthesis of findings. Simulation and Games, 12, 307-332.

Brenner, J., & Nichols, D. (1981). 4-H/UOAC Adventure Ropes Course: Leader's Handbook. San Francisco, CA: University of California, Cooperative Extension Department and Urban Outdoor Adventure Center. (ERIC Document Reproduction Service No. 255 528)

Brownell, G. (1987). Computers and teaching. St. Paul, MN: West.

Budin, H., Kendall, D. S., & Lengel, J. (1986). Using computers in social studies. New York, NY: Teachers College Press.

Bullough, R. V. , Sr., & Beatty, L. F. (1991). Classroom applications of microcomputers. New York, NY: Macmillan.

Burt, C. W., & Geis, G. L. (1986, April). Guidelines for development testing: Proposed and practiced. Paper presented at the annual meeting of the American Educational Research Association, San Francisco, CA. (ERIC Document Reproduction Service No. 270 500)

Butler, J. T. (1983). Games and simulations in the community college classroom. Unpublished document. (ERIC Document Reproduction Service No. ED 251 161)

Butler, R. J., Markulis, P. M., & Strong, D. R. (1988). Where are we: An analysis of the methods and focus of the research on simulation gaming. Simulation and Games, 19, 3-26.

Cates, W. M., (1985). A practical guide to educational research. Englewood Cliffs, NJ.: Prentice-Hall.

Chapman, K. (1973). Guidelines for using a social simulation game. Boulder, CO: ERIC Clearinghouse for Social Studies/Social Science Education. (Eric Document Reproduction Service No. ED 085 292)

Chapman, K., Davis, J. E., & Meier, A. (1974). Simulation/games in social studies: What do we know? Boulder, CO: ERIC Clearinghouse for Social Studies/Social Science Education. (ERIC Document Reproduction Service No. ED 093 736)

Chartier, M. R. (1972). Learning effect: An experimental study of a simulation game and instrumented discussion. Simulation and Games, 3, 203-218.

Cherryholmes, C. H. (1966). Some current research on effectiveness of educational simulations: Implications for alternate strategies. The American Behavioral Scientist, 10(2), 4-7.

Choi, B., & Gennaro, E. (1987). The effectiveness of using computer simulated experiments on junior high students' understanding of the volume displacement concept. Journal of Research in Science Teaching, 24, 539-552.

Claxton, C. S., & Murrell, P. H. (1987). Learning styles: Implications for improving educational practices. ASHE-ERIC Higher Education Report No. 4. Washington, D.C.: Association for the Study of Higher Education.

Clements, D. H. (1985). Computers in early and primary education. Englewood Cliffs, NJ: Prentice-Hall.

Coburn, P., Kelman, P., Roberts, N., Snyder, T. F. F., Watt, D., & Weiner, C. (1985). Practical guide to computers in education (2nd edition). Reading, MA: Addison-Wesley.

Coleman, J. S., Livingstone, S. A., Fennessey, G. M., Edwards, K. J., & Kidder, S. J. (1973). The Hopkins games program: Conclusions from seven years of research. Educational Researcher, 2(8), 3-7.

Cowles, K. J., & Hauser, R. E. (1977). Humanistic debriefing: Its importance and its methodology. Simgames, 4(2), 2-4.

Cox, D. A., & Berger, C. F. (1985). The importance of group size in the use of problem solving skills on a microcomputer. Journal of Educational Computing Research, 1, 459-468.

Cruickshank, D. R., & Telfer, R. (1980). Classroom games and simulations. Theory into Practice, 19 (1), 75-80.

Dekkers, J., & Donatti, S. (1981). The integration of research studies on the use of simulation as an instructional strategy. Journal of Educational Research, 74(6), 424-427.

Dervin, B., & Clark, K. (1987). ASQ: Asking significant questions. Alternative tools for information need and accountability assessments for libraries. Belmont, CA: Peninsula Library System. (ERIC Document Reproduction Service No. 286 519)

Dorn, D. S. (1989). Simulation games: One more tool on the pedagogical shelf. Teaching Sociology, 17, 1-19.

Ellman, N. (1977). Before the simulation fails: Avoiding potential pitfalls. Social Studies, 68, 251-253.

Feldman, R. S. (1983, April). In defense of children's lies: On ethics and methods of studying children's communication of deception. Paper presented at the annual meeting of the American Educational Research Association, Montreal. (ERIC Document Reproduction Service No. ED 230 285)

Fennessey, G. M. (1973). Guidelines for writing the director's manual for a simulation game. (Report No. 152). Baltimore, MD: John Hopkins University, Center for the Study of Social Organization of Schools. (ERIC Document Reproduction Service No. ED 084 314)

Fletcher J. L. (1971). The effectiveness of simulation games as learning environments: A proposed program of research. Simulation and Games, 2, 425-454.

Foster, J. L., Lachman, A. C., & Mason, R. M. (1980). Verstehen, cognition, and the impact of political simulations: It is not as simple as it seems. Simulation and Games, 11, 223-241.

Fowler, S. M. (1986). Intercultural simulation games: Removing cultural blinders. In L. H. Lewis (Ed.), Experiential and simulation techniques for teaching adults. New Directions for Continuing Education, 30, (pp. 71-81). San Francisco: Josey Bass.

Garson, G. D. (1985). Computer simulation in social science. Raleigh, NC: North Carolina State University. (Eric Document Reproduction Service No. ED 269 283)

Garson, G. D. (1987). Academic microcomputing: A resource guide. Newbury Park, CA: Sage.

Gentry, J. W. (1980). Group size and attitudes toward the simulation experience. Simulation and Games, 11, 451-460.

Gillespie, J. A. (1973). Designing simulation/games in social studies. The game doesn't end with winning. Viewpoint, 49(6), 21-27.

Gillis, H. L. (1985, July). An active adventure for groups. Paper presented at the Georgia School Counselors Institute, St. Simons Island, GA. (ERIC Document Reproduction Service No. ED 260 879)

Gokhale, A. A. (1989, June). To investigate the effectiveness of computer simulation versus laboratory experience, and the sequencing of instruction, in teaching logic circuits. Dissertation Abstracts International, 51(1), 96A.

Grabe, M. (1985). Evaluating the educational value of microcomputers. In S. Harlow, (Ed.), Humanistic perspectives on computers in the schools (pp. 35-44). New York: The Haworth Press.

Gray, B. (1988, June). Enhancing learning through debriefing. The Computer Teacher, 15(9), 19-21.

Green, V. A., & Nicol, J. M. (1985). Explorations: Teacher book grade 5. Vancouver: Douglas & McIntyre.

Greenblat, C. S., & Baily, J. G. (1980). Sex role games and simulations: An evaluation. In R. H. Horn & A. Cleaves (Eds.), The guide to simulations/games for education and training (4th ed.) (pp. 239-247). Beverly Hills, CA: Sage.

Greenblat, C. S., & Duke, R. D. (1981). Principles and practices of gaming-simulation. Beverly Hills, CA: Sage Publications.

Greenblat, C. S., & Uretsky, M. (1977). Simulation in social science. American Behavioral Scientist, 20, 411-426.

Harry, L. (1967). Using simulation games in the classroom. (Report No. 44). Baltimore, MD: John Hopkins University, Center for the Study of Social Organization of Schools. (ERIC Document Reproduction Service No. ED 031 767)

Hasell, M. J. (1980). Urban gaming simulations: An evaluation. In R. H. Horn & A. Cleaves (Eds.), The guide to simulations/games for education and training (4th ed.) (pp. 286-303). Beverly Hills, CA: Sage.

Heyman, M. (1975). After the post-game, the post, post-game discussion? Simulation/Gaming/News, 2(1), 25-26.

Hunt, D. E. (1987). Beginning with ourselves: In practice, theory, and human affairs. Cambridge, MA: Brookline Books.

Jackson, M. W. (1979). An antipodean evaluation of simulation in teaching. Simulation and Games, 10, 99-138.

Jamieson, I., Miller, A., & Watts, A. G. (1988). Mirrors of work: Work simulations in schools. London: Falmer Press.

Jaques, D. (1974). The academic game: A simulation of policy-making in a university for 8 to 20 players. London: London University. (ERIC Document Reproduction Service No. ED 157 471)

Jaques, D, (1985). Debriefing debriefing. In M. van Ments and K. Hearnden (Eds.), Perspectives on gaming and simulation 10: Effective use of games & simulation (pp. 57-65). Loughborough England: SAGSET.

Johnson, D. W., & Johnson, R. T. (1974). Instructional goal structure: Cooperative, competitive or individualistic? Review of Educational Research, 44, 213-240.

Johnson, R. T., Johnson, D. W., & Stanne, M. B. (1985). Effects of co-operative, competitive and individualistic goal structures on computer-assisted instruction. Journal of Educational Psychology, 77, 668-677.

Johnson, R. T., Johnson, D. W., & Stanne, M. B. (1986). Comparison of computer-assisted cooperative, competitive, and individualistic learning. American Educational Research Journal, 23, 382-392.

Jones, K. (1987). Simulations: A handbook for teachers and trainers (2nd ed.). London: Kogan Page.

Kaplan, A. (1964). The conduct of inquiry. Scranton, PA: Chandler.

Kaufman, D. (1983). A computer-based instructional system for distance education. Proceedings of the Fourth Canadian Symposium on Instructional Technology (pp. 232-238). Winnipeg: National Research Council.

Kidder, S. J., & Guthrie, J. (1972). Training effects of a behaviour modification game. Simulation and Games, 3, 17-28.

Kinzer, C. K., Sherwood, R. D., & Loofbourrow, M. C. (1989). Simulation software vs. expository text: A comparison of retention across two instructional tools. Reading Research and Instruction, 28(2), 41-49.

Kolb, D. A. (1984). Experiential Learning: Experience as the source of learning and development. Englewood Cliffs, NJ: Prentice-Hall.

Kolb, D. A. (1985). Learning style inventory. Boston: McBer.

Kolb, D. A., & Lewis, L. H. (1986, June). Facilitating experiential learning: Observations and reflections. In L. H. Lewis (Ed.), Experiential and simulation techniques for teaching adults. New Directions for Continuing Education, 30, (pp. 99-107). San Francisco: Josey Bass.

Kreps, G. L., & Lederman, L. C. (1985). Using the case method in organizational communication education: Developing students' insight, knowledge, and creativity through experience-based learning and systematic debriefing. Communication Education, 34, 358-364.

Lavalle, R., Stoffel, S., & Wade, B. (1982). Search is an emergency: A field co-ordinator's guide for managing the search function. Tacoma, WA: Emergency Response Institute. (ERIC Document Reproduction Service No. ED 243 614)

Lederman, L. C. (1984). Debriefing: A critical reexamination of the postexperience analytic process with implications for its effective use. Simulation and Games, 15, 415-431.

Livingstone, S. A. (1973) Simulation games in the classroom: How important is the post-game discussion? Baltimore, MD: John Hopkins University, Center for the Study of Social Organization of Schools. (Eric Document Reproduction Service No. ED 083 324)

Lockard, J., Abrams, P. D., & Many, W. A. (1987). Microcomputers for educators. Boston: Little, Brown and Company.

Mandell, C. J., & Mandell, S. L. (1989). Computers in education today. St. Paul, MN: West.

Marks, G. H. (1982). Computer simulations in science teaching: An introduction. Journal of Computers in Mathematics and Science Teaching, 1(4),18-20.

McCarthy, B. (1980). The 4MAT system: Teaching to learning styles with right/left mode techniques. Oak Brook, IL: Excel.

McCarthy, B. (1985, April). What 4mat training teaches us about staff development. Educational Leadership, 42(7), 61-68.

McKenzie, D. L., & Padilla, M. J. (1984, April). Effects of laboratory activities and written simulations on the acquisition of graphing skills by eighth grade students. Paper presented at the annual meeting of the National Association for Research in Science Teaching, New Orleans. (ERIC Document Reproduction Service No. ED 244 780)

Miller, A. (1988). Who would like to share their experiences?: Debriefing and experiential learning. In D. Saunders, A. Coote, and D. Crookall (Eds.), Perspectives on gaming and simulation 13: Learning from experience through games and simulations (pp. 23-34). Loughborough England: SAGSET.

Moriah, D. M. (1984, Fall). Chicken gizzards and screams in the night: The making of a successful simulation. Journal of Experiential Education, 7(3), 37-39.

Norton, P., & Resta, V. (1986). Investigating the impact of computer instruction on elementary students' reading achievement. Educational Technology, 26(3), 35-41.

Okey, J. R., & Oliver, R. G. (1987, April). Learning from computer simulations. Paper presented at the annual meeting of the National Association for Research in Science Teaching, Washington, DC. (ERIC Document Reproduction Service No. ED 282 753)

Pate, G. S., & Mateja, J. A. (1979). Retention: The real power of simulation/gaming. Journal of Experiential Learning and Simulation, 1, 195-202.

Pearson, M., & Smith, D. (1985). Debriefing in experience-based learning. In D. Boud, R. Keogh, & D. Walker (Eds.), Reflection: Turning experience into learning (pp. 69-84). London: Kogan Page.

Pearson, M., & Smith, D. (1986, Dec.). Debriefing in experience-based learning. Simulation/Games for Learning, 16(4), 155-172.

Pierfy, D. A. (1977). Comparative simulation game research: Stumbling blocks or stepping stones. Simulation and Games, 8, 255-268.

Plummer, C. M. (1980). Future games and simulation: An evaluation. In R. H. Horn & A. Cleaves (Eds.), The guide to simulation/games for education and training (4th ed.) (pp. 108-131). Beverly Hills, CA: Sage.

Raths, J. (1987, October). Enhancing understanding through debriefing. Educational Leadership, 45(2), 24-27.

Reid, N. (1980). Simulation techniques in secondary education. Simulation and Games, 11(1), 107-120.

Reiser, R. A., & Gerlach, V. S. (1977). Research on simulation games in education: A critical analysis. Educational Technology, 17(12), 13-18.

Rivers, R. H., & Vockell, E. (1987). Computer simulations to stimulate scientific problem solving. Journal of Research in Science Teaching, 24, 403-415.

Roberts, N (1976). Simulation gaming: A critical review. (ERIC Document Reproduction Service No. ED 137 165)

Ross, R. G. (1987, March). Managing the site visit: Communication issues and strategies for the internship director. Paper presented at the conference of the Minnesota Association for Field Experience Learning, Minneapolis, MN. (ERIC Document Reproduction Service No. ED 291 116)

Ruben, B. D. (1980). Communication games and simulations: An evaluation. In R. H. Horn & A. Cleaves (Eds.), The guide to simulation/games for education and training (4th ed.) (pp. 11-25). Beverly Hills, CA: Sage.

Ruben, B. D., & Lederman, L. C. (1982). Instructional simulation gaming: Validity, reliability, and utility. Simulation and Games, 13, 233-244.

Rude, R. T. (1986). Teaching reading using microcomputers. Englewood Cliffs, New Jersey: Prentice-Hall.

Schuncke, G. M. (1978). Action approaches to learning. Social Studies, 69, 212-217.

Shaw, E. L., & Okey, J. R. (1985, April). Effects of microcomputer simulations on achievement and attitudes of middle school students. Paper presented at the annual meeting of the National Association for Research in Science Teaching, French Lick, IN. (ERIC Document Reproduction Service No. ED 255 389)

Sherwood, R. D., & Hasselbring, T. (1984). A comparison of student achievement across three methods of presentation of a computer-based science simulation (Technical Report Series, Report No. 84.1.5). Nashville, TN: George Peabody College for Teachers, Learning Technology Center. (ERIC Document Reproduction Service No. ED 262 750)

Sia, A. P., & Sydnor, D., (1987, February). Promoting excellence: Some classroom evaluation alternatives. Paper presented at the annual meeting of the Association of Teacher Educators, Houston, TX. (ERIC Document Reproduction Service No. ED 278 631)

Sibley, W. A. (1974). The effect of simulation games on attitudes of sixth graders towards the environment. Dissertation Abstracts International, 35(04), 2075A-2076A.

Smith, P. (1986, January). Instructional simulation: Research, theory and a case study. Paper presented at the annual convention of the Association for Educational Communications and Technology, Las Vegas. (ERIC Document Reproduction Service No. ED 267793)

Smith, S. S., & Richardson, D. (1983). Amelioration of deception and harm in psychological research: The important role of debriefing. Journal of Personality and Social Psychology, 44, 1075-1082.

Stadsklev, R. (1974). Handbook of simulation gaming in social education (Part 1: Textbook). University of Alabama, Institute of Higher Education Research and Services.

Stice, J. E. (1987). Using Kolb's learning cycle to improve student learning. Engineering Education, 77, 291-296.

Stumpf, S. A., & Freedman, R. D. (1981). The Learning Style Inventory: Still less than meets the eye. Academy of Management Review, 6, 297-299.

Sugarman, L. (1985). Kolb's model of experiential learning: Touchstone for trainers, students, counselors, and clients. Journal of Counseling and Development, 64, 264-268.

Svinicki, M. D., & Dixon, N. M. (1987). The Kolb model modified for classroom activities. College Teaching, 35, 141-146.

Tabachnick, B. G., & Fidell, L. S. (1983). Using multivariate statistics. New York: Harper & Row.

Tapsfield, A. (1984). Primarily Geography. In D. Watson (Ed.), Exploring geography with microcomputers (pp. 105-116). London: Council for Educational Technology.

Thames, W. R. (1979). The game is the least important thing. Social Studies, 70, 122-124.

Thatcher, D. (1986). Promoting learning through games and simulations. Simulation/Games for Learning, 16, 144-154.

Trowbridge, D., & Durnin, R. (1984). Results from an investigation of groups working at the computer. Irvine, CA: University of California, Educational Technology Center. (ERIC Document Reproduction Service No. ED 238 724)

Turner, T. N. (1982). Simulation games are for younger learners too. Social Studies, 73, 130-134.

Twelker, P. A. (1972). Some reflections on instructional simulation and gaming. Simulations and Games, 3, 147-153.

van Ments, M. (1989). The effective use of role-play: A handbook for teachers and trainers. London: Kogan Page.

VanSickle, R. L. (1978). Designing simulation games to teach decision-making skills. Simulation and Games, 9 , 413-428.

Walford, R. (1985). Simulation: After the honeymoon - what next? In M. van Ments and K. Hearnden (Eds.), Perspectives on gaming and simulation 10: Effective use of games & simulation (pp. 19-23). Loughborough, England: SAGSET.

Wassermann, S., & Ivany, J. W. G. (1988). Teaching elementary science: Who's afraid of spiders? New York: Harper & Row.

Waugh, M. L. (1986). The effect of teacher involvement on student performance in a computer based science simulation. In W. C. Ryan (Ed.), Proceedings NECC'86: National Educational Computing Conference pp. 52-55). Eugene, OR: International Council on Computers in Education.

Willis, J., Hovey, L., & Hovey, K. G. (1987). Computer simulations: A source book to learning in an electronic environment. New York: Garland.

Wilson, D. K. (1986). An investigation of the properties of Kolb's Learning Style Inventory. Leadership and Organization Development Journal, 7(3), 3-15.

Woodhouse, D., & McDougall, A. (1986). Computers: Promise and challenge in education. Melbourne: Blackwell Scientific Publications.

Woodward, J. P. (1985). Teaching health concepts and problem solving skills through effective instructional practices and a computer simulation. Dissertation Abstracts International, 46(7), 1906A. (University Microfilms No. 8520738)

Woodward, J., Carnine, D., & Gersten, R. (1988). Teaching problem solving through computer simulations. American Educational Research Journal, 25, 72-86.

Zelmer, A. E., & Zelmer, A. C. L. (1980). Health and health care games and simulations: An evaluation. In R. H. Horn and A. Cleaves (Eds.), The guide to simulation/games for education and training (4th ed.) (pp. 132-140). Beverly Hills, CA: Sage.

Appendix A

Debriefing Reflection Activities: Student

Debriefing Activity 1: What Happened in the Simulation? Written Assignment

1. List about 15 very bad things that happened to your family during the simulation. Try to remember the events that caused you to become frustrated, sad, angry, or discouraged. The bad things that you list should be the events that caused the biggest drops in your character's health or spirit. These may have happened at the homestead, at the store, or at the job.

2. List about 10 very good things that happened to your family during the simulation. Try to remember the events that caused you to become happy or excited. The good things that you list should be the events that caused the biggest increases in your character's health or spirit. These may have happened at the homestead, at the store, or at the job. Use the backside of this paper if necessary.

Appendix B

Debriefing Reflection Activities: Teacher

Overview of Debriefing Stage 1: Recall

In this first stage of debriefing, students are encouraged to recall and recount the significant things that happened to their character(s) so as to provide a common starting point for later discussion and analysis. This stage also serves to de-role the students. During the simulation, students may have identified closely with the simulation character and may have built up a number of frustrations. Talking about their experiences can provide a release for any emotions that may have been generated. This is necessary so that the student can approach the next stage of debriefing (analysis) in a more detached manner.

This stage of debriefing was begun by the written assignment in the previous lesson (Appendix A). It is completed in this lesson through the use of a large group discussion. There are two major thrusts: discussion of the general successes and failures during the simulation (Debriefing Activity #2) and consideration of specific simulation events (Debriefing Activity #3). It should be possible to complete both of these activities within a 40 minute period.

Activity #2 (Reflection): Group Discussion.

In this activity, students describe the overall successes and frustrations that they had in the simulation, for example by recounting whether they were able to achieve their goals or not. Students are also encouraged to identify specific events that occurred that were "turning points". Discussion during this phase is intended to both recall experiences as well as release feelings.

Recall events. Any of the following questions could be used to prompt students to recall the **events** of the recently completed simulation (role #3):

How many teams found it easy/difficult to reach the goal? What made it difficult? What made it easy?

What were some of the good things that happened to your characters during the simulation? What were some of the bad?

Release feelings. In this portion of the discussion, the teacher should ask questions which prompt students to talk about any personal feelings they experienced during the simulation. Students will likely tend to focus on events that pleased or displeased their characters. The teacher should ensure that the students talk about what made them personally happy or unhappy. Sample questions are:

What did you like/dislike about the simulation?

Did you ever get mad or frustrated during the simulation? When did this happen?

Activity #3 (Reflection): Group Discussion

In the second phase of the discussion, students are encouraged to talk about specific simulation events. Students will have encountered a wide range of different experiences, depending upon the decisions that they made and the random events that they encountered. The purpose of this activity is to have student recount some of the less common experiences so as to provide a common base of knowledge for all.

Some of the rarer experiences in the simulation that might need to be shared are identified below. The focus of attention should be on just recalling the incident so that all students will be aware of the full range of events that can occur. Also, these questions provide the teacher with an opportunity to present some background information. (Background material for each question was provided in the manuals given to teachers but has been deleted in this appendix for the sake of brevity.)

1. Did anyone have trouble being allowed to enter Canada?
2. Did anyone arrive in Canada at the wrong time?
3. Did anyone have a lot of trouble getting to the store?
4. Did anyone find that things changed as they picked up English?
5. Did anyone work for a farmer?
6. Did anyone work for a long time at a mine? What happened?
7. Did anyone get fired at a job? Did anyone get mistreated by other workers?
8. Did anyone find that things got better as they got more worldly?
9. Did anyone have the size of their family change?
10. Did anyone lose a farm animal?
11. Did anyone have any trouble with their crops after they had been planted?

Appendix C

Debriefing Analysis Activities: Overview

The purpose of this second stage of debriefing is to help students understand the simulation experience. The focus of this debriefing stage is on two areas:

1. The cause and effect relationships between specific variables. Why did certain events occur in the simulation? Why did certain consequences occur after these events?

2. The relative importance of the underlying variables. Which variables are the most important to consider in order to succeed at the simulation?

There are seven written/discussion activities (Debriefing Activities #4 - #10), encompassing three periods (Days 12-14) planned for this stage of debriefing. Day 12 contains written and discussion exercises focussing on the cause and effect relationships, and the relative importance, of variables related to the characters (health, spirit, worldliness, knowledge of a second language, and money). Day 13 has similar activities, but this time they focus on the cause and effect relationships, and the relative importance, of variables related to the homestead site and to outside jobs. In the last activity (day 14), the students consider the relative importance of all underlying variables by examining strategies for playing the simulation.

Appendix D

Debriefing Analysis Activities: Character Variables

Overview

One main group of cause-effect relationships with which students should become familiar are those associated with the simulation characters. These are the characters' health, spirit, worldliness, knowledge of a second language, and money. Students should become aware of the kind of impact that these variables have on the simulation. What kinds of events affect these characteristics? What happens to the characters when variable measures are low or high? The short-answer questions in Debriefing Activity #4 are designed to prepare students for a discussion of these relationships in Debriefing Activity #5.

Debriefing Activity 4: Student Worksheet

(The format of the worksheet has been modified for inclusion in this appendix)

A. Health: If a character has low health levels, (s)he is likely to become ill. List three bad things that could happen in the simulation if a character becomes ill.

B. Spirit: List one bad thing that could happen in the simulation if a character had low spirit.

C. Worldliness: List two bad things that could happen in the simulation if a character had low worldliness.

D. Knowledge of Another Language: It is possible in the simulation for the father to speak English and/or German in addition to his own language. If he can speak another language, some good things can happen to him. But, if he can't speak English or German, he'll miss out. List three things that the father will miss out on if he is not able to speak another language.

E. Money: List one bad thing that could happen in the simulation if a family arrived in Canada with little money.

Debriefing Activity 5: Large Group Discussion Guide

This activity is intended to help the students determine the cause and effect

relationships between simulation events and the variables associated with the simulation characters. After students have completed the written activity, they are lead through a discussion of the importance of these variables.

A chart on the chalkboard is used to guide the discussions. The most important feature in this lesson is the discussion that takes place as students consider the cause and effect relationships. The format of the chart is intended to provide a visual summary of that discussion for the students.

Each variable should be discussed thoroughly (e.g., health column 1, health column 2, health column 3) before another is considered. The teacher should first ask students to consider the effect of low values in the particular factor. For example, what will happen in the simulation if health is low? Students will already have prepared answers for these questions through the previous written exercise. Then attention is focussed on potential causes of changes in the values. The teacher should pose two general discussion questions. What can cause health values to increase? What can cause health values to decrease? The responses to these questions should also be summarized and entered into the chart. Consideration should then be given to the next factor.

When the chart has been completed, the teacher should have students consider the relative importance of the five factors. The students should be asked to decide which factors are the most important and which factors are the least important.

(The teacher's manual included an outline of the chart, sample entries, and a discussion of each of the variables. Only the outline of the chart has been included in this appendix).

Measure	What happens if the value is low?	How can levels be decreased?	How can levels be increased?
Health			
Spirit			
Worldliness			
Knowledge of another language			
Money			

Appendix E

Debriefing Analysis Activities: Homestead and Job Variables

Overview

Two sets of cause-effect relationships are examined: factors related to the homestead site and job related variables. Students examine the impact that the three job related factors (food, accommodation, and honesty of the boss) can have on job success. Then, they consider the impact that the type of homestead site can have on the ultimate success or failure in the simulation. The students first complete a short written exercise (Activity #6) and then discuss their answers in Activity #7.

Debriefing Activity 6: Student Worksheet

(The format of the worksheet has been modified for inclusion in this appendix)

A. List two bad things that will likely happen in the simulation if a job has poor food.

B. What is likely to happen if a job has poor sleeping arrangements?

C. List two bad things that could happen if your job has a dishonest boss.

Job Summary Chart : Use this chart to answer questions D-G

Job	Average Daily Salary	Average Daily Room & Board	Average Net Daily Salary	Chances of Good Food	Chances of Good Sleeping Conditions	Chances of Good Boss
City	$1.85	$1.00	$0.85	Good	Good	Fair
Farm	$0.90	$0.35	$0.55	Good	Good	Very Good
Lumber	$1.85	$0.90	$0.95	Poor	Poor	Fair
Mine	$2.05	$1.00	$1.05	Fair	Fair	Fair
Rail	$1.30	$0.55	$0.75	Good	Good	Good

D. Which three jobs tend to have the best food?

E. Which three jobs tend to have the best sleeping arrangements?

F. Which two jobs tend to have the best bosses?

G. Which jobs tend to have the best pay? Put the jobs in order from best to worst. (Note, that you should look at how much the job rate is after room and board have been taken off.)

Debriefing Activity 7: Large Group Discussion Guide

After students have completed the written assignment, the teacher should first go over student answers to the written assignment. After the effects have been discussed and summarized, the focus of attention can be shifted to determining the relative importance of each of the underlying variables.

Following discussion of the variables associated with the outside job, consideration should be given to homestead site variables. No written activity is included for these variables since their effects should be reasonably clear. In the discussion, the teacher should first have students identify the effects and then have them consider the relative importance of the variables.

(The teacher's manual included answers to each of the following questions. These have been deleted in this appendix for the sake of brevity.)

Discussion Guide: Job

1. What happens with bad food?
2. What happens with bad accommodation?
3. What happens with a bad boss?
4. Rank these variables
5. Which jobs are best for quick money? Why?
6. Which jobs are best for good conditions? Why?
7. Which jobs give best combination of money and good conditions? Why?

Discussion Guide: Homestead Site Variables

8. What happens if the site is close to the city?
9. What happens if the site has good fertility?
10. What happens if the site has water nearby?
11. What happens if the site has a "bad" amount of trees?
12. What happens if the site has neighbours nearby?
13. Which two factors are the most important in the first few years on the homestead? Why?

Appendix F

Debriefing Analysis Activities: Strategy

Overview

The students complete a written assignment (Debriefing Activity #8) in which they consider the cause and effect relationships associated with decisions they might make on accessing advice, gaining farming experience, and deciding when to leave Galicia. These issues are examined more closely in a discussion format (Debriefing Activity #9). The focus of student attention then shifts to an analysis of how all of the variables considered in the last two lessons fit together. In Debriefing Activity #10, the class considers, in a group discussion format, the various strategies that can be employed in order to be successful.

Debriefing Activity 8: Student Worksheet

(The format of the worksheet has been modified for inclusion in this appendix)

A. Advice: List three good things that could happen in the simulation if your family asks for advice.

B. Farming experience: List two ways that your family can pick up some valuable tips on how to farm in Canada.

C. Departure Date: List three bad things that could happen if your family left Galicia at the wrong time of year.

Debriefing Activity 9: Large Group Discussion Guide

After students have completed the written assignment, the teacher should conduct a discussion of the cause and effect relationships between simulation events and the variables examined. (The teacher's manual included answers to each of the following questions. These have been deleted in this appendix for the sake of brevity.)

1. What happens if the family asks for advice?
2. How helpful or important is this advice?
3. What are two ways of picking up farming experience?
4. How important is this information? What happens if the family doesn't have it?
5. What are consequences of a bad departure date?
6. Which months are best to leave?

Debriefing Activity 9: Large Group Discussion Guide

(Revised in this appendix for the sake of brevity)

In this part of the lesson, the teacher should focus student attention onto the overall strategy for the simulation. This is done by asking student groups how they would handle certain critical decisions. The point of the exercise is not to identify "the one successful strategy" but to have students first devise a strategy and then consider its associated strengths and weaknesses.

1. How will you allocate personal characteristics?
2. When will you leave Galicia?
3. What kind of homestead site will you look for?
4. What is your overall strategy for the next two years?
5. How do you plan to earn money?

Appendix G

Source Materials for O Emigratsii Simulation

Balance, J. (1984). Salt and braided bread: Ukrainian life in Canada. Toronto: Oxford University Press.

Bruce, J. (1976). The last best west. Toronto: Fitzhenry & Whiteside.

Burke, M. V. (1978). The Ukrainian Canadians. Toronto: Van Nostrand Reinhold.

Czuboka, M. (1983). Ukrainian Canadian, eh? Winnipeg: Communigraphics/Printers Aid Group.

Czumer, W. (1981). Recollections about the life of the first Ukrainian settlers in Canada (L. T. Laychuk, Trans). Edmonton: Canadian Institute of Ukrainian Studies.

Kaye, V. (1964). Early Ukrainian settlements in Canada: 1895-1900. Toronto: University of Toronto Press.

Keywan, Z. (1971). Greater than kings: Ukrainian pioneer settlements in Canada. Montreal: Harvest House.

Kostash, M. (1977). All of baba's children. Edmonton: Hurtig Publishers.

Lysenko, V. (1947). Men in sheepskin coats: A study in assimilation. Toronto: Ryerson.

Marunchak, M. H. (1970). The Ukrainian Canadians: A history. Winnipeg: Ukrainian Free Academy of Sciences.

Osborne, K. (1969). The prairies: Selected historical sources. Toronto: McClelland & Stewart.

Robertson, H. (1974). Salt of the earth. Toronto: James Lorimer & Company.

Sellman, R. R. (1974). The prairies. London: Methuen Educational Ltd.

Shortt, A., & Doughty, A. G. (Eds.). (1914). Canada and its provinces: A history of the Canadian people and their institutions by one hundred associates (Vol. XX). Toronto: Edinburgh University Press.

Urquhart, M. C. (Ed.). (1965). Historical statistics of Canada. Toronto: MacMillan.

Appendix H

Lesson Plan: Introduction to Role 1

Lesson Goals

Students will be introduced to the content of the simulation program and become familiar with its use, including how to load it, begin play, and save progress.

The teacher will introduce the variables that distinguish the different jobs as advance organizers and will focus the students' attention on the need to determine the relative strengths and weaknesses of the five outside jobs in the simulation.

Students will be exposed to the beginning months of role #1 and will be introduced to the recording instrument used for this role.

Teacher Activities

The following activities should be conducted in a large group setting. The teacher should demonstrate simulation play to the students. A large screen display unit is necessary so that all students will be able to see the microcomputer screen.

The teacher should perform the following activities:

a. Provide a brief overview of what you will be doing this period. Then, begin by demonstrating how to load and begin the simulation. The first choice that students will face is whether they want to continue a previous game or to start a new one. Explain the distinction between a new and old game. Advise the class that you will show them how to use the "continue" option later. Select the option to begin a new game.

b. Access two of the background information options (background to the simulation and to role #1) and read the information to the class. (It is important that the teacher read out these and other major text screens for the benefit of those students who might have difficulty with reading or seeing the screen). Begin play of role #1.

c. Outline the options available for job selections. Access one or two job advice sections and point out that these comments are unintelligible at this time because the character cannot understand English yet. Note that this situation will change.

d. Select a job and complete the first month. Familiarize students with the types of data being reported on the month end result screens. Access, as well, the summary information on the character. Advise students that this screen will help them to track the progress of their character over the course of the simulation.

e. Familiarize students with the decisions they will have at the end of each month (continue with same job, look for a new job, etc.). Point out that it is possible that they might be forced to look for a new job because of conditions beyond their control. Alternatively, students might decide on their own to look for another job. If they decide to leave a particular job, they can look for an entirely different job or opt to look for another job of the same type. Jobs within one job type do tend to have the same characteristics but they will differ to a certain degree. One of the goals in this simulation is to become familiar with the advantages and disadvantages of each job type. To achieve this, some experimentation will be necessary. If possible, decide to continue with this particular job.

f. Discuss briefly the options that are offered at the end of each month of play (continue play, save, quit, etc.). Elect to continue.

g. Starting at the beginning of the second month on a job, the students may opt to buy food. Discuss this and elect to buy food. As the month end results are shown, focus student attention onto the variables which underlie job characteristics--job food, job living conditions, and job boss. The concept of these three variables should be provided to students as advance organizers. The teacher should definitely <u>not</u> explain why they are important, or how they interact. However, (s)he could identify their existence and get students to think about why they might be important (e.g., "What do you think would happen to the immigrant if the boss was dishonest?") Students should also be prompted to think about the likelihood that these factors will differ from one job to another, and from one job type to another.

h. At the end of this second month, elect to leave that particular job. It is possible to choose an entirely different job. Or, one could look for a job of the same type. Re-emphasize that jobs within a particular type will vary a little. They won't be able to find out if one job type is good or bad with only one attempt. Perhaps their first choice was just lucky/unlucky. Involve the class in the decision as to what job to try.

i. During the third month, continue to focus student attention onto the

underlying variables. At the conclusion of the third month, stress again that the goal of the student is to try and find which jobs are best. There is more to consider than just rate of pay. Review the overall purpose of role #1 (to earn $300) and how it will be important that the students find those types of jobs that will provide the character with money, while not reducing his health and spirit too much.

j. Demonstrate how to save a game. Then, re-start the simulation and show what will happen when the students continue their previous game. This completes the demonstration portion of the lesson. Turn the computer off and on again and eject the disk.

k. Students will find it difficult to remember all of the data from the various jobs, especially since this data will vary even within a single job type. Accordingly, students will record certain data from each job. Introduce the Job Data Form with an overhead transparency of a partially completed form and discuss its use. During their attempts at role 1, one line of data should be entered each time a new job is attempted (either of the same job type or of a different job type).

l. Discuss the manner in which students will play the simulation. Introduce the rule that students have to share control of the mouse and that this control should change at the end of each simulated month. Stress, as well, that the person with the mouse should not make decisions for the group but rather should ensure that all students participate in the group decision making.

** Activities k & l may be conducted at the beginning of the next period if time does not permit their inclusion here.

Appendix I

Modified Job Data Collection Form

Date Played _____ Recorder _____

Job	Daily Salary	Daily Room & Board	Net Daily Salary	Food?	Sleeping Conditions?	Boss?
Example	*$0.95*	*$0.45*	*$0.50*	*Good*	*Bad*	*Good*
City						
City						
City						
City						
Farm						
Farm						
Farm						
Farm						
Lumber						
Lumber						
Lumber						
Lumber						
Mine						
Mine						
Mine						
Mine						
Rail						
Rail						
Rail						
Rail						

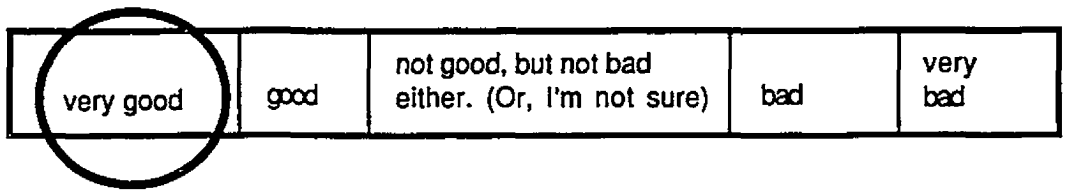
Appendix J

Attitude Survey

Name: _____

The following questions will ask you how you feel about certain things about Galician immigration. Each question has five possible answers. An example is shown below.

Example: Yesterday, the weather was..



You can see that the comments in the boxes are arranged in order, from very good all the way to very bad. The comments on the right hand side are the opposite of the comments on the left hand side. If you thought that the weather yesterday was very good, then you would put a circle around the first box.

The middle box is used when you don't feel strongly one way or the other. You would circle the middle box if you thought that yesterday's weather wasn't good, but it wasn't bad either. **You can also use the middle box when you don't know anything about the question.** For example if you were sick in bed all day and never saw what the weather was like yesterday, you would circle the middle box.

Be sure that you answer every question. There are no wrong answers to these questions - just say what you feel.

1. In facing their new lives in Canada, Galician immigrants generally ...

tried very hard to succeed.	tried hard to succeed.	didn't try hard, but didn't give up easily either. (Or, I'm not sure.)	gave up easily.	gave up very easily.

2. Galician immigrants were ...

very hard-working.	hard-working.	not hard-working, but not lazy either. (Or, I'm not sure.)	lazy.	very lazy.

3. Many Galician immigrants in the 1900's were successful in homesteading their land. What they were able to do was.....

very praise-worthy.	praise-worthy.	not praiseworthy, but not unimportant either. (Or, I'm not sure.)	unimportant.	very unimportant.

4. Any success the Galicians had in settling their homesteads was due ....

entirely to their hard work.	mostly to hard work but with some luck too.	to some hard work and some good luck. Or, (I'm not sure.)	mostly to luck but with some hard work too.	entirely to good luck.

5. Compared to other Canadians, life for Galician immigrants was ...

much easier.	easier.	not easier, but not harsher either. (Or, I'm not sure.)	harsher.	much harsher.

6. The kind of work that Galicians had to do <u>on the homestead</u> was ....

very easy.	easy.	not easy, but not difficult either. (Or, I'm not sure.)	difficult.	very difficult.

7. The kind of work that Galicians had to do <u>on the job</u> was ....

very easy.	easy.	not easy, but not tough either. (Or, I'm not sure.)	tough.	very tough.

8. In the 1900's, the Canadian people generally treated Galician immigrants....

very fairly.	fairly.	not fairly, but not unfairly either. (Or, I'm not sure.)	unfairly.	very unfairly.

9. Some immigrants might choose to live close to other people from their country who had arrived in Canada earlier. Others did not. For the Galicians, living close to such neighbours was ...

a very good idea.	a good idea.	not a good idea, but not a bad idea either. (Or, I'm not sure.)	a bad idea.	a very bad idea.

Appendix K

O Emigratsii Achievement Test: Part 1 (Modified Format)

Name: _____

1. Galicians emigrated to Canada in large numbers in the early 1900's because there were a number of things about life in their homeland that they did not like. (a) One thing that they did not like about their life in their homeland was _____

_____

(b) Another thing about life in their homeland that they did not like was

_____

_____

2. Galician immigrants, arriving in Canada, often had their last names changed without their permission. **True** or **False**? _____

3. Not all immigrants were allowed into Canada. They had to have a minimum amount of money when they arrived. Also, if anyone had certain illnesses, he or she would be sent back. A sick child could be sent back alone if the parents were too poor to buy tickets to go with him or her. **True** or **False**? _____

4. Galicians looked for a number of things when they were selecting the site of their homestead. List four things about a homestead site that would be important for them to think about before purchasing it.

(a) _____

(b) _____

(c) _____

(d) _____

5. Galician settlers often lived far away from the city. This meant that their trips to the store were quite long. However, these trips were made much easier by the roads that they were able to use. Although the roads weren't paved, the settlers could travel on them easily with animals and wagons. When Galicians planned to go to the city, the only thing that might prevent their trip would be bad winter weather.
True or **False?** _____

6. Galician immigrants often had to work away from their homestead so that they could earn money to buy animals and equipment. Many Galician fathers worked for long periods of time away from home. Five types of jobs that a Galician father often found in Alberta in the 1900's were:
(a) _____ (b) _____ (c) _____
(d) _____ (e) _____

7. In the 1900's, many Galicians often worked at an outside job away from their homesteads. After living expenses had been subtracted from their earnings, what would a typical good month's pay be? **Circle the correct answer.**

a. $ 5.00
b. $ 20.00
c. $ 50.00
d. $ 100.00
e. $ 500.00

8. Men of all countries worked in the mines, however this kind of work was harder on the Galicians. They believed that the devil lived underground and many were scared to go into the mines. **True** or **False?** _____

9. Galician immigrants were lucky they came to Canada in the early 1900's and not twenty years earlier. In 1900 there were unions to protect workers from dishonest bosses, bad working conditions, and unsafe jobs. As a result, Galician immigrants were able to find good, safe jobs. **True** or **False?** _____

10. Having the father work at an outside job was not the only way for Galician families to earn money in the 1900's. There were things that the mother and children could do as well. Name three other ways that Galician families could earn money.

(a) _____

(b) _____

(c) _____

11. Galician settlers frequently chose homestead sites that were covered with trees instead of choosing sites with few trees. This meant that they had to spend much more time and energy clearing the land. Why did they pick those kinds of sites? **Circle the correct answer.**

a. The people selling the land didn't show the Galicians the good sites. They knew that the Galicians could be easily fooled.

b. The Galicians knew that the trees would provide needed shade for their crops during the very hot Alberta summers.

c. Since wood was very expensive to buy in Galicia, they thought that homestead sites with lots of trees would be very valuable.

d. The Galicians thought that if the land could grow lots of trees, then it would be good soil for growing crops.

12. Most of the heavy work at the homestead was done during the first few years by the Galician women. **True** or **False?** _____

13. In the 1900's, the crops of the Galicians were very good. Their land was being used for farming for the very first time. As long as there was good weather, farming was easy. All the Galicians had to do was take care of the weeds. There was nothing else likely to damage their crops. **True** or **False?** _____

14. In almost all cases, Galician settlers and workers were welcomed by Canadians because they were seen to be hard working and honest. **True** or **False?** _____

Appendix L

O Emigratsii Achievement Test: Part 2 (Modified Format)

Name: _____

1. Some Galicians made their trip to Canada at the wrong time. This decision made their first year in Canada much more difficult. It was a bad idea to leave Galicia in August because _____

2. There were a number of things that Galician settlers looked at when they were picking their homestead site. Some of these were:
   a. how close the site was to the city;
   b. how close the site was to water;
   c. the amount of trees/brush on the site;
   d. how good the soil was (soil fertility); and
   e. how close the site was to neighbours.

All of these were important. But it was usually impossible to find a perfect site. If you were picking a homestead site for a Galician settler, which things do you think would be more important than the others? **In the list above, circle the two** things that you think would be the most important in helping the settlers to be successful in their first few years on the homestead.

Explain why. _____

3. A Galician worker asks whether good **food**, good **sleeping** arrangements, or a good **boss** is the most important thing to have in an job. What is your answer?

_____ Why? _____

4. Farming in Canada was difficult for many immigrants since the weather and growing conditions were different from what they were used to in their homelands. Galician immigrants were able to learn about the special tricks that were needed to farm in Alberta in a number of ways. (a) One way that Galicians learned how to farm in Canada was _____

(b) Another way was _____

5. Pretend that the health of a Galician family is really low. **List two** bad things that could happen to them because their health levels got low.

(a) _____ **(b)** _____

6. Before they arrived in Canada, some Galician men were able to speak another language. Then, in Canada, they learned English. **a.** Describe one good thing that would likely have resulted because they could speak another language.

_____

b. Describe another good thing about speaking another language.

_____

7. Circle the two types of job that generally had the highest pay.

City Farm Lumbercamp Mine Railway

8. Circle two types of job you would select if you wanted to have the best chance of getting good food.

City Farm Lumbercamp Mine Railway

9. Circle two types of job you think would be most likely to have a dishonest boss.

City Farm Lumbercamp Mine Railway

10. By the time Galicians arrived in Canada, most of the good homestead sites close to cities were already taken. **a.** Some Galicians found that living far away from the city was bad because _____

b. Another reason why living far away from a city was bad was _____

_____

Appendix M

O Emigratsii Achievement Test: Part 3 (Modified Format)

Name: _____

1. A Galician family wants to move to Canada but two of their children are quite ill. They are given one free wish before they leave. Which of the following wishes should they pick in order to avoid problems from their children being ill? They should wish that: **(Circle a letter a-e.)**

   a. Both parents will be able to speak English.
   b. Both parents will be very worldly.
   c. Both parents will start with very high spirits.
   d. The father will always get a job with good food and a good boss.
   e. The family will leave Europe in the summer months.

2. There are two Galician families. Family #1 lives in a part of Galicia that is very close to three other countries. They visit friends in these other countries often. They also are used to travelling into a nearby city to sell their crops and buy supplies.

Family #2 lives in another part of Galicia. They have never left their village. Other than that, the two families are the same.

Both families decide to move to Canada. In the months and years that follow, how will the two families do? **Circle a letter a-c.**

   a. Family #1 will likely have an easier time than Family #2.
   b. Family #1 will likely have the same experiences as Family #2.
   c. Family #1 will likely have a harder time than Family #2.

Explain why you answered the way you did. _____

_____

3. There are two other Galician families (not the same families that were in the previous question). They have their tickets and are ready to leave for Canada. Below is some information about them.

	Family #3	Family #4
Money left after buying tickets:	$1000	$100
Health of family	50%	100%
Spirits of adults	45%	90%

These are the only differences between them. How will the families probably do in their new lives in Canada? **Circle a letter a-c below.**

a. Family #3 will likely do <u>better</u> than Family #4.
b. Family #3 will likely do <u>the same</u> as Family #4.
c. Family #3 will likely do <u>worse</u> than Family #4.

Explain why you answered the way you did. _____

_____

4. A Galician family has been trying to homestead for over a year now and they know they have done a lot of things right. Their large family is healthy, in good spirits, and they have enough food to last for a while. They had enough money when they arrived to buy all the right supplies and equipment. They have food, a cow, an ox, a wagon, a stove, a rifle, and ammunition. After collecting food each month, they have lots of time to work on the homestead (chores, clearing land, etc.).

But, they are having a terrible time. Even though they have a lot of people working, they have just a little bit of land cleared. They never seem to have enough time to spend on clearing it. When they do find time, they don't get much done. Clearing land is going very slowly. They have made one <u>big</u> mistake. **What was their mistake?**

_____

_____

_____

5. Two Galician families have arrived in Canada. Their homesteads and families are exactly the same and they have the same amount of money to spend at the store. Here is the only difference. Family #5 is in a big rush to clear their land. They spend all their money on two oxen, a plow, wagon, stove, and food. They spend almost all their time clearing land at the homestead. After two months they have a lot cleared.

Galician family #6 is not in a rush. They spend all their money on a rifle and ammunition, a cow, an ox, a stove, and food. Since they hunt and gather berries and mushrooms, they can't spend as much time clearing their land. After two months, they have only a little land cleared.

How do you think the families will do in the next two years in staying alive and clearing their land? **Circle a letter a-c below.**

a. Family #5 will do much better than Family #6.
b. Family #5 will do the same as Family #6.
c. Family #5 will do much worse than Family #6.

6. It is March, 1902. A Galician father needs $65 to buy a wagon. He has been in Canada for a year and has a good start on his homestead. The wagon is the only thing he needs. He is in excellent health and spirits. He must earn the money as quickly as he can. He has to get back home since his wife is expecting a baby. **Circle the job he should pick. City Farm Lumbercamp Mine Railway**

7. It is April, 1902. A tornado has just destroyed a Galician homestead. The family's animals are dead, their equipment has been broken, and their crops are ruined. The father wants to find a good job quickly so that he can start over again. His wife and children will live with neighbours. He can leave them and work for about 6 months. He is very upset about what has happened to him -- he can't put up with having problems on a job too.

Here is the father's problem. He needs a job that pays pretty good money. But, he won't be able to put up with jobs with bad conditions--he is too upset. He has enough time to earn the needed money if he can find a good job quickly. But, if he finds lots of

bad jobs before he finds a good job, he'll run out of time. **Circle the job he should look for below.**

City **Farm** **Lumbercamp** **Mine** **Railway**

8. Pretend that some immigrants came to Canada from a country named Lutizia. Lutizia was a country with broad, flat valleys surrounded by steep hillsides. Crops grew well in Lutizia since the soil was good and there were lots of streams and rivers. The Lutizians lived in villages of log houses built from the many trees that grew on the hills all around them. They were lucky that wood from these trees was free. Winters were long and cold and they burned lots of wood to keep warm.

When they came to select a homestead site in Canada, Lutizians usually selected a different type of homestead site than the Galicians did.

Describe how the Lutizian homestead sites were different from the Galician homestead sites. _____

_____

9. Alberta was very much like Lutizia. When the Lutizians arrived, they were able to farm in the same way that they had back home. Also, they were able to collect snakeroot and trap like they did in Lutizia.

Some Lutizians felt that finding a homestead site that was near neighbours was not important. They knew that neighbours could give advice to new Canadians. But, since they already knew a lot about homesteading and farming in Canada, they didn't need that advice. Many decided to look for sites that were far away from neighbours.

These Lutizians were right about not needing the advice. But, they were wrong about picking sites far from neighbours. **Explain** why a homestead close to neighbours would be a good idea for the Lutizians.

_____

Appendix N

O Emigratsii Student Questionnaire (Modified Format

Please circle the number that comes closest to how you feel about the unit you have just completed on Galician immigrants.

A. I think that the unit that we did on Galician immigrants was generally ...

1	2	3	4	5
very boring	boring	neither boring nor interesting	interesting	very interesting

B. I think that the unit that we did on Galician immigrants generally ..

1	2	3	4	5
confused me a lot.	confused me a little.	neither helped me learn nor confused me.	helped me learn a little.	helped me learn a lot.

C. What did you learn from the unit? Complete the sentence below. **The most important thing that I learned from this unit was that**

D. This unit was probably different from the way that you normally learn social studies. Which way do you like best? **Circle an answer below.**

Normal Way **Simulation**

E. Please explain why you answered question D the way you did.

F. You can put down anything you want to say about the unit on Galician immigrants you have just completed. You can talk about what you liked or disliked about it. You can make suggestions about how the lessons or the simulation could be improved. Or, you can leave this part blank if you like.

Section 2. In the previous section, you told how you felt about the whole unit that you have just completed. In this section, you will be asked questions about **two parts of that unit**--the simulation and the classroom lessons you had after the simulation was over.

A. You played the simulation O Emigratsii for at least six periods. **Playing the simulation was generally ...**

1	2	3	4	5
very boring	boring	neither boring nor interesting	interesting	very interesting

B. **I think that the simulation generally...**

1	2	3	4	5
confused me a lot.	confused me a little.	neither helped me learn nor confused me.	helped me learn a little.	helped me learn a lot.

C. After you had played all three roles in the simulation, you had some lessons in the classroom. Your teacher asked the class some questions. You answered some of these on paper and you also discussed some as a whole class. **I think that these lessons were generally ...**

1	2	3	4	5
very boring	boring	neither boring nor interesting	interesting	very interesting

D. **The lessons after the simulation generally ...**

1	2	3	4	5
confused me a lot.	confused me a little.	neither helped me learn nor confused me.	helped me learn a little.	helped me learn a lot.

Appendix O

O Emigratsii Teacher Questionnaire

The Simulation

1. Rank the simulation's motivational impact on the students on a scale of 1-5, 1 being very boring and 5 being very interesting.

2. Rank the simulation's pedagogical potential on a scale of 1-5.

3. What did you like about the simulation?

4. What would you do to improve the simulation (additions, deletions, corrections)?

5. How did you feel about your role during the simulation? Did you find it uncomfortable? difficult? boring? What did you like about your role and what didn't you like? Did you find it difficult to not give student answers?

The Debriefing

1. Rank the debriefing's motivational impact on the students on a scale of 1-5.

2. Rank the debriefing's pedagogical potential on a scale of 1-5.

3. What did you like about the debriefing lessons?

4. What didn't you like about the debriefing? What would you do to improve it? (add, delete, rearrange?)

The Unit as a Whole

1. Rank the unit's motivational impact on the students on a scale of 1-5.

2. Rank the unit's pedagogical potential on a scale of 1-5.

3. What were the most important concepts/content that students stood to gain from the unit (i.e., directly related to the unit's coverage on immigration)?

4. Were there other indirect benefits that the unit provided?

5. If you were going to give advice to another teacher thinking of doing this unit, what would that advice be?

Appendix P

Analyses by Length of Exposure to the Unit

Table 37

ANCOVA Results by Exposure and Gender

Effects	F	df	p
Immediate Post Achievement Test			
Exposure	51.31	5, 291	.000
Gender	1.09	1, 291	.297
Interaction between IVs	2.20	5, 291	.054
Immediate Post Attitude Survey			
Exposure	18.25	5, 291	.000
Gender	1.61	1, 291	.206
Interaction between IVs	1.40	5, 291	.223

Table 38

Tests Means for Exposure Groups

Before and After Adjustment by Covariate

		Immedate Post Achievement			Immediate Post Attitude		
Exposure	n	M	SD	M (adj.)	M	SD	M (adj.)
6	24	6.97	2.78	7.63	30.29	2.82	30.61
16	51	17.51	3.53	16.79	36.65	3.43	36.30
17	47	18.27	2.97	17.94	37.53	3.09	37.37
19	64	17.88	4.41	17.64	36.72	2.85	36.60
20	36	18.59	3.22	19.27	38.14	3.03	38.47
22	82	18.93	3.41	18.88	36.07	3.36	36.05
All	304	17.38	4.68	17.28	36.32	3.65	36.27

Table 39

Protected t Test Results

Immediate Post Attitude Survey

Exposure	6	16	17	19	20
16	7.64***				
17	8.95***	1.75			
19	8.31***	0.53	1.33		
20	9.90***	3.30***	1.64	2.97**	
22	7.78***	0.48	2.40*	1.10	4.02***

Notes: Degrees of Freedom = (5, 297); Error Mean Square = 9.07; N = 304
* = p < .05; ** = p < .01; *** = p < .001

Table 40

Protected t Test Results

Immediate Post Achievement Test

Exposure	6	16	17	19	20
16	12.48***				
17	13.86***	1.91			
19	14.10***	1.53	0.52		
20	14.90***	3.84***	2.03*	2.64**	
22	16.35***	3.95***	1.74	2.51**	0.66

Notes: Degrees of Freedom = (5, 297); Error Mean Square = 8.79; N = 304
* = p < .05; ** = p < .01; *** = p < .001

Appendix Q

Results from Group 14

Introduction

As indicated earlier, due to the unique nature of Group 14, their results are reported separately. As with the sample of 304 students (hereafter known as the "main sample"), there was a slight majority of males (M = 23, F = 20) in this group. A notable difference between this group and other groups was its percentage of older students. As shown in Table 8, approximately 28% of the students in Group 14 were 11 years of age or older compared to only 9% of the students in the main sample.

Achievement Tests and Attitude Surveys

Although the unique composition of Group 14 increases the risk of drawing conclusions from any comparisons with other groups, a few general patterns can be noted. The achievement and attitude data from all 347 students in the nine initial groups was examined before Group 14 was removed from the study. A series of ANCOVA analyses revealed the presence of significant differences within the groups on every DV, as shown below in Table 41. Protected *t* tests were conducted to determine the relationships between individual groups on each of the DVs.

Table 41

ANCOVA Results by Group for All Groups in the Study

Effects	*F*	*df*	*p*
Immediate Post Achievement Test	41.92	8, 328	.000
Immediate Post Attitude Survey	12.55	8, 328	.000
Retention Post Achievement Test	34.88	8, 328	.000
Retention Post Attitude Survey	12.43	8, 328	.000

Note: *N* = 347

Comparisons between Group 14 and the nil exposure control group (Group 0) suggest that Group 14 did achieve a significant amount of learning and attitude growth. As seen in Table 42, Group 14 scored significantly higher than Group 0 on all four DVs. Although Group 0 and Group 14 varied in two respects (treatment, composition of the group), it is thought that the degree of significance between their scores was sufficient to warrant notation since the effect of the inequivalent composition would likely have been to reduce the difference between the two groups. These results suggest that the unit was successful in promoting learning and attitude change even with a relatively weak group of students.

Table 42

Significant Differences on Protected t Tests

Group 14 Compared to Other Groups

Group	Immediate Achievement Test	Retention Achievement Test	Immediate Attitude Survey	Retention Attitude Survey
0	9.17***	9.70***	5.33***	4.87***
1	4.19***	3.14**	2.44*	3.42***
12	6.00***	4.93***	4.05***	5.33***
13	7.53***	6.80***	3.15**	3.98***
123	7.66***	5.33***	5.35***	5.33***
124	1.95	0.75	1.90	2.38*
1234	6.91***	7.20***	2.50*	3.57***
1432	7.82***	6.76***	1.21	2.19*
Error MS	8.19	8.15	9.37	9.81

Notes: Scores from Group 14 were higher than those from Group 0 but lower than all others. df = 8, 337; * = $p < .05$; ** = $p < .01$; *** = $p < .001$

Another pattern of results evident in Table 42 is also interesting. Group 14's scores on the DVs were less than every other experimental group, including the non-debriefed control group which had been exposed to only the simulation. In fact, as demonstrated by Protected t Test results, the inferiority of Group 14's scores was significant in almost every case.

Interpreting the reasons for the significant inferiority of Group 14's achievement and attitudinal scores is difficult. It is likely that the unique nature of the group was a major factor in its relative poor showing. However, the group also received a debriefing treatment which was found to be ineffective with the other groups. This also may have had an effect, either on its own or through some interaction with the general low ability of the students. Since this group differed in two respects from all other groups in the study, isolation of these factors was impossible. However, while the reasons for this group's poor showing in comparison to the other experimental groups cannot be identified, it must be remembered that this group did achieve some success from the unit, albeit at an apparently reduced level.

Classroom Observations

Patterns of simulation play by the students in Group 14 appeared to be very consistent with students in the main sample. There were no apparent differences in the overall pattern of behaviour. Students were found to be involved in the simulation activities 98.8% of the time (main sample = 98.5%), distracted from the simulation 0.9% of the time (main sample = 1.0%) or engaged in other activities 0.3% of the time (main sample = 0.2%). Examination of each type of involvement and distraction revealed only minor differences from the behaviour of the main sample (e.g., fluctuations of less than 1.5%). These were not considered to be noteworthy. Comparisons of patterns of activity by role, by play day, and by period half were hindered by incomplete data from Group 14 in some roles and play days. However, no major departures from the trends established in the main groups were found.

Student Questionnaire

The unit as a whole. Group 14's means on the two questions assessing the students' reaction to the overall unit were reasonably high (4.0 on the interest scale and 4.1 on the educational value scale) and similar to those from the other groups. A MANCOVA of the scores on these two questionnaire items from the entire sample of students revealed that there was no significant difference between Group 14 and the other groups, $F = 1.4$ (14, 610), $p = .142$. Thus, although achievement and attitudinal measures indicate that Group 14's growth was relatively limited, the students nevertheless rated the unit as interesting and as educationally valuable as students in the other groups.

Most important thing learned. Responses from Group 14 to this item on the questionnaire were very similar to those from the main sample. For example, both sets of students most commonly identified the harshness of immigrant life as the most important thing learned. Comments about historical facts, about Galicians, about life in general, and about the simulation were also made but in slightly different frequencies than those made by the main sample. Table 43 compares Group 14's pattern of answers to this question to the pattern of responses from the main sample.

Table 43

Group 14 Questionnaire: Most Important Thing Learned

Comment Category	Group 14 Frequency	Group 14 Proportion	Main Sample Proportion
Insights into ...			
Harshness of Immigrant Life	15	38%	53%
Historical Facts and Events	8	20%	17%
Life in General	8	20%	10%
Simulation Details and Strategies	6	15%	10%
The Galicians	3	8%	10%

Instructional mode preference. Of the 43 students in this group, 81% indicated that they preferred learning social studies by simulation rather than by traditional means. As can be seen in Table 44, the explanations of Group 14's preferences were similar to those from the main group. Both groups had the same range of reasons. The two most common attractions of the simulation were its increased interest and the better learning it provided, and the most common reason for disliking the simulation was its difficulty. Some minor differences were noted in the frequencies of other categories. The biggest difference of Group 14's response was the lower preference rate for the simulation, 81% versus 92%.

Table 44

Group 14 Questionnaire

Mode Preference Comments

Comment Category	Group 14 Frequency	Group 14 Proportion	Main Group Proportion
Motivational Impact	12	29%	35%
Better Learning	8	19%	13%
Explanations of Negative Responses	5	12%	5%
Attraction of Computers	4	10%	10%
Better than the Alternative	3	7%	6%
Experiential Education Benefits	2	5%	10%
Control of One's Own Learning	2	5%	8%
Novelty of the Experience	2	5%	6%
Unclassified Positive Responses	2	5%	1%
Opportunity to Work with Others	1	2%	3%
Challenge	1	2%	2%

Teacher Questionnaire

The responses from the two teachers in this group showed no major deviations from the thrust of the comments from the other teachers. For example, they had similar observations about the strengths and weaknesses of the simulation, the most important concepts learned, and the indirect benefits of the unit.

Their responses on the debriefing section of the questionnaire are worth noting. This group did not really engage in any debriefing--they played the three roles of the simulation and then had two days of replay. When asked to improve this form of debriefing, one of the teachers suggested a number of discussion questions, including: "How did you feel about role 2?" and "What did you learn were the most important factors in farming successfully?". It is interesting to note that these questions are reflective and analytical in nature, the debriefing stages that were omitted.

Their ratings of the unit's interest and educational value were also revealing in that they were very positive and only marginally lower than the teachers in the main sample. Both teachers were aware that their students were having difficulties. However, they still found that the students were very interested (4.3/5). Perhaps, more importantly, they rated the educational value of the activity even higher (4.5/5). Given the small number of teachers in this sample, it would be inappropriate to rely too heavily on these specific means. However, the main reaction of the teachers to the unit, in spite of the difficulties that their students faced, was very positive and this can be considered noteworthy.

> I didn't have any trouble at any point involving kids....I thought it was great and it really opened up the whole topic of immigration. I'd give it a 5.
>
> Some were right into it and some were way off the course, but I think the bulk of them were interested.
>
> It was a good change from the normal kind of process we use in the classroom, you know text oriented or research kind of thing. I noticed the kids who probably wouldn't have done so well on a written report...really got into this a lot better.
>
> Some of them kept getting sent back to the Ukraine. It took them a while to figure out that they had to have a certain amount of money to stay, [but] they hung in there. I just thought it was a good learning situation.