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**Learning styles of post-secondary vocational education students  
and hotel managers in the Bahamas**

**Rolle, Sophia Anne, Ph.D.**

**Iowa State University, 1993**

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Learning styles of post-secondary  
vocational education students  
and hotel managers in the Bahamas

by

Sophia Anne Rolle

A Dissertation Submitted to the  
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DOCTOR OF PHILOSOPHY

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Iowa State University  
Ames, Iowa

1993

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## **DEDICATION**

This dissertation is dedicated especially to my mother and to my family because they constantly reminded me of the importance of hard work and the completion of any projects started.

## TABLE OF CONTENTS

	Page
INTRODUCTION .....	1
Objectives .....	3
Definitions .....	4
Assumptions .....	4
Delimitations .....	4
REVIEW OF LITERATURE .....	6
Vocational Education in the Bahamas .....	6
Learning Style Models .....	9
Cognitive models .....	10
Field independence and field dependence .....	10
Cognitive style mapping .....	11
Kolb's learning style model .....	13
Social interaction models .....	17
Fuhrmann and Jacobs model .....	17
Grasha-Riechmann model .....	19
Instructional preference models .....	21
Learning Preference Inventory .....	21
Instructional Preference Questionnaire .....	21
Hospitality-related Research Studies .....	22
METHODOLOGY .....	28
Selection of the Sample .....	29
Selection of the Instrument .....	29
Preparation of the Instrument Packet .....	32
Administration of the Instrument .....	32
Analysis of the Data .....	33

	Page
RESULTS AND DISCUSSION .....	37
Description of Respondents .....	37
Preliminary Determination of Learning Styles .....	42
Description of Common Variables for Total Group .....	46
Learning Style Predictive Discriminant Analysis .....	47
Major Findings .....	50
Discussion .....	54
Implications .....	59
SUMMARY AND RECOMMENDATIONS .....	60
Summary .....	60
Limitations .....	61
Conclusions .....	61
Recommendations .....	62
BIBLIOGRAPHY .....	64
ACKNOWLEDGMENTS.....	68
APPENDIX A:     PERMISSION TO REPRODUCE FIGURE 1 .....	69
APPENDIX B:     INFORMATION FOR REVIEW OF RESEARCH INVOLVING HUMAN SUBJECTS FORM.....	71
APPENDIX C:     BAHAMAS HOTEL TRAINING COLLEGE CORRESPONDENCE.....	73



	Page
APPENDIX D: LEARNING STYLE INVENTORY ADAPTED FROM MARSHALL AND MERRITT .....	77
APPENDIX E: SUPPLEMENTARY FORMS .....	86
APPENDIX F: ITEM MEANS AND OCCURRENCES OF MISSING DATA IN ORIGINAL DATA SET .....	91
APPENDIX G: SCATTERGRAM OF LEARNING STYLE PLOTS .....	93

**LIST OF FIGURES**

	Page
Figure 1. Kolb's learning style model .....	15
Figure 2. Proportions of samples in each learning style category.....	57

**LIST OF TABLES**

	Page
Table 1. Demographic characteristics of students .....	39
Table 2. Demographic characteristics of managers .....	41
Table 3. Means for learning traits and learning dimensions .....	44
Table 4. Age match created variable with frequencies for associated ranges ..	46
Table 5. Predictive discriminant analysis group classification results .....	48
Table 6. Fisher's linear discriminant classification function coefficients .....	49
Table 7. Learning styles of students and managers .....	51
Table 8. Learning styles of students by enrolled programs .....	52
Table 9. Composition of learning traits by item number using student and manager responses .....	53
Table 10. Factor loadings for two-factor solution using learning traits .....	58

## INTRODUCTION

In the Caribbean, as well as around the world, rapid technological and vocational developments are bringing about significant changes in socio-economic realities (Ellis, 1991). It is critical for people at all levels of Caribbean society to develop an understanding of the importance of vocational and technological contributions to society. A prerequisite to this understanding is providing knowledge and skills to people, enabling them to understand and appreciate the vocational and technological environment and the types of new jobs available within such an environment. Ellis (1991) noted that recent labor surveys had revealed that the majority of new jobs will be in the area of technical services. Simultaneously, technological changes within the industrial sector will result in labor market shortages especially at the levels of technician and technologist.

During the late 1960s and early 1970s, the Bahamian government felt that, among other things, unemployed people with little or no technical or vocational skills would not contribute to the economic growth of the country and would have a negative effect on the rapidly developing tourism industry of the Bahamas. To this end, training in technical and vocational education was seen as a key element in the solution to this problem, and resulted in the establishment of a number of vocational and technical schools and training centers (*Handbook of the Industrial Training Center*, 1991). The Bahamas Hotel Training College (BHTC) was among these institutions.

In the two decades since these post-secondary institutions were first established, continuing technological developments have placed increased demands on these institutions to prepare highly skilled workers. However, in

her recent critique of vocational and technological education in the Caribbean, Ellis (1991) stated that the present system of vocational education does not adequately provide students with the skills needed for jobs within the industrial, vocational, and manufacturing sectors.

In an examination of post-secondary vocational education schools, Dube (1989) noted that these schools have been called upon not only to prepare and produce skilled and trained workers, but also to retrain current workers and update their skills. To facilitate this need, Dube believed a major reorganization of existing curricula is necessary.

One way of reorganizing an existing curriculum begins with examining the learning styles of the students in the particular program. Fleming (1989) stated that having respect for students' learning styles and abilities is a key factor in motivating optimal performance. An individual's learning style would be a major consideration when making the classroom-to-industry fit required for modern business and industrial communities. A learning style, as typified by Keefe (1979), is "the cognitive, affective, and psychological traits that serve as relatively stable indicators of how learners perceive, interact with, and respond to the learning environment."

Several learning style models were reviewed to determine which one was most appropriate for use with the objectives of this study. These included Field Independence and Field Dependence developed by Witkin, Goodenough, and Moore (1975), Cognitive Style Mapping developed by Hill and Nunney (1972), the Fuhrmann and Jacobs Model (1980), and the Kolb (1984) Learning Style Inventory (LSI). Because of its use with adult audiences and its basis in experiential learning, Kolb's model was selected to be used in this study.

An alternate format of the Kolb's LSI developed by Marshall and Merritt (1984) was selected for data collection. This instrument was selected because the format measured learning styles according to Kolb's model, had higher construct validity than Kolb's LSI, and also had been used previously by other researchers in the hospitality industry.

Several research studies relating to the hospitality industry have been completed using the learning style models mentioned above. The studies examined learning styles of hospitality students, professors and managers, and compared learning styles of unit and district managers in the restaurant industry. However, no studies were found that investigated the differences in learning styles between post-secondary students in a hospitality management program and hotel managers. Also these studies were all conducted in the United States, rather than using an international setting, such as the Bahamas. The overall purpose of this study is to determine the learning styles of full-time post-secondary vocational education students and hotel general managers in the Bahamas and to investigate the effect of common demographic variables (nationality, age, gender) on learning styles.

### **Objectives**

1. To assess the learning styles of full-time post-secondary vocational education students at BHTC.
2. To assess the learning styles of hotel general managers currently working in the Bahamas.
3. To compare the predominant learning styles of full-time post-secondary vocational education students and hotel general managers.

4. To compare the learning styles of full-time post-secondary vocational education students by the four full-time programs they were enrolled in at BHTC.

### **Definitions**

1. Hotel—a lodging establishment that includes restaurant facilities on the premises.
2. Hotel General Manager—the individual responsible for the entire management of the hotel.
3. Learning Style—the manner in which an individual perceives, processes, and transmits information (Kolb, 1981). The natural means by which the human mind relates to the world and thus describes how people learn (Gregorc, 1982).

### **Assumptions**

1. All full-time post-secondary vocational education students and hotel general managers in this study have a predominant learning style which can be measured.
2. Learning styles are unique and remain constant over time.
3. Kolb's (1984) four learning style categories are nominal in nature; no ordered relationship is assumed to exist among them.

### **Delimitations**

1. The study is limited to full-time students at BHTC and to general managers in hotels in Nassau, Bahamas.

2. The researcher was unable to collect data from a larger number of general managers because (a) they were not in town during the collection period, (b) they canceled the appointment and were unable to reschedule, (c) they were not available during the data collection period.
3. Research studies in vocational education and/or learning style from an international perspective were not available in the Iowa State University Parks Library or through inter-library loan services.



## **REVIEW OF LITERATURE**

### **Vocational Education in the Bahamas**

During the late sixties and early seventies there was a marked change in economic activities in the Bahamas. There was a decided upsurge in tourism, banking, and related service industries while there was a significant drop in building activity. The skills of Bahamians did not match the needs in these emerging job opportunities. In fact, it was estimated that well over one-third of the individuals who sought employment had no skills or work experience (*Handbook of the Industrial Training Center*, 1991). These employment problems resulted in social problems particularly among unemployed youth.

At that time, the government felt that these unemployed people (a) were not contributing to the economic growth of the country, (b) were likely to engage in anti-social activities mainly due to the frustration of not finding gainful employment with which to support themselves and their families, and (c) were likely to develop negative self-concepts thus decreasing their potential and desire to make a meaningful contribution to society. In addition, it was feared that unemployment would create a negative effect on the rapidly developing tourism industry (*Handbook of the Industrial Training Center*, 1991).

During the 1980s, the economic recovery in the United States was seen by the Bahamian government as a force which contributed to an upsurge in jobs in the Bahamian tourism industry. However, this major growth in the Bahamian economy soon leveled off, and many individuals who aspired to employment in tourism had to seek employment in other fields. Technical and vocational education were seen as key elements for solving the demand for skilled labor in emerging fields. Yet the Bahamian government realized that

adequate training programs and facilities were needed to accommodate this demand. In the early 1980s, the Bahamian government identified four major conditions of technical and vocational education that influenced the government's decision to make technical and vocational education a priority. These included: projections of continued youth unemployment and the social problems associated with it; the leveling off of tourism-related jobs and the need to diversify; high migration from the Family Islands to Nassau and Grand Bahama due to lack of economic activities on the outer islands; and finally, the severe shortage of well-trained Bahamians.

During the initiation of programs such as industrial training, basic hotel training, carpentry, and plumbing, the objective was to provide basic job skills in the shortest possible time to individuals who had an acute lack of skills. To this end, a number of vocational and technical schools and training centers were established. The Bahamas Hotel Training College was among these institutions.

The Bahamas Hotel Training College was established in 1973 as a tripartite body consisting of the government, the hotel industry, and the Bahamas Hotel Catering and Allied Workers Union. BHTC is financed by government through the Ministry of Education and Culture and by the hotel industry through the Bahamas Hotel Association, the Nassau/Paradise Island Promotion Board, and the Grand Bahama Island Promotion Board.

The express purpose of the Bahamas Hotel Training College is to train present and future employees of hotels, tourism organizations, and allied industries. The philosophy extends into facilitating a total training and vocational center for the development of the tourist industry (*Handbook of the Industrial Training Center*, 1991).

In an examination of post-secondary vocational schools, Dube (1989) noted that these schools have been called upon not only to prepare and produce initially skilled and trained workers, but also to retrain current workers and update their skills. In order for post-secondary vocational schools to facilitate this need, Dube believed a major reorganization of existing curricula was necessary. Post-secondary curricula must address the needs of both vocational students in educational institutions and the training systems and programs within industries. Post-secondary education should provide the means for producing trained labor in a diverse industrialized society; it should include those emphases which are vocational and technical in nature, leading to careers not necessarily requiring university graduation. This focus for vocational programming is not to de-emphasize other kinds of programs such as adult and continuing education or pre-university studies, but rather, it attempts to provide offerings that do not compete with other programs.

To foster the reorganization of vocational programs, a curriculum development specialist would be needed to assess needs of students and the labor market, develop occupational requirements, specify instructional objectives, and draft the total curriculum to include courses for basic training, upgrading, and retraining (*History of the Industrial Training Center*, 1991). In the early 1980s, the Bahamian government recommended that career counselors be trained and appointed to serve as resources to integrate career guidance concepts within occupational and vocational programs offered at the post-secondary institutions.

To maximize the proportion of students becoming employable, vocational education must change in ways that develop more appropriate curricula. Many vocational education teachers realized that how they provide instruction is as

important as what instructional content they provide (Fleming, 1989). Fleming stated that having respect for students' learning styles and abilities is a key factor in motivating optimal classroom performance. When teachers are aware of the predominant learning styles of their students, they can provide instruction that more closely relates to those learning styles.

In Lewin's (1936) field psychology and in the cognitive-field theory of learning (Bigge, 1976) the concerns for environment and teaching styles are evident. Within these theories, an individual's behavior or learning style is seen as a function of the person's physical environment, classroom climate, teaching attitudes, instructional methods, work conditions, and familiar disposition. Schmidt (1984) felt that all these conditions have an impact on the individual learner's perception of appropriate conditions and mode for learning and, therefore, may affect the level of achievement. An individual's learning style would be a major consideration when making the classroom-to-industry fit required for modern business and industrial communities. Institutions of higher education or post-secondary education must consider carefully the questions of individual differences and the implications of such differences for the manner in which they approach their institutional purposes and educational practices (Thompson & O'Brien, 1991).

### **Learning Style Models**

A learning style, as typified by Keefe (1979), is "the cognitive, affective, and psychological traits that serve as relatively stable indicators of how learners perceive, interact with, and respond to the learning environment." Typically, characteristics of learning styles can be observed when students participate in an internship experience or any experience that allows for hands-on, on-the-job

training. Students can best display their grasp of basic classroom knowledge in the actual work environment. This blend of classroom knowledge and work experience can be a tool used in making the classroom-to-industry fit.

Cross (1976) and Claxton and Ralston (1978) suggested that personality-related learning characteristics that distinguish one group of students from another are often called student learning styles. The students' learning characteristics indicated by these authors include what attitudes and values students have about learning, how they like to think, and how they want information presented.

With this variety, it is sometimes difficult when planning classes for teachers to recognize those learning characteristics that will yield the best results in the classroom. Researchers and practitioners in the field have tended to group these personality-related learning dimensions into learning style models. These models generally emphasize either the cognitive functioning of students, the nature of the social interactions in the classroom, or the instructional preferences of students (Fuhrmann & Jacobs, 1980).

### **Cognitive models**

Cognitive models are learning style models that emphasize those intellectual characteristics that help us learn. Cognitive characteristics help us perceive, think, and remember (Fuhrmann & Jacobs, 1980).

*Field independence and field dependence* Witkin (1977) identified two types of cognitive styles: field dependent and field independent. Individuals who are field dependent have a very difficult time identifying target stimuli from backgrounds, while field independent individuals are not as easily confused by background stimulation.

Witkin, Goodenough, and Oltman (1977) extended the analysis of these two styles to describe how people learn. They discerned that field dependence and field independence involved much more than the student's ability to pick out certain stimuli from a background. Rather, the two styles are best seen as opposite ends of a continuum that describe how people handle the information they acquire.

People who are field independent tend to rely more on internal cues for processing information. They attempt to analyze things into little parts and are able to work independently. People considered to be field dependent tend to rely more on external stimuli in a task. They find it extremely difficult to separate individual parts from the whole. Field dependent people also tend to need other people around them when learning and are likely to consult with others before making decisions.

In a survey of 1,422 college students, Witkin et al. (1975) suggested that field independence and field dependence were neither good nor bad. Both characteristics helped students adapt to the demands of their educational environments. Further, they found that knowledge of a student's cognitive style was a good predictor of the student's choice of college major and eventual occupation after formal education. Field independent students were more likely to major in mathematics and sciences while field dependent students preferred majors such as elementary and early childhood education, speech therapy, nursing, social work, and business personnel work. Students of both types were satisfied with their majors, and there were no differences between student types in their overall grades.

*Cognitive style mapping* Hill and Nunney (1972) developed an approach to assess the cognitive components of learning style known as cognitive style

mapping. This approach was used to determine certain preferences that each person has for gathering information, thinking and making inferences, and making decisions that determine interest in self, other people, and surrounding objects.

Of primary concern in gathering information is the sensory modalities that people prefer to use; for example, auditory and visual senses are used to gather information, and tactile and kinesthetic involvements are used to manipulate objects. When it comes to making inferences, an important component is the way people carry out activities while processing information. Such actions include a preference for deductive reasoning, a tendency to look for similarities and differences, and the use of rules to help accept or reject information. In the decision making process, consideration is given for how individuals make decisions for themselves, rather than what is suggested by other people. Interest in self, others, and objects could mean how well we know ourselves, empathize with others, communicate with others, and overall, enjoy the beauty of the world around us (Hill & Nunney, 1972).

Hill's Cognitive Style Mapping Inventory utilizes four broad categories to measure a learner's cognitive map. These categories reflect the following ideas:

1. Education is the process for searching for meaning.
2. Thought is different from language.
3. Man is a social creature with a unique capacity for deriving meaning from his environment and personal experiences through the creation and use of symbols.
4. Not content with biological satisfactions alone, man continually seeks meaning (Hill & Nunney, 1972).

These four categories are expanded into 27 specific cognitive characteristics. The Cognitive Style Mapping Inventory asks learners to rate themselves on 224 descriptive statements such as, "If I hear the daily news on the radio, I understand it better than if I read it in the newspaper." Then each of the 27 learner characteristics is compiled and rated as major (true more than half of the time), minor (true less than half of the time), or negative (rarely true).

*Kolb's learning style model* Kolb's (1976, 1984) model of experiential learning provides the basis for this study because of its adult learner orientation and context. Bonham (1988) suggested that Kolb's model is more appropriate and relevant to adult learners and that it has a relatively sound and well-defined theory base—experiential learning. Kolb (1984) defined learning as "a process whereby knowledge is created through the transformation of experience" (p. 38). He traced the intellectual origins of experiential learning in the works of Dewey, Lewin, and Piaget. Norms for scores on the Learning Style Inventory (LSI) were developed from a sample of 1,933 men and women ranging in age from 18 to 60 and representing a wide variety of occupations. The norms, along with reliability and validity data for the LSI, were reported in earlier works by Kolb (1976, 1981).

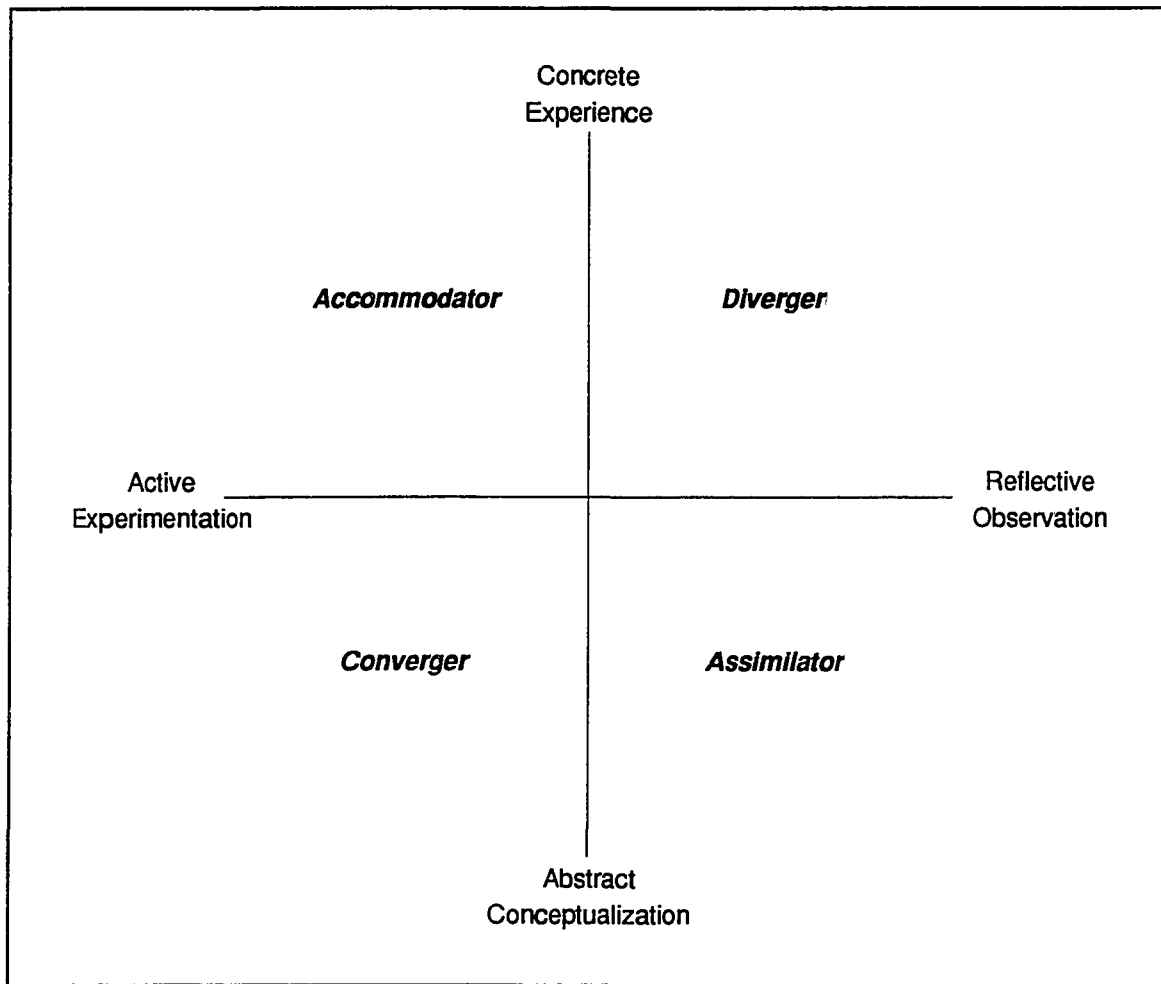
Kolb's (1984) comprehensive model extends over four traits in acquiring information and learning skills. These traits are Concrete Experience (CE), Reflective Observation (RO), Abstract Conceptualization (AC), and Active Experimentation (AE). Concrete experience involves oneself fully in a new experience and seeks out additional experiences so that people can utilize all senses firsthand. Reflective observation involves observing other people doing things and trying to emulate those experiences or developing observations about personal experiences in a learning environment. Abstract conceptualization



is the creation of concepts and theories to explain the world. Active experimentation is using the theories and concepts a learner has acquired to solve problems and make decisions.

According to Kolb (1984), these traits comprise four modes of human learning. Most people move through these four modes in succession; they have a concrete experience, observe and reflect upon it, and then form abstract concepts and generalizations that, in turn, lead to hypotheses to be tested in further actions. Although this flow seems typical, Kolb notes that individuals vary in their relative emphasis on, or preference for, each mode. Learning is often governed by individual needs and goals. Because needs and goals make learning a highly individualized process, a person may emphasize one mode more than another. Also, according to Rubin (1989), individuals seem to develop consistent stable learning or cognitive styles relative to their age. Each person has relatively weak and strong points in learning, accounting for variations in his or her mode of learning.

Kolb (1984) found that in this model, abstract conceptualization-concrete experience (AC-CE) and active experimentation-reflective observation (AE-RO) are two distinct dimensions or continua—abstract-concrete and active-reflective respectively (Figure 1). Each represents two dialectically opposed adaptive orientations fundamental to the learning process. The AC-CE dimension describes the preferred mode of prehension or acceptance of information or experience, while the AE-RO dimension is the transformation of information or experience. The transaction among the four learning traits and the resolution of transformation of the adaptive dialectics provide the structural basis of the learning process for Kolb's learning style types (converger, assimilator, diverger, and accommodator).



**Figure 1. Kolb's learning style model**

Figure © 1992 by the Association for the Development of Computer-Based Instructional Systems. Used by permission (Appendix A).

Kolb designed the Learning Style Inventory to measure learners' responses to the degree of utilization in the four learning traits. People who rely on abstract conceptualization and active experimentation are called convergers. These people like to find specific answers and when presented with a task move quickly to find an answer. Convergers are unemotional and prefer dealing with

things rather than people. People who rely mostly on the cognitive skills of abstract conceptualization and reflective observation are known as assimilators. Assimilators are interested in theoretical concerns and have little or no interest in application. Divergers are those people who have skills in concrete experience and reflective observation. The generation of alternate ideas and the enjoyment of the work process are synonymous for these people. Finally, accommodators are people who are at their best in concrete experiences and active experimentation. They are risk takers, like to focus on doing things and having new experiences, and generally perform well in situations where they must adapt to new circumstances.

The Kolb Learning Style Inventory plots an individual's position in relation to the four styles: converger, assimilator, diverger, and accommodator. The inventory requires that individuals rank-order nine sets of four words, each according to the learner's own description of his or her learning trait. The four words in a row are positioned so that each word is a member of a unique column. When all nine sets of words are printed, four columns are visually apparent. The sum of the ranks for the nine words in each column then indicates one's score on each of the four traits. Difference scores for AC-CE and AE-RO are computed to form two dimensions or continua, called ACCE and AERO, respectively. These dimensions form axes on which the difference scores are plotted. Each quadrant on the graph identifies one learning style. The quadrant in which the plotted scores fall determines which learning style a person is, converger, assimilator, diverger, or accommodator.

As a result of hereditary makeup, an individual's particular past life experiences, and the demands of the present environment, most people develop learning style characteristics that emphasize some learning traits over others

(Kolb, 1984). These learning characteristics can be determined using cognitive style models that seek to emphasize the learning style differences among students.

### **Social interaction models**

Social interaction models are used to identify cognate features of interactions that learners have and the role these features play in learning (Fuhrmann & Jacobs, 1980). Teachers, peers, close friends, and family members also play a role in what and how a student learns.

*Fuhrmann and Jacobs model* Johnson (1976) noted that learners are either “dependent prone” and need highly structured settings in which to function, or they are “independent prone” and require greater flexibility and freedom. In 1980, Fuhrmann and Jacobs added a third category called the “collaborative prone” to Johnson’s theory, and developed a structured model that discriminates three classroom learning styles: the dependent style, the independent style, and collaborative style (Fuhrmann & Jacobs, 1980). In this model, even though an individual may prefer one style over the others, no one style is better than the other ones. Thus, the categories are considered value-free. A dependent classroom learning style is used most often in beginning skills classes where it is assumed that the students have no prior experience. In a course that focuses on developing skill in a problem solving group, a collaborative style is most appropriate. Independent learning is evident when learners have more knowledge or skill upon entering the course and when they want to continue to search on their own. These learners also may feel that the instructor cannot offer as much as the learner would like. If the students need to learn to work with unfamiliar equipment such as the computer, neither the independent nor collaborative styles are appropriate.

In this model, learning styles are associated more closely with personalities, in that people whose predominant learning style is independent, dependent, or collaborative are also more independent, dependent, or collaborative, respectively, in their personality. Fuhrmann and Jacobs gathered results from a study of more than 800 undergraduate and graduate students in 15 different educational institutions. They found that older students were less dependent than younger students and that advanced students were less dependent than beginners. The strength of collaboration remained the same. It was obvious then that as students progressed through college, their need for structure decreased, perhaps because of their experiences.

In developing their model, Fuhrmann and Jacobs (1980) sought to investigate independent, dependent, and collaborative interactions in a variety of settings. The researchers asked students to classify personally positive classroom learning experiences according to behavioral descriptors of classroom activities. A student first identified the positive experience, a "learning highlight" (an activity or event that was a positive, rewarding, and personally meaningful experience) through an open-ended question. The student then read 36 behavioral descriptors of classroom activities and checked those that most closely represented the highlight. Twelve of the descriptors explained a dependent style, twelve explained an independent style, and twelve a collaborative style. This entire process was repeated three times, after which the student's style preferences were measured by noting the specific behaviors that were prevalent in the learning experiences they found most meaningful.

Scores were developed by noting the relative weight of each of the three styles. The D score, indicating dependence in the learning situation, refers to the learner's expectation that it is the teacher who is primarily responsible for

the learning that occurs. The C score, indicating collaboration, refers to the learner's expectation that the responsibility for learning should be shared by the teacher and learner. The I score, indicating independence, refers to the learner's expectation that he or she will be encouraged to set and attain his or her own goals.

*Grasha-Riechmann model* Learning based on the roles students play in the classroom is the focus of the Grasha-Riechmann model, developed by Riechmann and Grasha (1974). Six roles identified by these authors are responsible for preferences students have for interacting with their peers and the teacher, and with their approaches to course content. These roles include: competitive, collaborative, dependent, independent, participant, and avoidant.

- **Competitive**—This style is exhibited by students who learn material in order to perform better than others in class.
- **Collaborative**—This style is typical of students who feel they can learn the most by sharing ideas and talents.
- **Dependent**—This style is characteristic of those students who show little intellectual curiosity and who learn only what is required.
- **Independent**—This response style is characteristic of students who are intellectually curious and like to think for themselves.
- **Participant**—Students who want to learn course content and like to go to class display this style.
- **Avoidant**—Students who are not interested in learning course content in the traditional classroom display this style.

Each of the styles described above occurs to some degree in every student. None of the roles are exclusive; instead, people are seen as having a

learning style profile that is composed of all of the roles, with some used more than others.

Grasha (1972) reported that students in traditional lecture-oriented classroom environments tended to approach the learning situation with competitive, dependent, and avoidant learning styles. Students adopted collaborative, independent, and participatory styles in classroom environments that included group activities, individual projects, and requirements for extensive student participation.

Andrews (1981) found that even though students may shift their learning styles according to their continued exposures to particular classroom methods, they actually benefited more from classroom methods that closely fit their styles. Andrews found that students high on the collaborative scale reported strong benefits to their learning from participating in peer-chemistry discussion sections. In contrast to this, students with strong preferences for the competitive style reported that they did not benefit as much by interacting in peer-centered sections.

A 90-item scale was used to assess the degree to which students see themselves assuming the six roles in the Grasha-Riechmann Model. Students' profiles are obtained from the scores on the six subscales covered by the instrument. They are asked to judge themselves on a five-point rating scale in terms of the degree to which they agree or disagree with the statements as they apply to all their classes. This version of the instrument is called the general class version. The specific class version has the same items rewritten to give the scale a frame of reference appropriate to a specific class.

### **Instructional preference models**

Instructional models are new in the area of student learning styles. Researchers are interested in discovering the preferences that students have for study methods, instructional media, course format, and other dimensions of classroom-related learning. Instruments that have been developed in this area are grounded directly in the classroom experiences of the students. The questions asked are very specific to classroom settings and are not general in nature as the cognitive development items found in Kolb's, Hill's, or Witkin's models. The social interaction models of Grasha-Riechmann, and Fuhrmann and Jacobs are more related to classroom applications. These instructional models focus specifically on learner behavior in the classroom.

*Learning Preference Inventory* The Learning Preference Inventory developed by Rezler and Rezmovic (1981) has two parts. The dimensions assessed by the Learning Preference Inventory are abstract, concrete, individual, interpersonal, student-structured, and teacher-structured. Part one asks students to rank-order six sets of six words according to their learning preferences. Part two asks students to rank-order sentences instead of words in terms of how students match their preferences for learning. There are nine different sets of six sentences that students must rank-order in part two.

*Instructional Preference Questionnaire* The Instructional Preference Questionnaire developed by Friedman and Stritter (1981) is comprised of 57 items that ask students to agree or disagree with learning situations. The dimensions measured by this instrument are: involvement in determining course content, preferred instructional media, formal course structure, discovery learning, and reality testing.



When the student's preferences are grounded directly in the classroom-related learning experience of the student, the types of actions instructors can take to match or modify certain preferences become much clearer. Although these instructional preference models have been utilized in classroom settings, no empirical evidence was found to establish their validity or to verify their usefulness in investigating learning styles.

### **Hospitality-related Research Studies**

Cognitive learning style, or the manner in which an individual perceives, processes, and transmits information (Kolb, 1981), is becoming increasingly more important for educators in designing vocational curriculum and for students in selecting careers. The fact that the comfort a student experiences with instruction may affect his/her performance in vocational education courses makes recognition of preferred learning styles important to teachers and curriculum designers, as well as to those students deciding on careers (Heitmeyer & Thomas, 1990).

There is a broad body of literature on cognitive learning styles, social interaction models, and instructional preference models, but research in specific areas of selected academic fields of study has proven to be somewhat limited (Heitmeyer & Thomas, 1990). Home economics is one discipline in which there is limited research in the area of learning style theory. Some information is available on learning styles in hospitality management, one specific area within home economics.

Research in the hospitality industry has been conducted most recently involving students, faculty, and managers. Berger (1983) conducted a study using three groups: students, faculty in a four-year hospitality management

program at Cornell University, and managers currently working in the industry who were graduates of the program. Scores were obtained for four learning skills (traits) using Kolb's (1980) experiential learning model in a four-stage cycle. The first stage in the cycle is concrete experience (CE), the basis for learning. The next stage is observation and reflection about the experience, or reflective observation (RO). These observations and reflections develop into a theory; the theory then leads to new hypotheses which become guides for the creation of further experiences. The third and fourth stages are referred to as abstract conceptualization (AC) and active experimentation (AE), respectively.

The scores from Berger's study were used to characterize each subject as possessing one of Kolb's four learning styles—converger, diverger, assimilator, or accommodator. Most of the students in the group were classified as divergers (33%) and accommodators (29%). Assimilators and convergers each made up 19%. Scores also were obtained from hospitality professors. It was determined that 42% of the 26 professors surveyed were convergers. Twenty-seven percent were assimilators; 15% were accommodators, and 15% were divergers.

Hospitality managers, on the other hand, produced 32% accommodators and 32% convergers of the 26 surveyed. The remainder were divergers (26%) and assimilators (10%). The learning style differences among the students, professors, and managers proved to be significant at the 0.05 level. Although the Kolb Learning Style Inventory was used because of its ease of administration and persuasive manual replete with LSI norms, Berger warned that the LSI has some deficits. The most compelling one is its lack of face validity. An example is that some of the four-word sequences in the LSI do not appear to be related.

Another study conducted by Hsu (1989) examined 118 unit managers and 45 district managers in hospitality operations. Learning styles were

measured using an alternate format, the Learning Style Inventory Semantic Differential (LSI-SD), developed by Marshall and Merritt (1983). Results indicated that the learning style most prevalent among the unit managers surveyed was that of the converger (78%). Of the district managers surveyed, 76% were predominantly convergers. Other learning styles determined for both unit and district managers were that for the unit managers, 3% were accommodators, while 11% of the district managers were accommodators. Also, 3% of the unit managers were divergers, while none of the district managers were divergers. Nine percent of unit managers and 7% of district managers were classified as assimilators. These findings were consistent with Kolb, Rubin, and McIntyre's (1971) management norms which indicated that managers, in general, tended to emphasize active experimentation and reflective observation. Also, professions with a technical base consisted primarily of people with the convergent learning style (Kolb, 1984). Hsu's findings were not consistent with Berger's (1983) findings which showed that managers were spread almost equally in all four of Kolb's learning style quadrants.

Several other authors have contributed to the understanding of learning styles for managers in the hospitality industry. Mitzberg (1975) indicated that, above all, managers need to be introspective about their work and have the willingness to continue to learn on the job. Kolb (1980) has contended that today's highly successful managers are distinguished not so much by any single set of knowledge or skills, but by their ability to adapt to and master the changing demands of their jobs and careers, and again by their ability to learn.

Heitmeyer and Thomas (1990) conducted an examination of cognitive learning styles and academic achievement of post-secondary home economics students in the specific majors of dietetics, child development, fashion

merchandising, and home economics education. While this study did not directly examine hospitality management students, it did, however, examine students in similar vocational education areas. These authors examined the question of whether all majors within home economics had the same learning style. They also sought to determine whether all food and nutrition students had a field independent learning style, because many of their background courses were in the analytical sciences (such as chemistry) preferred by field independent learners. Home and family life majors also were studied to see if they were categorized as field dependent learners. The authors examined whether home economics education majors and fashion merchandising majors shared the same predominant learning style or had different learning styles.

Heitmeyer and Thomas (1990) used two cognitive learning style models to test three hypotheses. They used the Kolb Learning Style Inventory (LSI) and the Witkin, Oltman, Raskin, and Karp (1971) Group Embedded Figures Test (GEFT) to classify the students into cognitive learning style categories. The following questions were asked by the researchers: (a) will the true proportion of students in the different learning style categories be equal? (b) will there be differences in mean academic achievement among groups of students with different cognitive learning styles? and (c) will there be a relationship in the classification of student learning style categories as measured by the Witkin GEFT and Kolb LSI?

A description of Kolb's LSI is discussed earlier. The Group Embedded Figures Test (GEFT) by Witkin et al. (1971) consists of identification of a series of 18 simple geometric figures. In a timed test, the student tries to locate and outline the simple figure embedded in the more complex background. The scores are derived based on the correct number of figures identified. Scores are

divided into four quartiles, with slightly different norms for men and women. Quartiles one and two denote the field independent learners.

For this particular study, it was felt that Kolb's diverger category was similar to Witkin's field dependent category, while Kolb's converger category was similar to Witkin's field independent category. The proportion of students falling into the field dependent category was 50% and 30% for the field independent.

Paulson, Baltzer, and Cole (1989) conducted a study which measured the learning styles of undergraduate hospitality students. Kolb's Learning Style Inventory (LSI) was used to investigate the effects of learning style on achievement, and on instructional methods preferred. The sample consisted of undergraduate hospitality students enrolled in the Quantity Food Production Management Experience course at Iowa State University. Results indicated that for the 135 students who took both the pre- and post-test, a significant relationship existed between learning style and cognitive achievement. They also reported that the sample included 35.0% divergers, 38.6% assimilators, and 20.7% accommodators. Only 2% of the students were found to be convergers.

Marshall and Merritt (1984) developed a new learning style instrument which is based on Kolb's original Learning Style Inventory (LSI), because they felt that Kolb's LSI had two major problems. These were (a) use of a paired comparison, ipsative assessment approach, and (b) scale reliabilities which have been reported to fall in the .30 to .60 range.

Marshall and Merritt (1983) conducted a study using 543 undergraduates enrolled at North Carolina State University or Southern Illinois University at Edwardsville to validate their new instrument. This study was the fourth such study by Marshall and Merritt (1984) in their quest to develop a reliable and valid method for assessing learning styles within the experiential learning model.

Two earlier validation studies by these authors supported the construct validity and reliability of Kolb's LSI, but found that a semantic differential format could be used for developing an instrument with greater internal consistency than Kolb's LSI. The first study administered both forms of the LSI (the original LSI and the alternate form of the LSI) to a single sample of subjects to determine the alpha reliabilities of the scales, the interrelatedness of the scales between the ipsative and normative forms, and the factor structures for both forms. The second study was to cross-validate the normative form of the LSI pilot tested in the first study.

At first, 100 items were analyzed, but only 40 items that had the highest item-total correlations (over 0.50) were used for the final instrument. These 40 items appeared on two bi-polar dimensions, providing 10 items per learning trait scale. Reliability for each scale was estimated using Cronbach's alpha coefficient (Stanley, 1971). For the four separate learning trait scales, the possible scores ranged from 0 to 40; for the two bi-polar dimensions, the possible scores ranged from -40 to +40. The estimated reliabilities for individual scales ranged from 0.78 to 0.88, and the two estimates for the bi-polar dimensions were 0.90 for ACCE and 0.93 for AERO.

Each individual learning trait scale represented one of the four stages of Kolb's learning style model which are concrete experience (CE), reflective observation (RO), abstract conceptualization (AC), and active experimentation (AE). The bi-polar dimensions represented the combination of AC-CE and AE-RO. Kolb (1980) indicated that an individual progresses from one learning trait on to the next, with CE being the first trait and AE being the last. Marshall and Merritt (1984) felt that individuals tend to develop one style as the predominant mode of learning.

## **METHODOLOGY**

This study describes the learning styles of post-secondary vocational education students and hotel general managers in the Bahamas. The investigation also compares predominant learning styles among the students grouped by program and between the manager and student groups.

The procedure for the study consisted of reviewing literature, selecting the sample, enlisting support for the study, selecting the instrument, administering the instrument, and analyzing and reporting the data. The literature review focused on international post-secondary vocational programs and specifically on programs in the Bahamas. Literature also was reviewed on the various learning style models and studies involving post-secondary vocational education audiences that used these learning style approaches. From the literature reviewed, it was deemed that Kolb's learning style model with an experiential base would be most appropriate to use with adult audiences in this study.

The Iowa State University Committee on the Use of Human Subjects in Research reviewed the project. The committee concluded that the rights and welfare of human subjects were adequately protected, the risks were outweighed by the potential benefits and expected value of the knowledge sought, confidentiality of data was assured, and informed consent was obtained through appropriate procedures (Appendix B).

A letter requesting permission to administer the survey was sent to Mr. Pinchbeck, Executive Director of BHTC in the Bahamas (Appendix C). Institutional agency permission was obtained before further contact was made with BHTC (Appendix C).

### **Selection of the Sample**

The sample for this study contained two groups, full-time post-secondary vocational education students at the Bahamas Hotel Training College (BHTC) and general managers from hotels in Nassau, Bahamas. In September 1991, a purposive sample was selected. Of the possible 125 students, 94 (75.2%) provided responses. Out of 50 possible general managers, 24 (48%) gave responses.

Only full-time students in attendance at BHTC during the fall of 1991 were asked to complete the survey instrument. Full-time students were selected from one of the four degree programs at BHTC: (1) Ordinary National Diploma 17 Program, (2) Ordinary National Diploma 18 Program, (3) National Apprentice Chef Program, and (4) Bahamas Certificate in Bookkeeping and Front Desk Skills. Students enrolled in the Ordinary National Diploma 17 Program are those students who are newly enrolled as full-time students. Those enrolled in the Ordinary National Diploma 18 Program are those students who have been full-time students at BHTC for two or more years.

### **Selection of the Instrument**

For this study, several learning style instruments were reviewed: Field Independence and Field Dependence developed by Witkin et al. (1975), Cognitive Style Mapping developed by Hill and Nunney (1972), Fuhrmann and Jacobs Model (1980), Kolb's Learning Style Inventory (LSI) (1976), and Learning Style Inventory with a semantic differential format by Marshall and Merritt (1984). The Learning Style Inventory developed by Marshall and Merritt (1984) was ultimately selected (Appendix D). Merritt granted permission to use the Learning Style Inventory with a semantic differential (LSI-SD, 1984) (Appendix D).



The LSI-SD is based on Kolb's original LSI. The scoring procedure for the LSI-SD is found in Appendix D. The LSI-SD was considered to be reliable and to have construct validity. Marshall and Merritt (1984) employed least squares factor analysis to examine the construct validity of the instrument. Cronbach's alpha coefficients were used to determine reliabilities for each trait. The LSI-SD trait scale reliabilities ranged from 0.61 to 0.86, with a mean reliability of 0.77. After reviewing the instrument, this researcher modified one of the words in one word pair to make both words in the pair the same part of speech. The original word pair, "consider-impulsive" was changed to "considerate-impulsive."

The LSI-SD also was selected because it was deemed culturally appropriate. Guest judges (faculty members from BHTC) were sent the LSI-SD to review prior to administration to students and managers. The judges indicated that the wording of the instrument was simple enough, and that the instrument could be completed by all the students in the various programs. Also, while the item response style was one that the students were not necessarily familiar with, the judges did believe that the semantic differential response style would not present a major problem.

The Learning Style Inventory using the semantic differential was designed to assess individual's learning styles within an experiential learning model. The instrument contains 40 items in a semantic differential format using a five-point response mode. The core of the LSI-SD reflects information processing. It depicts learning in the following four stages:

1. Concrete Experience (CE)
2. Reflective Observation (RO)
3. Abstract Conceptualization (AC)
4. Active Experimentation (AE)

These four traits form two orthogonal, bi-polar axes, with AC-CE being one axis and AE-RO being the other axis. An individual can be classified by predominant learning style into one of the four quadrants defined by these axes. The four learning styles that are identified by these two axes are:

1. The Diverger—These people tend to be good at generating ideas, such as brainstorming. Their predominant learning traits are feeling (CE) and watching (RO).
2. The Assimilator—The predominant learning traits of these people are thinking (AC) and watching (RO). They tend to be good in inductive reasoning and interested in abstract conceptualization.
3. The Converger—These people tend to focus on the practical application of ideas. The predominant learning traits are thinking (AC) and doing (AE).
4. The Accommodator—The predominant learning traits are feeling (CE) and doing (AE). The accommodator's strength is in doing things and in carrying out plans.

The LSI-SD contains four scales having 10 items associated with each scale. The scales measure the four learning traits, AC, CE, AE, and RO. Each item is a bi-polar pair with a five-point response mode. Numeric values associated with each rating option are as follows:

<u>Option</u>	<u>Numeric Value</u>
A	1
B	2
C	3
D	4
E	5

Scores for each scale are obtained by summing the numeric values assigned the bi-polar pair items associated with that particular scale.

### **Preparation of the Instrument Packet**

The instrument packet for each respondent consisted of a letter to the respondent (Appendix E), the LSI-SD, and a demographic component. Two forms of the demographic component were developed. One demographic component was developed for students (DC-S) (Appendix E) and the other for managers (DC-M) (Appendix E). The DC-S and the DC-M forms contained demographic variables to be measured that were either similar or unique for each group. Common variables were gender, age, and Caribbean home. Variables unique to the DC-S were years as a full-time student and program in which currently enrolled. Variables that were unique to managers on the DC-M form were number of years in current position and number of years in the Bahamas.

### **Administration of the Instrument**

Before administering the instrument packet to students in their classroom settings, the researcher first explained to the audience that she was

an alumna of BHTC. The students also were told the overall objectives of the research study and the importance of completing the instrument.

The LSI-SD, along with the DC-S, was administered by the researcher over a one-week period to full-time students while they attended classes in the fall 1991. This procedure helped to assure that all students in the four programs who were in attendance received instrument packets.

The LSI-SD, along with the DC-M, was administered in July and September 1991. The instrument was delivered personally to each participating manager. The researcher waited while the instrument was completed, thus eliminating the need to send a follow-up instrument. Both groups completed the LSI-SD on machine-readable answer sheets that were provided by the researcher.

### **Analysis of the Data**

Before distribution, each instrument packet was given a four-digit code number. The first two digits identified whether the respondent was a student or a manager. The first two digits of the manager's code were 00, while the first two digits for the student's code were 01. Sequential numbering followed these two digits for both groups.

Respondents used machine-readable response sheets to record their responses to the LSI-SD. The response sheets were optically scanned, and the data was transferred to computer files, one for the student group, and one for the manager group. The software program, SPSS Release 4.0 (SPSS, 1990) was used to analyze data. Descriptive statistics including frequencies, percentages, and means were calculated for the 40-item instrument as well as for the demographic characteristics.

Scores were computed on the four learning traits which comprise this model: AC, CE, AE, and RO. After the data for both groups were optically scanned, several items with missing data were found. Many of the actual answer sheets were not completed using the correct type of pencil (#2 pencil), thus they were not read by the scanner. After visually examining the answer sheets and correcting the marking problem, there were still some missing data (Appendix F). At this point, missing data were replaced with item mean scores.

Missing data for students were replaced by the mean item scores for the total student group, and missing data for managers were replaced by mean item scores for the total manager groups. Scale scores were computed for the four learning traits for each student and manager ( $AC = \sum ac1 + ac2 + ac3 + \dots ac10$ ;  $CE = \sum ce1 + ce2 + ce3 \dots ce10$ ;  $AE = \sum ae1 + ae2 + ae3 \dots ae10$ ;  $RO = \sum ro1 + ro2 + ro3 \dots ro10$ ). The four traits were grouped to provide two axes (ACCE & AERO). The formula for the ACCE axis was  $ACCE = AC - CE$ , and for AERO the formula was  $AERO = AE - RO$ . A difference score for each axis was computed. After these calculations, learning styles were determined by plotting scores on the two axes to identify the learning style quadrant in which an individual datum point fell.

The scoring procedure specified by Marshall and Merritt (Appendix D) does differ slightly from Kolb's original scoring procedure. The procedures developed by Marshall and Merritt resulted in similar learning style classifications to Kolb's but used a variation on the axes to plot learning style position. The sign of the values represented on the ACCE and AERO axes have been reversed. In addition, the ACCE dimension is calculated as  $CE - AC$  for Marshall and Merritt, but  $AC - CE$  for Kolb. Likewise, AERO is calculated as  $RO - AE$  for Marshall and Merritt, but  $AE - RO$  for Kolb. This reversal of dimension

formula and value representation on the axes caused confusion for the researcher. Several telephone contacts were made with Merritt to better understand the scoring procedure. Because these contacts resulted in changing information on scoring procedure, the dimension formulas specified by Kolb ( $ACCE = AC - CE$  and  $AERO = AE - RO$ ) and the grid position with negative values to the top and right of the (0,0) origin were used.

The Kolmogorov-Smirnov goodness of fit test determines the degree of agreement between the distribution of a set of sample values (observed scores) and some specified theoretical distribution. The test estimates whether the scores in the sample can reasonably be thought to have come from a population having the theoretical distribution. The sampling distribution indicates whether a divergence of the observed magnitude would probably occur if the observations were really a random sample from the theoretical distribution (Siegel, 1956). The Kolmogorov-Smirnov goodness of fit test (Kolmogorov, 1941; Smirnov, 1948) was performed on the ACCE and AERO axes to ensure that these dependent variables were normally distributed.

Discriminant analysis was used to determine whether a set of independent variables could predict the learning style of each respondent (either BHTC student or hotel manager). Common demographic characteristics (age, gender, Caribbean home) from both groups were used as independent variables to determine effect on learning style. For purposes of the discriminant analysis, two variables were created. Because the age ranges on the DC-S and DC-M varied, a new age match variable was created to accommodate the ranges from both instruments. In addition, a dichotomous variable, student/manager status was created.

Cross-tabulation and chi-square analysis procedures were conducted to identify the overall proportion for each learning style quadrant by student and manager groups. Chi-square procedures also were completed to determine learning styles of students by their enrolled programs. From Kolb's learning style model, the proportions of convergers, assimilators, divergers, and accommodators reported in previous research studies were compiled. These groups were compared to the proportions of learning style categories found in this study.

Upon closer examination of learning style plots (Appendix G), additional analyses were considered. A recalibration of ACCE and AERO axes was performed. Using either the original or recalibrated axes, the analyses showed that there were students and managers who were plotted on the axes, thus these respondents were unable to be classified in one of the four learning style quadrants.

Confirmatory factor analysis was used to cross-validate the learning trait scales. The 40 items from the LSI-SD were factor analyzed using the principal components method with varimax rotation. Items were placed into four factors based upon size of factor loading and rationality of fit. Factors were determined by examining items with loadings (positive and negative) above .35 on a factor. The .35 loading minimum was determined after examining the obtained factor loadings for *fit* of items into a factor relative to the LSI-SD scoring procedure. This minimum is reasonable for items used to form a factor. Nunnally (1978) described substantial factor loadings as those which are .40 or higher, and very small loadings as those which are .30 or lower. He stated that factors typically are not interpreted when all items in the factor have loadings no higher than .30.

## **RESULTS AND DISCUSSION**

This study was designed to identify learning styles of full-time post-secondary vocational education students and hotel general managers in the Bahamas and to investigate the effect of common demographic variables (Caribbean home, age, gender) from these groups on learning styles. Data relevant to these objectives were collected from a sample of 94 full-time students and 24 managers through a 40-item semantic differential learning style instrument and a demographic component described in the previous chapter.

This chapter presents a description of the data and results of findings for the objectives of this study. The results will be reported in six sections:

1. Description of respondents
2. Preliminary determination of learning styles
3. Description of common variables for total group
4. Learning style predictive discriminant analysis
5. Major findings
6. Discussion

### **Description of Respondents**

According to Claris Price, Registrar of the Bahamas Hotel Training College, there were 125 full-time students in attendance during fall, 1991. Of the 125 full-time students in attendance during the data collection period, 94 students completed the survey instrument for a response rate of 75%.

During the data collection periods of July and September 1991, an attempt was made to contact and collect data from 50 general managers in hotels in Nassau, Bahamas. Hotels were operationally defined as those lodging



establishments that include restaurant facilities on the premises. These establishments usually had 300 or more guest rooms. General managers were defined as those individuals who were responsible for the entire management of the hotel. Fifteen of 50 general managers could not be reached by telephone. Of the 35 who were contacted, 11 were unable to participate during the data collection period due to one of the following reasons: (a) they were not in town during the collection period, (b) they canceled the appointment and were unable to reschedule, or (c) some general managers were simply not available during the data collection period. Therefore, of the 50 hotel general managers contacted for participation in the survey, data were collected from 24 hotel general managers for a response rate of 48%.

Table 1 summarizes demographic characteristics of students. Demographic data indicate that of the 94 students who participated in this study, 34 (36.2%) were male and 60 (63.8%) were female. Eighty-eight (93.6%) students were less than 25 years old, and three (3.2%) were between the ages of 25 and 29. Another three (3.2%) students were between the ages of 30 and 34 years old. An overwhelming percentage of the students (95.7%) had permanent homes in the Caribbean, while only four of the students did not live in the Caribbean.

When asked how long the students had been enrolled in programs at BHTC as full-time students, 42.6% indicated that they were new full-time students. Twenty-three (24.5%) were enrolled in the program for one year. Students enrolled in a program on a full-time basis at BHTC for a year and a half amounted to 9.6% of the total. Twenty-one (22.3%) students were enrolled full-time in a program at BHTC for two years or more. Of the 94 full-time students who participated during the data collection period, one student (1.1%)

**Table 1. Demographic characteristics of students**

Variables	Frequency <sup>a</sup>	Percent (%)
Gender		
Male	34	36.2
Female	60	63.8
	94	100.0
Age group of students		
Less than 25 years	88	93.6
25 to 29 years	3	3.2
30 to 34 years	3	3.2
	94	100.0
Home in the Caribbean		
Yes	90	95.7
No	4	4.3
	94	100.0
Time in program as a full-time student		
New full-time student	40	42.6
1 year	23	24.5
1½ years	9	9.6
2 years or over	21	22.3
Not a full-time student	1	1.1
	94	100.0
Program enrolled		
Ordinary Diploma 17	17	18.1
Ordinary Diploma 18	53	56.4
National Apprentice Chef	18	19.1
Bookkeeping and Front Desk	6	6.4
	94	100.0
Prior work in industry		
Yes	34	36.2
No	60	63.8
	94	100.0

<sup>a</sup> For each variable on the demographic component for students form (DC-S), all respondents answered. No missing data occurred.

reported that he/she was not a full-time student but took many classes with the other full-time students. Data from this one student were retained in the data set.

There were four programs in which full-time students at BHTC could have been enrolled. There were 17 (18.1%) students enrolled in the Ordinary National Diploma 17 Program. Fifty-three (56.4%) students were enrolled in the Ordinary National Diploma 18 Program. Eighteen (19.1%) of the students were enrolled in the National Apprentice Chef Program, and only six (6.4%) of the students were enrolled in the Bookkeeping and Front Desk Skills Program.

When asked if the students had any prior work experience in the hospitality industry, 34 (36.2%) indicated that they did have some experience. Sixty (63.8%) students indicated that they did not have any work experience in the hospitality-related positions.

Table 2 summarizes managers' demographic data by count and percentage. Data indicate that of the 24 managers who participated in this study, 16 (66.7%) were male, and eight (33.3%) were female. The ages of managers varied somewhat. Only one (4.2%) of the managers was less than 30 years of age. Six (25%) of the managers were between 30 and 39 years old. Eleven managers (45.8%) reported their ages to be between 40 and 49 and six (25%) were over 49 years of age.

When asked what was the highest degree received by general managers in this study, eight (33.3%) had only a high school diploma. Five of the managers (20.8%) had a two-year hospitality-related degree. There was only one (4.2%) manager who had a hospitality-related bachelor's degree. There were six (25%) managers who held non-hospitality related bachelor's degrees. Four (16.7%) of the general managers had advanced degrees, which included MBA, PhD, or some other graduate-level degree.

**Table 2. Demographic characteristics of managers**

Variables	Frequency <sup>a</sup>	Percent (%)
Gender		
Male	16	66.7
Female	8	33.3
	<u>24</u>	<u>100.0</u>
Age group of managers		
Less than 30 years	1	4.2
30 to 39 years	6	25.0
40 to 49 years	11	45.8
50 to 59 years	5	20.8
60 or more years	1	4.2
	<u>24</u>	<u>100.0</u>
Highest degree received		
High school diploma	8	33.3
2-year hospitality-related	5	20.8
B.S. hospitality-related	1	4.2
B.S. nonhospitality-related	6	25.0
Advanced degree	4	16.7
	<u>24</u>	<u>100.0</u>
Number of years in current position <sup>b</sup>		
1 year	6	25.0
2 to 5 years	6	25.0
6 to 10 years	6	25.0
12 to 19 years	6	25.0
	<u>24</u>	<u>100.0</u>
Similar positions held		
Yes	14	58.3
No	10	41.7
	<u>24</u>	<u>100.0</u>
Number of years in Bahamas <sup>b</sup>		
1 to 3 years	5	22.0
10 to 19 years	6	25.0
20 to 26 years	6	25.0
31 to 52 years	7	28.0
	<u>24</u>	<u>100.0</u>
Nationality		
Bahamas	14	58.3
United States	5	20.8
Italy	1	4.2
Israel	1	4.2
France	1	4.2
Germany	1	4.2
Canada	1	4.2
	<u>24</u>	<u>100.0</u>

<sup>a</sup> For each variable on the demographic component for managers form (DC-M), all respondents answered. No missing data occurred.

<sup>b</sup> Categories were determined by collapsing data points rather than determining equal sized intervals. There were no data counts between labeled categories.

Managers were asked to indicate the number of years they had been employed in their current position. The number of years in current position ranged from 1 to 19 years. The mean number was 6.79 years and the standard deviation was 5.91. For summarizing, the frequency distribution was examined and data were collapsed. Six (25%) managers were in their present position for one year and six (25%) managers were in their current position between two and five years. Another six managers were in their current position for 6 to 10 years, and six were in their current position for 12 to 19 years. When asked if these managers had held a position similar to the one that they currently hold, 14 (58.3%) answered positively, while 10 (41.7%) answered negatively.

Number of years managers had lived in the Bahamas ranged from 1 to 52 years. The mean was 21.25 years and the standard deviation was 15.09. The data then were grouped for summary presentation into proportionally equal categories. Five (22%) managers lived in the Bahamas for one to three years. Six (25%) managers resided in the Bahamas between 10 and 19 years. Six (25%) lived in the Bahamas between 20 and 26 years, while seven (28%) lived there between 31 to 52 years. Nationalities of the general managers included the continents of North America (Bahamas, United States, Canada) (83.3%), Europe (Italy, France, Germany) (12.6%), and Asia (Israel) (4.2%).

### **Preliminary Determination of Learning Styles**

Respondents used machine-readable answer sheets to record their responses to the LSI-SD. The answer sheets were optically scanned and the data transported to two computer files, one for the student group and one for the manager group. Scores were computed for student and manager groups on the four learning traits which comprise the learning style model. These traits

were identified as abstract conceptualization (AC), concrete experience (CE), active experimentation (AE), and reflective observation (RO). After the LSI-SD answer sheets were optically scanned for both groups, scores reflected that of the 24 managers, 18 (75%) had a diverger learning style comprised of the CE and RO learning traits, while three (12.5%) of the managers had an assimilator learning style that was comprised of the AC and RO learning traits. Three managers (12.5%) were not classified initially by learning style because some data were missing from their response sheets (Appendix G).

Scores for students were computed to determine learning traits. Of the 94 students, 56 had complete data on which scores were computed. Of the 56 students, 29 (30.9%) had a diverger learning style comprised of the CE and RO learning traits. Eleven (11.7%) students had an accommodator learning style with CE and AE as the predominant learning traits. The converger learning style with AC and AE as the predominant learning traits accounted for five (5.3%) of the students, while 11 (11.7%) students had the assimilator learning style with AC and RO as the dominant learning traits. Thirty-eight (40.4%) of the students were not classified into learning style quadrants initially, because some data were missing from their response sheets (Appendix G).

From reviewing the LSI-SD response sheets for both student and manager groups, it was determined that many of the sheets were not completed using a #2 pencil which is required for optical scanning. This problem was corrected, and the data were analyzed again. However, for 22 (23.4%) cases, some items still had missing data. At this point, missing data were replaced with item mean scores from the respective manager or student group (Appendix G).

After missing data were replaced with group item mean scores, the four learning trait scores were re-computed. Scores for ACCE and AERO learning

dimensions were calculated as differences between the trait scores in each dimension (Appendix D). Means for learning traits and learning dimensions are reported in Table 3. Using the combined data set (student and manager groups), the ACCE and AERO dimensions were submitted to the Kolmogorov-Smirnov goodness of fit test. The Kolmogorov-Smirnov goodness of fit test indicated that both the ACCE (K-S test = .682,  $p = .742$ ) and the AERO (K-S test = .851,  $p = .464$ ) axes were distributed normally.

**Table 3. Means for learning traits and learning dimensions**

Learning trait/dimension	Students $\bar{X}$ (n = 85)	Managers $\bar{X}$ (n = 24)	Total group $\bar{X}$
AE	23.71	28.56	24.70
RO	19.34	14.07	18.27
AC	23.56	28.24	24.51
CE	17.66	16.74	17.47
ACCE	-4.37	-11.50	-7.04
AERO	-5.90	-14.54	-6.44

For any student's item that had a missing response, the response was replaced by the mean item score for the total student group. Items were summed into scale scores, and these scores indicated that of the 94 students, 44 (46.8%) had a diverger learning style with dominant learning traits of CE and RO. Seventeen (18.1%) students were accommodators with learning traits of CE and AE. Convergents with AC and AE learning traits accounted for nine (9.6%) of all students, while 15 (16%) of the remaining students were assimilators with predominant learning traits of AC and RO. After mean item replacement for missing data, nine (9.6%) students still were not classified into any of the

learning style quadrants. This was due to these individuals' scores falling directly on either the ACCE or AERO axis, or at the origin (Appendix F).

The problem of unclassified cases was not evident in Kolb's original LSI. Kolb's LSI axes were calibrated at the 50th percentile rather than at the 0 point. Therefore, the axes were most likely decimal numbers, rather than whole numbers, with the result that no cases would fall directly on the axes. However, for this study, when axes were recalibrated at the 50th percentile, the coordinates of the origin did include a whole number (-6.84, -7.00). Unfortunately, recalibrating the axes did not resolve the problem of unclassifiable cases, because for this data set, the adjusted axes still included a whole number, and some cases were plotted on that axis.

Missing data for managers were replaced by the mean item scores for the total manager group. The analysis indicated that after this replacement, 21 (87.5%) managers were divergers with predominant learning traits of CE and RO. The remaining three (12.5%) managers were classified as assimilators with learning traits of AC and RO.

After mean item replacement and determination of learning styles for the student and manager groups, the data files for both groups were combined to simplify remaining data analyses. The combined groups were classified as the total group. Two additional variables were created. A dichotomous variable was used to indicate student or manager status. In addition, the age categories on the demographic component for students form (DC-S) varied from the age categories on the demographic component for managers form (DC-M). After examining the frequencies on age for each group, a new variable, age match, was created which combined the two ranges (Table 4).



Combined scores of learning style quadrants were obtained for the total group. These scores revealed that 65 (55.1%) individuals in the total group were divergers. Seventeen (14.4%) individuals were accommodators, nine (7.6%) were convergers, and the remaining 18 (15.3%) individuals were assimilators. Again, nine (7.6%) of this combined group were not classified into learning style quadrants, because the individual scores fell either on the ACCE or the AERO axis or on the origin.

**Table 4. Age match created variable with frequencies for associated ranges**

Age range in years	DC-S	DC-M	Combined
<25	88		
25-29	3		
30-34	3		
35-50	0		
<30		1	
30-39		6	
40-49		11	
50-59		5	
60 or more		1	
<25			88
25-29			4
30-39			9
40-49			11
50 or more			6
Totals	94	24	118

#### **Description of Common Variables for Total Group**

Independent variables common to both the student and manager groups were examined. These variables were gender, age, and Caribbean home. Descriptive analyses indicated that 50 (42.4%) respondents were male, and 68

(57.6%) were female. Individuals who were less than 25 years old accounted for 88 (74.6%) of the total group. Four (3.4%) were between the years of 25 and 29. Nine (7.6%) individuals in the group were between 30 and 39 years old. Eleven (9.3%) were between 40 and 49 years old, while only six (5.1%) were over 50 years old. When asked if respondents' permanent homes were in the Caribbean, 104 (88.1%) answered positively, and 14 (11.9%) answered negatively.

### **Learning Style Predictive Discriminant Analysis**

Discriminant analysis is a procedure used to classify units into defined groups or populations. The techniques used in classifying units are known as predictive discriminant analysis (PDA) (Huberty, 1984). Predictive discriminant analysis techniques may be used to answer two questions: What are good estimates of separate-group and total-group percents of correct classification (i.e. hit rates)? and are the observed hit rates better than those expected by chance? In essence, PDA techniques are used primarily to establish a group-assignment rule and assess its use. Predictive discriminant analysis was used in this study to determine whether the independent variables could be used to classify the learning styles of the respondents.

Discriminant analyses were conducted using the total group of students and managers. Prior probabilities for each learning style were established for the total group. Prior probabilities are simply probabilities of belonging to one of the groups being considered and are typically based on relative population sizes (Huberty, 1984). The prior probabilities for this study reflected the actual proportions found for each learning style. The probabilities used were 0.60 for diverger, 0.16 for accommodator, 0.08 for converger, and 0.16 for assimilator.

Results of the discriminant analysis using prior probabilities indicated that all 109 cases (excluding the nine cases that were ungrouped) were predicted as belonging to the diverger group. Table 5 shows that 59.6% of all grouped cases were correctly classified.

**Table 5. Predictive discriminant analysis group classification results**

Learning style groups	Actual group membership Number	Predicted group membership							
		with prior probabilities <sup>a</sup>				without prior probabilities <sup>b</sup>			
		Di <sup>c</sup>	Ac <sup>d</sup>	Co <sup>e</sup>	As <sup>f</sup>	Di	Ac	Co	As
Diverger	65	65	0	0	0	22	26	14	3
Accommodator	17	17	0	0	0	0	13	4	0
Converger	9	9	0	0	0	0	4	5	0
Assimilator	18	18	0	0	0	4	5	6	3
Ungrouped	9	9	0	0	0	1	5	3	0
Total	118								
Percent correctly classified		59.63%				39.45%			

<sup>a</sup> Prior probabilities were established as .60, .16, .08, .16, respectively.

<sup>b</sup> Without prior probabilities expectations for group membership were .25, .25, .25, .25, respectively.

<sup>c</sup> Di or Diverger.

<sup>d</sup> Ac or Accommodator.

<sup>e</sup> Co or Converger.

<sup>f</sup> As or Assimilator.

Perhaps all 109 cases were predicted as belonging to the diverger group because of the high probability established for divergers and the limited variability in the independent variables. That is, of the four variables considered, three were dichotomous variables (Caribbean home, gender, and student/manager status), and age match had a five-point range.

Table 6 shows the classification function coefficient results. These results indicate that the dichotomous variables (student-manager group, Caribbean home, and gender) seem to contribute the most to the discriminant function equation.

**Table 6. Fisher's linear discriminant classification function coefficients**

Variables	Diverger	Accommodator	Converger	Assimilator
Age match	-6.33	-6.86	-6.99	-6.83
Caribbean home	11.30	10.91	10.50	11.92
Gender	8.90	9.36	7.92	8.79
Student/manager status	24.56	24.27	24.35	24.70
Constant				
With priors <sup>a</sup>	-23.74	-24.25	-22.18	-24.92
Without priors <sup>b</sup>	-24.61	-23.81	-21.04	-24.47

<sup>a</sup>Prior probabilities for group membership were .60, .16, .08, .16, respectively.

<sup>b</sup>Without prior probabilities expectations for group membership were .25, .25, .25, .25, respectively.

For this study, discriminant analysis also was performed without establishing prior probabilities. This would assume that a person had an equal chance of being identified with each particular learning style. When no prior probabilities were established, only 39.5% of cases in the total group were correctly classified (Table 5).

Table 6 shows the classification function coefficients for both sets of results, using prior probabilities, and without specifying prior probabilities. The coefficients for each variable were the same. However, the constant varied slightly.

### **Major Findings**

This section of the study will report the results of the objectives that were established. The objectives were:

1. To assess the learning styles of full-time post-secondary vocational education students at BHTC.
2. To assess the learning styles of hotel general managers currently working in the Bahamas.
3. To compare predominant learning styles of full-time post-secondary vocational education students and hotel general managers.
4. To compare the learning styles of full-time post-secondary vocational education students by the four full-time programs they enrolled in at BHTC.

Results of the investigation of objective one indicated that of the 94 students who participated in this study, 44 (46.8%) had a diverger learning style. Seventeen (18.1%) students were accommodators, nine (9.6%) were convergers, and the 15 (16%) remaining students were assimilators. Analysis of objective two indicated that of the 24 managers who participated in this study, 21 (87.5%) were divergers and three (12.5%) were assimilators.

When learning styles were compared between the student and manager groups, results indicated that 44 (50.7%) students and 21 (87.5%) managers had the diverger learning style. Seventeen (13.3%) of the students were accommodators, while no managers had the accommodator learning style. None of the managers had converger learning styles, but nine (7%) students had this style. The remaining three (12.5%) managers had an assimilator learning style, while 15 (14%) students had this style (Table 7). Student scores were calculated using only 85 students. Nine students whose learning styles could

not be classified because their scores, when plotted, fell on the ACCE or AERO axis were dropped from further analysis. Chi-square results ( $\chi^2 = 11.65$ , d.f. = 3) indicated that when compared, differences in learning styles for the student and manager groups were statistically significant at the .05 level.

**Table 7. Learning styles of students and managers**

Learning styles	Students <sup>a</sup>		Managers	
	Frequency	Percent (%)	Frequency	Percent (%)
Diverger	44	51.8	21	87.5
Accommodator	17	20.0	0	0.0
Converger	9	10.6	0	0.0
Assimilator	15	17.6	3	12.5
Total	85	100.0	24	100.0

<sup>a</sup> Nine students were excluded because they were not able to be classified.

Students' learning styles were compared to the program they were enrolled in at BHTC. Only three programs (Ordinary National Diploma 17, Ordinary National Diploma 18, and National Apprentice Chef Program) were included in the chi-square analysis, because the overall count for students in the Bookkeeping and Front Desk Skills Program was too low. Seven (8.3%) students from the Ordinary National Diploma 17 Program, 26 (23.8%) from the Ordinary National Diploma 18 Program, and eight (8.8%) from the National Apprentice Chef Program had a diverger learning style. Students who had an accommodator learning style are represented in the three programs. These included: three (3.2%) from the Ordinary National Diploma 17 Program, nine (9.2%) from the Ordinary National Diploma 18 Program, and five (3.4%) from the

National Apprentice Chef Program. The Ordinary National Diploma 17 Program had three (1.7%) students who had a converger learning style, the Ordinary National Diploma 18 Program had four (4.9%), and the National Apprentice Chef Program had two (1.8%) students who had converger learning style. Students with an assimilator learning style were included in all of the programs; three (2.8%) were in the Ordinary National Diploma 17 Program, seven (8.1%) were in the Ordinary National Diploma 18 Program, and three (1.1%) were in the National Apprentice Chef Program (Table 8). When chi-square results are compared ( $\chi = 8.32$ , d.f. = 9), the differences in learning styles for students in the three programs were not statistically significant.

**Table 8. Learning styles of students by enrolled programs**

Learning styles	Ordinary National Diploma 17		Ordinary National Diploma 18		Apprentice Chef	
	N	(%)	N	(%)	N	(%)
Diverger	7	43.8	26	56.5	8	47.1
Accommodator	3	18.8	9	19.6	5	29.4
Converger	3	18.8	4	8.7	2	11.8
Assimilator	3	18.8	7	15.2	2	11.8
Total	16	100.0	46	100.0	17	100.0

Factor analysis was used to cross-validate the learning trait scales. The combined data set for 118 students and managers was used in the factor analysis. The 40 items from the LSI-SD were factor analyzed using the principal components method with varimax rotation. According to Marshall and Merritt's (1984) scoring procedure, each learning trait (AC, CE, AE, and RO) consisted of a 10-item sub-group of the total 40 items comprising the instrument (Table 9).

**Table 9. Composition of learning traits by item number<sup>a</sup> using student and manager responses<sup>b</sup>**

Learning traits	Marshall and Merritt original scheme	Factor analyzed scheme	Rotated factor loadings
Abstract Conceptualization	10	15	.46
	15	17	.37
	17	24	.40
	24	26	.41
	26	27	.63
	27	29	.57
	29	34	.50
	34	36	.45
	36	38	.44
	38	39	.49
		40	.39
Active Experimentation	6	6	.56
	7	7	.53
		10	.38
	11	11	.50
	13	13	.52
	16	16	.52
	19	19	.36
	23	23	.41
		28	.36
	32	30	.39
	39	32	.66
	40		
Reflective Observation	2	2	.49
	3	5	.50
	8	9	.51
	9	12	.25
		18	.56
	20	21	.50
	22	22	.58
	31	31	.38
	33		
	35	35	.58
	37	37	.51
Concrete Experience	①	3	.54
	④		
	5	8	.46
	12		
	14	14	.32
	18	20	.67
	21		
	②⑤		
	28		
	30	33	.36

<sup>a</sup> Item numbers for items which did not emerge in factor analysis for 4-factor solution are circled.<sup>b</sup> n = 118.



For purposes of cross-validation, a factor analysis using a four-factor solution was conducted. Items in the four-factor solution did not reflect the same combination of items comprising the original learning traits. For the learning traits abstract conceptualization, active experimentation, and reflective observation, nine, eight, and six, respectively, of the original 10 items were maintained. For the concrete experience learning trait, only one of the original 10 items was maintained.

### **Discussion**

Reported demographic characteristics of students participating in this study were somewhat predictable. Almost one-third of the 94 students were male, and two-thirds were female. In addition, 88 (93.6%) students were less than 25 years old. With more females entering management roles in the hospitality industry, this finding seems to support their desire to develop appropriate skills. That many of the students either lived in, or reported their national origin from the Bahamas or somewhere in the Caribbean was expected.

In the Ordinary National Diploma 18 Program at BHTC, 53 (56.4% of all the full-time students enrolled) completed the survey. This high proportion was probably due to the fact that the Ordinary National Diploma 18 Program has the youngest full-time students in the school. Also, these students are more apt to be present on the first day of classes, because they are not as familiar with the school system as are the Ordinary National Diploma 17 Program students who have been enrolled for two or more years at BHTC.

After carefully examining the results of the managers' demographic data, several unexpected findings were noted. Out of the 24 general managers surveyed, eight were female, and 16 were male. This distribution was

surprising, because even though the hospitality industry is thought of as a very male-dominated industry, the proportion of females in general hotel manager positions is increasing. The other surprising finding was that eight out of the 24 managers had only a high school diploma. This constituted one-third of the general managers who supervised 300-plus room hotels. Two conditions may contribute to this fact. First, many of the managers were between the ages of 40 and 49, and there was not much emphasis on obtaining a degree in hospitality management when they first entered the hospitality industry. More emphasis was placed on learning a vocational trade which would assist individuals to support their families. Second, many of these managers had no formal training, but moved up through the ranks of the industry. After a period of time, due to seniority and/or years of experience in the industry, the position of general manager became vacant and was offered to them. This conjecture seems to be supported by the fact that 12 of the managers were in the position of general manager for 10 to 19 years, while 14 other managers held positions similar to their current ones.

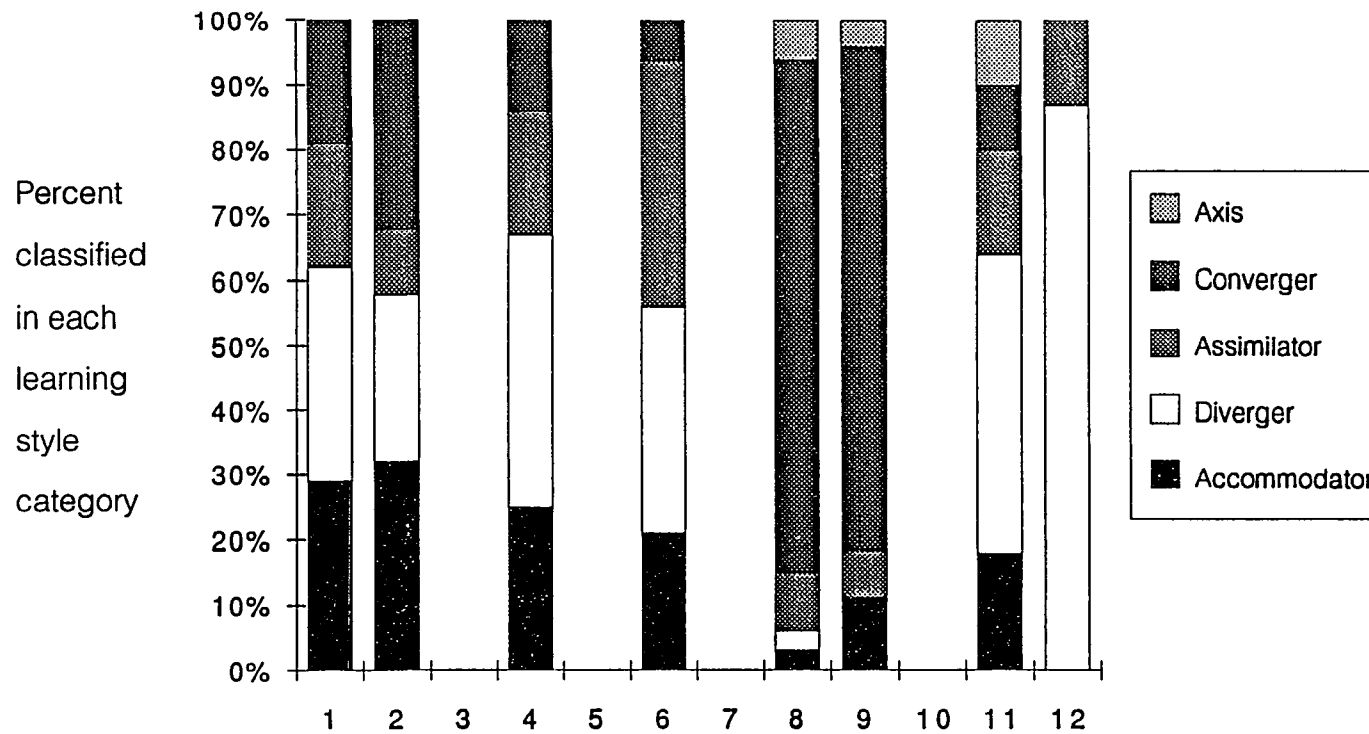
In terms of cultural representation among the managers, many were from foreign countries. Managers indicated that they were from countries in the continents of Asia, North America, and Europe. Despite the differences in nationality, respondents were still able to complete the LSI-SD instrument with minimal or no questions regarding the wording on the instrument.

In the examination of the learning styles of both the students and managers, it was very apparent that almost all respondents in the manager group had the diverger learning style, and half of all respondents in the student group had similar learning traits that resulted in very similar learning styles. Of the four learning styles discussed earlier (diverger, accommodator, converger,

and assimilator), the one that was predominant for both groups was that of the diverger. Forty-four students and 21 managers had the diverger learning style. Skills of a person with the diverger learning style, according to Kolb (1984) and Marshall and Merritt (1984), are brainstorming ideas, having imaginative abilities, understanding people, and recognizing problems. From the researcher's personal experience in the hospitality industry, these skills seem to be the preferred skills for managers as they work with hospitality industry personnel.

In comparing the results of hotel managers and students in this study with those of other studies in the hospitality industry, there is only partial agreement on learning style classification. Results appear similar in some cases, while in other cases they vary sharply (Figure 2). When comparing hospitality managers in this study with those of Hsu (1989) and Berger (1983), cross-tabulations indicated that the majority of the managers in these previous studies were convergers. No convergers were identified in this study, however, and the predominant learning style for Bahamian hotel general managers was diverger. When the classification results for students in this study were compared to students in studies by Berger (1983), Heitmeyer and Thomas (1990), and Paulson et al. (1989), there were similarities. Like the majority of the students in this study who were divergers, the majority of students in the previous studies also had a diverger learning style.

Of the three general managers who did not have a diverger learning style in this study, all were recorded as having an assimilator learning style. Examination of other demographic characteristics for these three managers did not reveal any unusual or unique characteristics when compared to the manager group in general.



- |   |   |    |                                   |
|---|---|----|-----------------------------------|
| 1 | Berger (1983) student group                   | 8  | Hsu (1989) unit manager group     |
| 2 | Berger (1983) manager group                   | 9  | Hsu (1989) district manager group |
| 4 | Heitmeyer & Thomas (1990) student group       | 11 | Rolle student group               |
| 6 | Paulson, Baltzer, & Cole (1989) student group | 12 | Rolle manager group               |

**Figure 2. Proportions of samples in each learning style category**

A confirmatory factor analysis was completed to determine if the 40 items on the Marshall and Merritt LSI-SD would cluster on the four learning traits as indicated in the scoring procedure. An additional factor analysis was performed on the four learning traits using a two-factor solution. The results indicated that the four learning traits which were used to form the two axes (ACCE and AERO) were not highly matched. These results instead seem to suggest that the learning traits of AC and AE and the CE and RO traits were better matched (Table 10). One reason for this different pairing could be that the population of individuals associated with the hospitality industry may differ from populations used in previous studies. The reviewed studies using Kolb's LSI or the LSI-SD by Marshall and Merritt reported using various populations including nursing students, adult students, and managers.

**Table 10. Factor loadings for two-factor solution using learning traits**

Learning traits	Factor I	Factor II
Abstract Conceptualization	.79	
Active Experimentation	.90	
Reflective Observation		.75
Concrete Experience		.89

The last area to consider in this section is whether an individual's learning style is an independent entity, or if the individual's preferred learning style changes over time in a cyclical fashion. From the literature cited, many conflicting statements suggest that both orientations have been proposed and used as a basis for research. A personal conversation with Kolb in 1991

suggested that he was convinced that, depending on certain situations, individuals' learning styles tended to change from their original learning style into another style. The direction of change was not the same, but differed by individual and situation. This position seems to be a reversal from Kolb's earlier assertion that a person's learning style tends to remain relatively constant over that person's life span.

For this study, the nature of learning styles was assumed to be both independent and constant. No cyclical movement was considered; rather, for statistical analysis, learning style was treated as a categorical variable.

### **Implications**

This study examined the learning styles of post-secondary vocational education students majoring in hospitality and hotel general managers in the Bahamas. Results were compared to similar studies conducted in the United States. Because of the treatment of missing data and the lower response rate for hotel general managers, findings from this study should be considered with some caution. Nevertheless, it appears that further investigation of the LSI-SD should be conducted to determine if it is an appropriate alternate form for the LSI. The problem of unclassified cases may be one which has merely gone unreported in earlier studies which used the LSI-SD.

## **SUMMARY AND RECOMMENDATIONS**

### **Summary**

This study was designed to determine the learning styles of post-secondary vocational education students and hotel general managers in the Bahamas. It was also designed to determine whether the predominant learning styles of both groups were similar and how the learning styles of students in the four full-time programs at BHTC compared.

To achieve the objectives of this study, the learning style instrument developed by Marshall and Merritt (1984) was used. This instrument was used because (a) it has an experiential-based learning style instrument that is best suited for surveying an adult audience in an experiential setting, (b) it has been used before by other researchers in the field of hospitality management, and (c) it appeared to present no cultural bias for the audience.

Data were collected from 94 students at BHTC and 24 general managers from hotels in Nassau, Bahamas. Students were selected from BHTC because these students were post-secondary students at a hospitality training center, and they would most likely graduate and follow a career path for becoming a general manager in a hotel in the Bahamas.

Descriptive statistics including frequencies, percentages, and means were calculated for the 40-item learning style instrument as well as the two demographic components. Learning styles for the LSI-SD were computed using the scoring procedure provided by Marshall and Merritt (Appendix D). The Kolmogorov-Smirnov goodness of fit test was performed on the ACCE and AERO axes to test for normality of the dependent variables. Discriminant analysis was used to determine whether a set of independent variables could predict the

learning style of each respondent. The common demographic characteristics of age, gender, and Caribbean home were used as independent variables to determine their effect on the learning styles.

### **Limitations**

The following limitations were recognized as a result of this study.

1. Thirty-eight (40.4%) of the students were not classified into learning style quadrants initially, because the answer sheets were not completed using a #2 pencil which is required for optical scanning. Procedures were used to recover as much data as possible.
2. Many of the hotel general managers were on vacation or out of the country during the data collection period, thus data were only collected from 24 of the possible 50 managers.
3. Although the request was made that only full-time students complete the learning style instrument, there was one student who completed the instrument who was not a full-time student. Because these data were not likely to alter findings significantly, the decision was made to leave the respondent's data in the data set.

### **Conclusions**

Two important conclusions were derived from this study. Computation of all data in this study revealed that (a) a majority of both the students (51.8%) and managers (87.5%) had a diverger learning style; and (b) when examining students' learning style by program for the three programs with adequate numbers for comparison, a plurality of the students represented in each program had a diverger learning style.



In addition, there were some concerns regarding instrumentation that emerged. The Marshall and Merritt LSI-SD does not account for those individuals whose scores fall on the ACCE or AERO axes, or at the origin. In Kolb's original LSI this problem is not evident, because the axes he used were calibrated at the 50th percentile, thus using decimal numbers (approximately 3.8, 5.9) rather than whole numbers for the coordinates of the origin. Using the Marshall and Merritt LSI-SD with ACCE and AERO intersecting at 0, 0 coordinates resulted in 10% of the cases not being classified.

This study has the potential to impact the hospitality industry of the Bahamas. It could impact the industry in the following ways:

1. Results of this study can assist BHTC program directors as they plan vocational courses which meet the curriculum objectives of the program and those of the Ministries of Education and Tourism.
2. Studies can be conducted that further investigate student learning styles at BHTC utilizing various learning style models.
3. When presented to the Ministry of Education, results of this study may be considered in the planning stages of new four-year hotel training facilities.
4. This study also adds to the body of knowledge relating to international vocational education.

### **Recommendations**

Based on the results of this study, the researcher makes the following recommendations:

1. A similar study should be conducted using a larger sample of students and managers from schools and establishments in the Bahamas or another Caribbean island.
2. A further examination should be made of the appropriateness of using the Marshall and Merritt LSI-SD as a substitution for Kolb's LSI with hospitality and other groups.
3. A study should be undertaken to investigate the relationship between learning styles of post-secondary education hospitality students and the teaching styles used in their classes.

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## **ACKNOWLEDGMENTS**

I would like to express my sincere gratitude to various individuals and organizations who have contributed to the success of this interesting academic pursuit.

I am especially grateful to Dr. Cheryl Hausafus, my major professor, for her guidance, scholarly advice, and moral support throughout the completion of the study. Sincere appreciation is extended to Dr. Rosalie Amos who agreed to become my co-major professor and to Dr. Mack Shelley for his statistical advice. Appreciation is also extended to other committee members: Dr. Cathy Hsu and Dr. William Wolansky whose invaluable expertise helped to shape the direction of this study.

The author wishes to thank the Minority Student Affairs Office and the International Chapter of P.E.O. Sisterhood for their financial assistance throughout the various stages of the study. Sincere appreciation is extended to Donna Fincham for her assistance in typing and formatting the actual dissertation.

A special thanks is reserved for Dr. George Jackson for his encouragement, support, and belief in me that I would accomplish all of my intended goals and also for being a friend to me throughout my five years at Iowa State University.

Above all, I would like to gratefully acknowledge my love and thanks to my mother, to whom this dissertation is dedicated. Thanks also is extended to my twin sister and other sisters in the Bahamas who have supported me throughout my educational endeavors. Thanks also goes out to those close friends who have stuck by me over the years.

**APPENDIX A**

**PERMISSION TO REPRODUCE FIGURE 1**



## *The Journal of Computer-Based Instruction*

A Publication of ADCIS, The Association for Development of Computer-Based Instructional Systems

Allen Avner, Editor  
University of Illinois - 252 ERL  
103 South Mathews Avenue  
Urbana IL 61801-2977 USA

Phone (217) 333-3893 FAX (217) 244-0793 E-Mail a-avner@uiuc.edu

---

10 September 1992

Sophia A. Rolle  
School of Hotel, Restaurant and Tourism Administration  
University of New Haven  
300 Orange Avenue  
West Haven CT 06516

Dear Dr Rolle:

Your letter requesting permission to incorporate Figure 1 from page 18 of the Winter 1992 (Volume 19, Number 1) issue of the *Journal of Computer-Based Instruction* in your dissertation was forwarded to me today from ADCIS Headquarters.

Permission is hereby granted, with the provision that the following notice be included in the figure caption or in the general dissertation notes citing copyright ownerships:

"Figure copyright 1992 by The Association for the Development of Computer-Based Instructional Systems. Used by permission."

Standard bibliographic citation of the original source should, of course, also be given in the appropriate location dictated by the style manual followed in the dissertation.

In the case of this particular figure, it would also be appropriate to indicate that the figure is "After Kolb" since it gives a graphic representation of the conceptual structure of D. A. Kolb's learning style theory. This is evident in the original paper by Larsen, but might not be evident if the figure and its caption were to appear in isolation.

Sincerely,



Allen Avner

**APPENDIX B**

**INFORMATION FOR REVIEW OF RESEARCH  
INVOLVING HUMAN SUBJECTS FORM**

# Information for Review of Research Involving Human Subjects

Iowa State University

(Please type and use the attached instructions for completing this form)

1. Title of Project Learning Styles of post-secondary students in vocational education programs, and hotel managers in the Bahamas.
2. I agree to provide the proper surveillance of this project to insure that the rights and welfare of the human subjects are protected. I will report any adverse reactions to the committee. Additions to or changes in research procedures after the project has been approved will be submitted to the committee for review. I agree to request renewal of approval for any project continuing more than one year.

Sophia A. Rolle  
Typed Name of Principal Investigator

5-15-91  
Date

S. A. Rolle  
Signature of Principal Investigator

Family and Consumer Sciences Education 219 Mackay Hall  
Department Campus Address

294-2925  
Campus Telephone

3. Signatures of other investigators Date Relationship to Principal Investigator

C. H. H. H. H. H.

5-15-91

Major Professor

4. Principal Investigator(s) (check all that apply)

☐ Faculty ☐ Staff ☒ Graduate Student ☐ Undergraduate Student

5. Project (check all that apply)

☐ Research ☒ Thesis or dissertation ☐ Class project ☐ Independent Study (490, 590, Honors project)

6. Number of subjects (complete all that apply)

150 # Adults, non-students      # ISU student      # minors under 14      other (explain)  
     # minors 14 - 17

7. Brief description of proposed research involving human subjects: (See instructions, Item 7. Use an additional page if needed.)

See attached

(Please do not send research, thesis, or dissertation proposals.)

8. Informed Consent:

☐ Signed informed consent will be obtained. (Attach a copy of your form.)  
☒ Modified informed consent will be obtained. (See instructions; item 8.)  
☐ Not applicable to this project.

Decision of the University Human Subjects Review Committee:

☒ Project Approved ☐ Project Not Approved ☐ No Action Required

Patricia M. Keith  
Name of Committee Chairperson

8-1-91  
Date

PM Keith  
Signature of Committee Chairperson



**APPENDIX C**

**BAHAMAS HOTEL TRAINING COLLEGE CORRESPONDENCE**

Permission request letter

Permission granted letter

IOWA STATE UNIVERSITY  
OF SCIENCE AND TECHNOLOGY

College of Family and  
Consumer Sciences  
Department of Family and  
Consumer Sciences Education  
219 MacKay Hall  
Ames, Iowa 50011-1120  
515 294-6444  
FAX 515 294-9449

May 14, 1991

M. A. Pinchbeck  
Executive Director  
Bahamas Hotel Training College  
P.O. Box N896  
Nassau, Bahamas

Dear Mr. Pinchbeck:

The Department of Family and Consumer Sciences Education at Iowa State University is involved in research to assess learning styles of hotel managers and of students in post-secondary vocational education programs in the Bahamas. We are requesting your permission to administer a questionnaire to students at the Bahamas Hotel Training College (B.H.T.C.). Sophia Rolle, a 1983 graduate of B.H.T.C., will be the principal investigator for this study.

It is our desire to administer a 40-item learning style questionnaire to all full-time students at B.H.T.C. The principal investigator would like to administer the instrument in September during class periods when most of the full-time students are present. The process of completing the questionnaire is expected to take approximately 15-20 minutes. A sample of the questionnaire to be used is attached.

Research indicates that learning styles have a direct influence on the success of students in experiential learning programs. Several studies have considered the learning styles of hotel, restaurant, and institution management students, but these studies were conducted in the United States. We wonder if the learning styles of post secondary students in hotel, restaurant and institution management programs in the Bahamas are similar to those in the U.S. We believe the study would be of interest to B.H.T.C. instructors as they consider the effect of student learning styles in the hotel, restaurant, and institution management program. In addition, comparing the learning styles of students with hotel managers in hotels in the Bahamas could provide useful information.

M. A. Pinchbeck  
Page 2  
May 14, 1991

We hope you agree that the proposed study can yield important information for post-secondary hotel, restaurant and institution management programming. We would appreciate hearing from you at your earliest convenience to inform us of your interest and cooperation in this research.

If you consent to letting us administer the questionnaire to B.H.T.C. students, Iowa State University requires a written letter from your institution granting permission to use facilities and student body for research purposes. We are providing a sample letter (enclosed) that you could adapt for this consent. If you have questions or concerns please feel free to call at (515)292-3715.

Sincerely,

*Cheryl O. Hausafus*

Cheryl O. Hausafus, Ph.D., C.H.E.  
Assistant Professor

*S. U. Rolle*

Sophia Rolle  
Graduate Student



## Bahamas Hotel Training College

P. O. BOX N 4896 — NASSAU, BAHAMAS  
TELEPHONE: (809) 323-5804

P. O. BOX F 1679 — FREEPORT, GRAND BAHAMA  
TELEPHONE: (809) 352-2896

EXECUTIVE DIRECTOR: M. A. PINCHBECK, B.ED., FHCIMA., MTS.

Ms. Cheryl O. Hausafus, Ph.D., C.H.E.  
Assistant Professor  
Iowa State University  
Department of Family  
and Consumer Sciences Education  
219 MacKay Hall  
Ames, Iowa 50011-1120  
U. S. A.

OUR REF: MAP/gr

YOUR REF:

DATE: 24th June, 1991

Dear Ms. Hausafus:

I write with reference to your request to conduct a Learning Style Questionnaire at the Bahamas Hotel Training College (BHTC). I wish to inform you that the faculty has considered your request and has agreed to participate in this exercise.

I would ask, therefore, that you liaise with Miss Claris Price, College Registrar, to arrange mutually convenient times and dates to undertake this research.

Thank you for your interest in BHTC. I look forward to participating with you in this project.

Yours sincerely,

Michael A. Pinchbeck, B.Ed., FHCIMA., MTS.  
Executive Director

cc: Miss Sophia Rolle  
Miss Claris Price

CHIEF TRAINING OFFICER — NASSAU: KENDAL C. JOHNSON

CHIEF TRAINING OFFICER — FREEPORT: IVA DAHL-BROWN



**APPENDIX D**

**LEARNING STYLE INSTRUMENT**

**ADAPTED FROM MARSHALL AND MERRITT**

Adapted LSI-SD

Permission to use LSI-SD

Marshall and Merritt's scoring procedure for the LSI-SD

Notes from contacts with Dr. Sharon Merritt regarding scoring procedure

Memo from Dr. Sharon Merritt regarding scoring procedures



**PLEASE NOTE**

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**Learning Styles**

**78-79**

**Learning Styles Questionnaire  
Forms A & X**

**81-83**

**University Microfilms International**

May 30, 1991

TO: Mrs. Sophia Rolle

FROM: Sharon L. Merritt, Ed.D., RN *SLM*

SUBJECT: Learning Style Questionnaire, 1985

A sample copy of the form you requested is enclosed. Permission is granted for you to use the form under the following conditions:

1. The instrument is used only for your research project.
2. Use of the instrument and all relevant publications by Dr. Marshall and I are correctly cited in your research.
3. If the questionnaire is used as part of the instrumentation for your research, the section containing the LSQ are fully cited with authors' names and addresses, and the following phrase;  
  
"Permission granted to \_\_\_\_\_ for exclusive and sole use in his/her research project."
4. Upon completion of the study, we receive a copy of all raw data collected in your study.
5. If publication(s) result(s) from your study, we receive full and complete credit as authors of the LSQ.
6. Reprint(s) of article(s) that include(s) discussion of results using the LSQ are forwarded to us.

Your agreement to these conditions for use of the LSQ is indicated by your signature below and return of this form to Dr. Merritt at the address above. Upon receipt of the signed form a copy of the scoring instructions will be forwarded to you.

SIGNATURE: Sophia A. Rolle

NAME: Sophia A. Rolle

ADDRESS: 2101 Oakwood Rd #218  
Ames Iowa 50010

TITLE OF PROPOSED RESEARCH: Learning styles of Post-Secondary Students and Hotel Managers in Vocational Education Programs in the Bahamas.

**Notes from contacts with Dr. Sharon Merritt regarding scoring procedure**

Several conversations were held between the researcher and Dr. Sharon Merritt, co-author of the Marshall and Merritt learning style instrument used in this study. Conversations centered consistently on apparent difficulties in applying the scoring procedure of the instrument.

During the first conversation that was held in September 1991, this researcher questioned the numeric values associated with each rating option of the scoring procedure, because they seemed to be in the reverse order. Dr. Merritt concluded that, indeed, the order was reversed and attributed this to a secretarial typographical error. A follow-up note was mailed to the researchers based on this conversation.

In April 1993, two conversations were held with Dr. Merritt once again to discuss the apparent difficulty using the scoring procedure. The conversations discussed inconsistencies in the way the learning styles were calculated. The calculations of the two dimensions appear different from Kolb's original model. On Kolb's original scoring procedure, the CE scores are subtracted from the AC scores, and the RO scores are subtracted from the AE scores. On the Marshall and Merritt instrument the scoring appears in the reverse order.

Dr. Merritt indicated that this was done because Kolb's instrument used ipsative measurement, while their model reflected a more consistent measurement based on Kolb's original learning style theory. She also added that the Marshall and Merritt model lacked error and that each word was rated independently of every other word. However, she finally indicated that the researcher should use Kolb's original scoring procedures for the ACCE and AERO dimensions.

**UIC** The University of Illinois  
at Chicago

College of *Nursing*  
Department of Medical-Surgical Nursing (M/C 802)  
845 South Damen Avenue 7th Floor  
Chicago, Illinois 60612  
(312) 996-7900

April 12, 1993

TO: Sophia Rolle  
FROM: Sharon L. Merritt  
SUBJECT: Scoring Procedures for LSQ

It is unclear to me why there appears to be confusion about the scoring procedures. The scoring procedures we developed result in a learner type classification similar to Kolbs' since we have reversed the sign of the numbers on the classification grid along with subtracting the AC score from the CE score, i.e. on our grid CE is a positive scale and AC a negative one which is the opposite of Kolb. There is a difference in how Kolb places his number on the LSI grid because these were developed from respondent norms. Since his measure is ipsative, he has measurement error built into the instrument. With the LSQ, one can get a 0 score placed at the center of the grid since our instrument is a normative one. Our measurement approach is actually more consistent with his theory and does not have error built into it because each word is rated independently of every other one.

Chicago

Peoria

Quad Cities

Urbana-Champaign

**APPENDIX E**

**SUPPLEMENTARY FORMS**

Letter to students

Demographic component for students

Letter to managers

Demographic component for managers

**IOWA STATE UNIVERSITY**  
OF SCIENCE AND TECHNOLOGY

College of Family and  
Consumer Sciences  
Department of Family and  
Consumer Sciences Education  
219 MacKay Hall  
Ames, Iowa 50011-1120  
515 294-6444  
FAX 515 294-9449

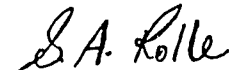
**Dear Bahamas Hotel Training College Full-Time Student:**

Enclosed is a survey questionnaire on learning styles of post-secondary students in vocational education programs and hotel managers in the Bahamas. This study is being conducted by the Department of Family and Consumer Sciences Education, at Iowa State University. You were selected to participate in this study because you attend the Bahamas Hotel Training College, and you are a full-time student. Results of this study will be reported only in summary form, all individual responses will remain confidential. You will be identified only by a code number and that will allow us to analyze responses for various sub-groups.

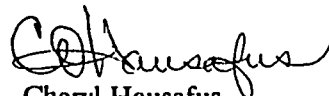
We have requested that only the general manager of the hotel or the full-time students of B.H.T.C. complete this questionnaire. A response from you is very important to obtain representative information needed for the success of this project. Your participation is voluntary and there is no risk or discomforts associated with your participation. If you have any questions about the questionnaire, please feel free to call Sophia Rolle (809) 323-5761.

We encourage you to complete the questionnaire, and we appreciate your cooperation in this study.

Sincerely,



Sophia Rolle  
Graduate Student



Cheryl Hausafus  
Major Professor

## Section 1. Student Characteristics

Directions: Place an "x" in the blank preceding the answer that best applies to you or fill in the blank with the information requested.

1. What is your sex?  
☐ Male  
☐ Female
2. What is your age?  
☐ Less than 25  
☐ 25-29  
☐ 30-34  
☐ 35-40
3. Is your permanent home in the Caribbean?  
☐ Yes. Please specify specific island. \_\_\_\_\_  
☐ No. Please specify home country. \_\_\_\_\_
4. How long have you been a full-time student at the Bahamas Hotel Training College?  
☐ New full-time student  
☐ 1 year in program  
☐ 1-1/2 years in program  
☐ 2 years or over  
☐ Not a full-time student
5. Which program are you currently enrolled in at the Bahamas Hotel Training College? Please specify. \_\_\_\_\_
6. Have you worked in the hospitality industry prior to becoming a full-time student at the Bahamas Hotel Training College?  
☐ Yes, ☐ No
7. In what capacity did you work? Please specify. \_\_\_\_\_

IOWA STATE UNIVERSITY  
OF SCIENCE AND TECHNOLOGY

College of Family and  
Consumer Sciences  
Department of Family and  
Consumer Sciences Education  
219 MacKay Hall  
Ames, Iowa 50011-1120  
515 294-6444  
FAX 515 294-9449

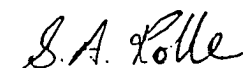
Dear Hotel Manager:

Enclosed is a survey questionnaire on learning styles of post-secondary students in vocational education programs and hotel managers in the Bahamas. This study is being conducted by the Department of Family and Consumer Sciences Education, at Iowa State University. You were selected to participate in this study because you attend the Bahamas Hotel Training College, and you are a full-time student. Results of this study will be reported only in summary form, all individual responses will remain confidential. You will be identified only by a code number and that will allow us to analyze responses for various sub-groups.

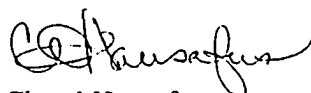
We have requested that only the general manager of the hotel or the full-time students of B.H.T.C. complete this questionnaire. A response from you is very important to obtain representative information needed for the success of this project. Your participation is voluntary and there is no risk or discomforts associated with your participation. If you have any questions about the questionnaire, please feel free to call Sophia Rolle (809) 323-5761.

We encourage you to complete the questionnaire, and we appreciate your cooperation in this study.

Sincerely,



Sophia Rolle  
Graduate Student



Cheryl Hausafus  
Major Professor



## Section 1. Manager Characteristics

Directions: Place an "x" in the blank preceding the answer that best applies to you or fill in the blank with the information requested.

1. What is your sex?  
☐ Male  
☐ Female
2. What is your age?  
☐ 30-39  
☐ 40-49  
☐ 50-59  
☐ 60 or more years
3. What is the highest degree you have received?  
☐ No formal education  
☐ High school diploma  
☐ 2-year hospitality management related associates degree  
☐ B.S. degree, hospitality management related  
☐ B.S. degree, non-hospitality management related  
☐ Advanced degree, please specify \_\_\_\_\_
4. How many years have you been in the position of general manager of this hotel? \_\_\_\_\_ years
5. Have you held a position similar to your current position before?  
☐ Yes, ☐ No
6. How many years have you been in the Bahamas? \_\_\_\_\_ years
7. If you are not a Bahamian, please specify your nationality. \_\_\_\_\_

**APPENDIX F**

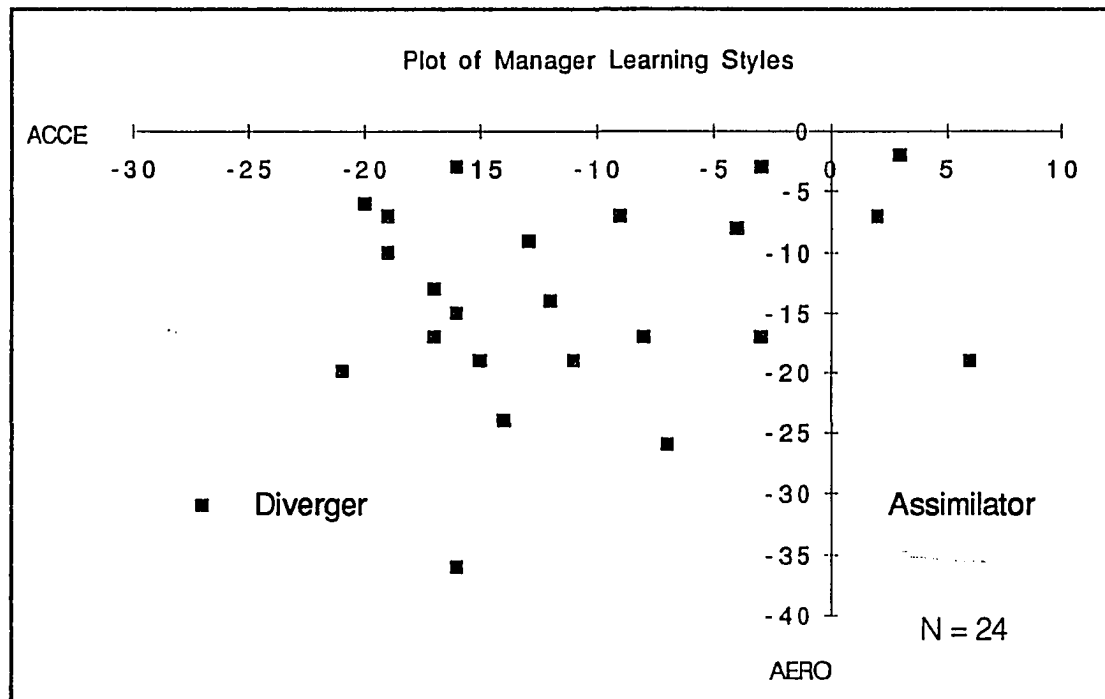
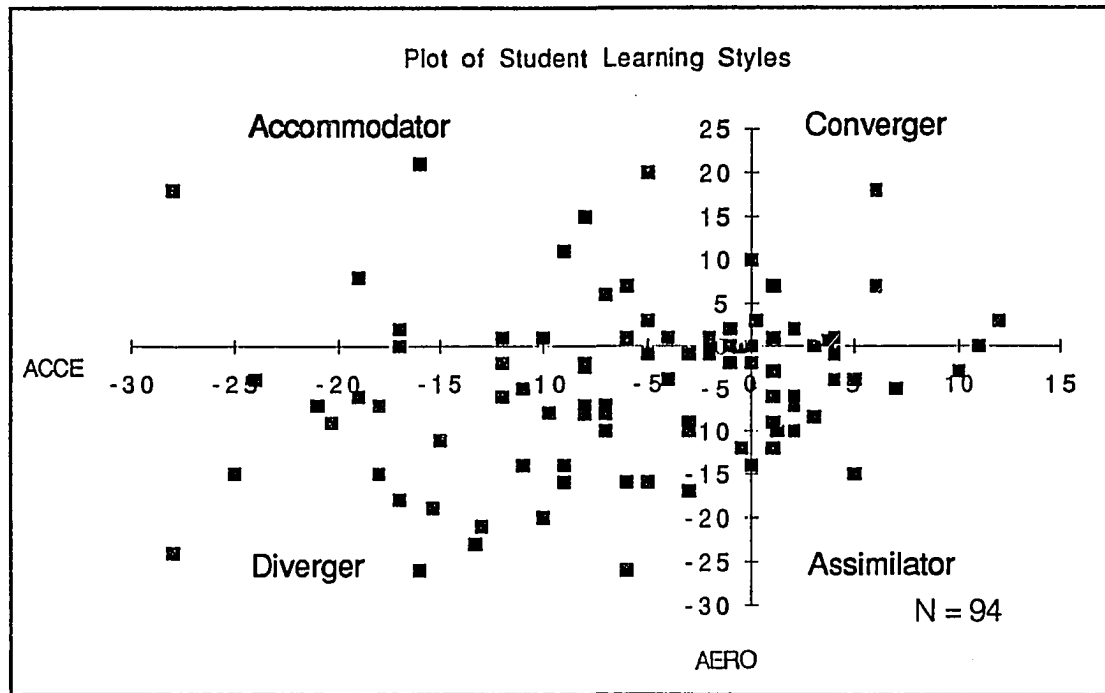
**ITEM MEANS AND OCCURRENCES OF MISSING DATA  
IN ORIGINAL DATA SET**

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**APPENDIX G**

**SCATTERGRAM OF LEARNING STYLE PLOTS**



**Scattergram of learning style plots**