

Chapter 4

RESEARCH FINDINGS

The purposes of the study were to identify the teaching styles of business instructors and the learning styles of their students in specific content areas, to determine if there is a match between the two, and to determine if relationships exist between student success and style match and between student evaluations of instructors and style match. This chapter presents the analyses of the six research questions that provided a framework for the study.

Research Questions

Research Question One: What are the teaching style profiles, including typologies, of the business instructors as measured by the Canfield Instructional Styles Inventory?

To answer this question, the Canfield Instructional Styles Inventory was administered to five business instructor participants. The participants responded to each question in the Instructional Styles Inventory by choosing 1 for their most-preferred choice and 4 for their least-preferred choice. Each scale was totaled to produce a raw score. The lowest raw score indicated the most preferred scale and the highest raw score indicated the least preferred scale in that category.

The group mean was calculated for each scale of the Instructional Styles Inventory. The group mean represents the raw scores for the participants in the study. Additionally, in the discussion each scale is linked to a normed percentile. The percentile compares the participants in this study to the normed reference group. The normed reference group was obtained by administering the Canfield Instructional Styles Inventory to 801 instructors from several Midwestern community colleges (Canfield, 1988). A percentile score between the 75th and 99th percentile represents a high preference (H); between the 50th and 74th percentile represents a moderate to high preference (MH); between the 26th and 49th percentile represents a moderate to low preference (ML); and between the 1st and 25th percentile represents a low preference (L).

The most preferred scale in the category of **Conditions for Instruction** was **Organization** with a group mean of 8.40 as shown in Table 3. The teachers differed from one another in their preference for this scale with scores ranging from a low of 6.00 to a high score of 12.00. Compared to the norming sample, the participants in this study had a higher preference for **Organization** as shown in Figure 1. The least preferred scale in this category was **Competition** with a group mean of 15.00. Participants ratings for the **Competition** scale ranged from a low of 12.00 to a high of 16.00. Sixty percent (3) of the participants rated this scale 16.00. Compared to the norming sample, the participants in this study had a higher preference for **Competition** as shown in Figure 1.

Teachers who prefer **Organization** believe that an important prerequisite for effective learning is for instructors to ensure that material is presented in a clear, well organized, and integrated manner. They believe students should be informed about why things are occurring in a particular order. Course outlines, topical outlines, chapter outlines, lecture note outlines, and other similar materials are likely to be used within the

Table 3

Instructional Style Profile for Business Teachers (n=5) Including Means,
Standard Deviations, and Ranges

Scale	Mean ^a	SD	Range
Conditions for Instruction			
Organization	8.40	2.3	6 - 12
Detail	11.20	1.9	9 - 14
Goal	12.00	4.3	9 - 16
Independence	12.40	3.9	6 - 16
Instructor	12.60	2.3	10 - 15
Authority	13.80	2.7	10 - 16
Peer	14.60	2.5	11 - 17
Competition	15.00	1.7	12 - 16
Areas of Interest			
People	9.80	1.8	8 - 12
Inanimate	12.20	3.2	7 - 16
Qualitative	12.40	4.6	8 - 20
Numeric	15.60	2.0	14 - 19
Modes of Instruction			
Direct Experience	10.00	3.6	5 - 15
Iconic	11.20	1.3	9 - 12
Lecturing	14.20	2.8	12 - 19
Reading	14.60	2.4	12 - 18
Influence			
A-Influence	7.60	1.3	7 - 10
B-Influence	9.80	1.0	8 - 11
C-Influence	13.00	1.2	12 - 15
Total-Influence	13.00	2.9	11 - 18
D-Influence	19.60	.9	18 - 20

^aThe lower the mean, the higher the preference.

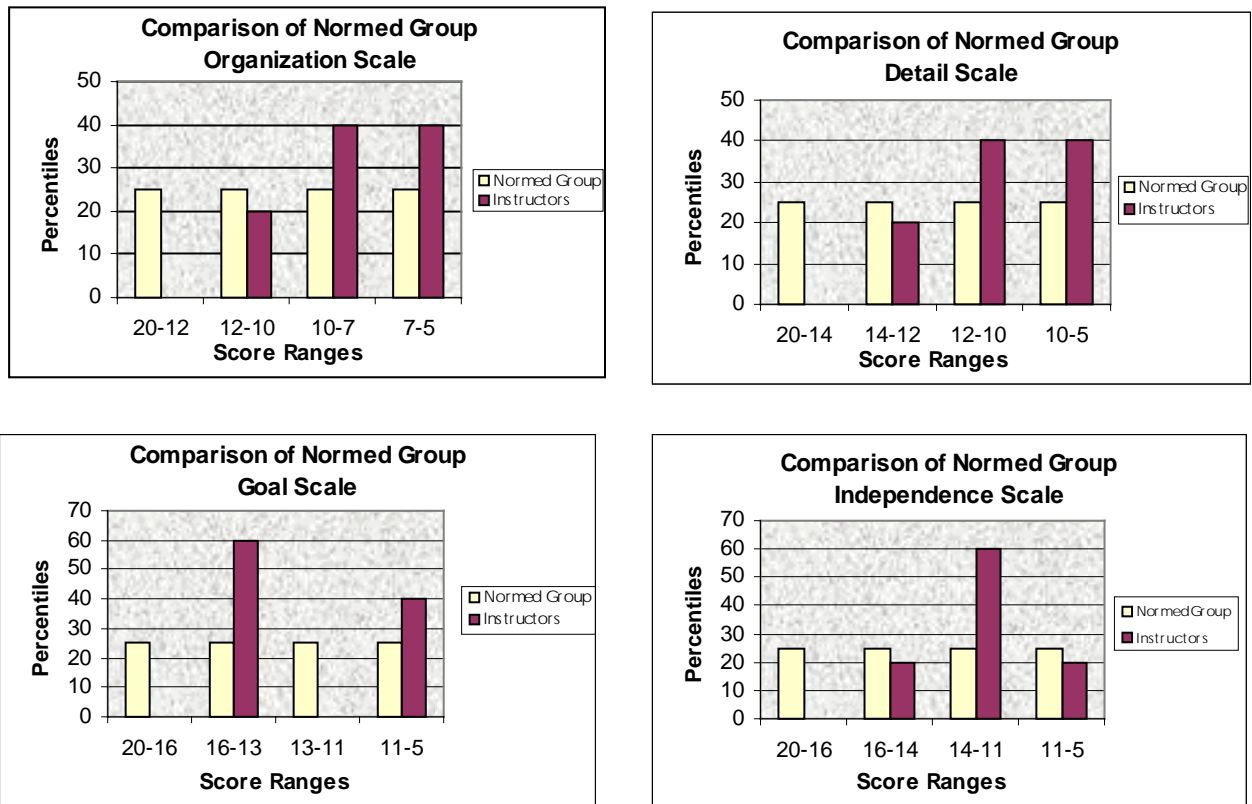


Figure 1. Comparison of the normed group with instructor participants for the Conditions for Instruction category scales.

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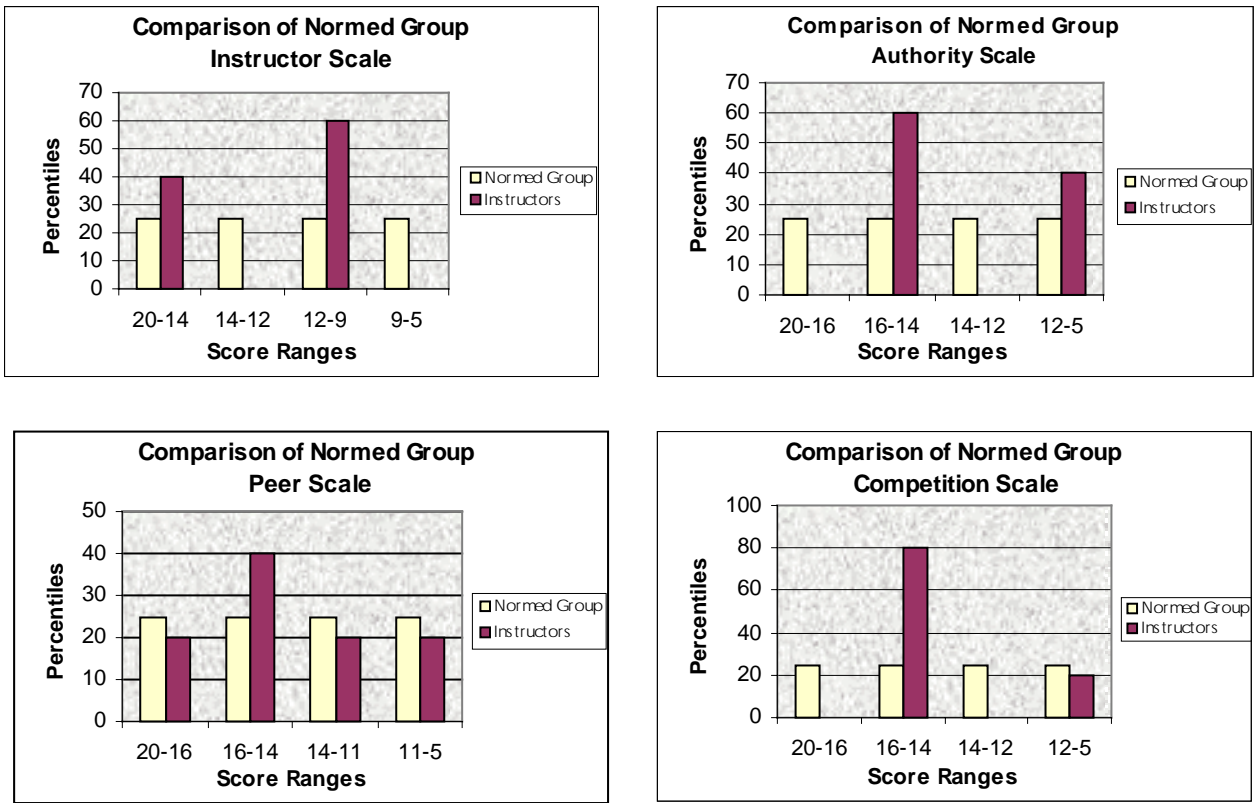


Figure 1. Comparison of the normed group with instructor participants for the Conditions for instruction category scales.

The least preferred scale, **Competition**, is favored by teachers who believe that it is important to compare performance with others as a means of effective learning. Students are provided with feedback on how their work compares to others and the best work is recognized. The teacher tries to motivate students to do the best work of anyone in the class.

In the **Areas of Interest** category, the most preferred scale was **People** with a group mean of 9.80. The scores ranged from 8.00 to 12.00. Two participants (40%) rated this scale 8.0. Compared to the norming sample, the participants in this study had a higher preference for **People** as shown in Figure 2. The least preferred scale was **Numeric** with a group mean of 15.60. The scores ranged from 14.00 to 19.00. Compared to the norming sample, the participants in this study had a higher preference for the **Numeric** scale as shown in Figure 2.

Teachers who prefer the **People** scale enjoy activities that involve others. The least preferred scale, **Numeric**, is favored by teachers who enjoy working with quantitative or math-related activities.

In the **Modes of Instruction** category, the most preferred scale was **Direct Experience** with a group mean of 10.00. The participants varied in their choice of this scale with scores ranging from 5.00 to 15.00. Compared to the norming sample, the participants in this study had a lower preference for **Direct Experience** as shown in Figure 3. The least preferred scale was **Reading** with a group mean of 14.60. The scores ranged from 12.00 to 18.00. The preference for **Reading** was lower for the participants in this study when compared to the normed group as shown in Figure 3.

Teachers who prefer the **Direct Experience** scale tend to provide real-life experience with a subject which could incorporate field trips, clinical experience, actual research with the subject matter, use of simulation, or the operation of equipment. They prefer direct contact with the topic of study.

The least preferred scale, **Reading**, is favored by teachers who tend to accomplish instruction through use of printed materials, books, articles, magazines, and other materials. Their preferred instructional activities may include preparing handouts and writing supplementary reading materials. They prefer giving assignments that include using conventional textbooks or library work procedures. They may be uncomfortable in the typical lecture environment.

The **Influence (A through D)** category expresses a conviction that learning performance will be affected by varying or adapting instruction methods. In the category of **Influence**, the most preferred scale was **A-Influence** whereby instructors feel strongly that instruction methods affect learning. They feel that students who are doing poorly could probably do better if they received the type of instruction needed to learn the material. They will usually try to vary their approach and type of assignments to spark the interest of seemingly disinterested students. The group mean for the **A-Influence** scale was 7.6. The scores ranged from a low of 7.00 to a high of 10.00. Eighty percent (4) rated this scale 7.00. Compared to the norming sample, the participants in this study had a higher preference for **A-Influence** as shown in Figure 4. The least preferred scale was **D-Influence** whereby instructors feel strongly that instruction methods do not affect learning. They typically feel that students who are doing poorly should not be in school at that stage of their lives. They feel it is the

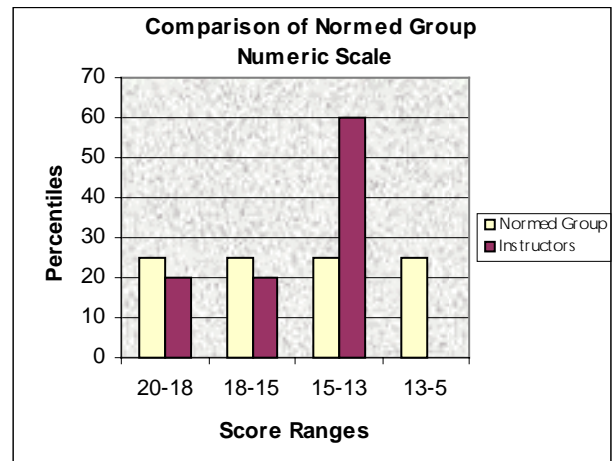
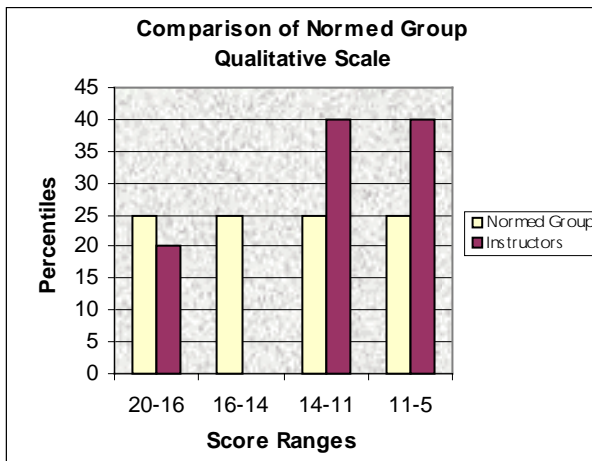
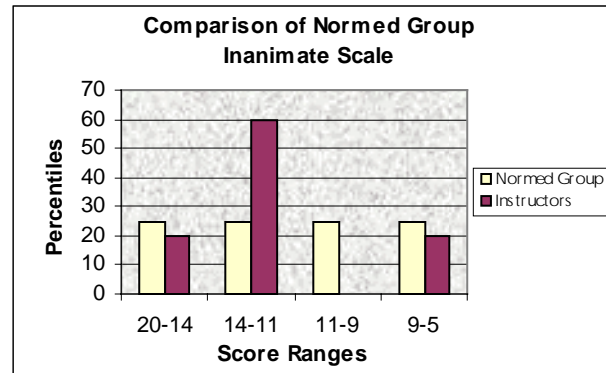
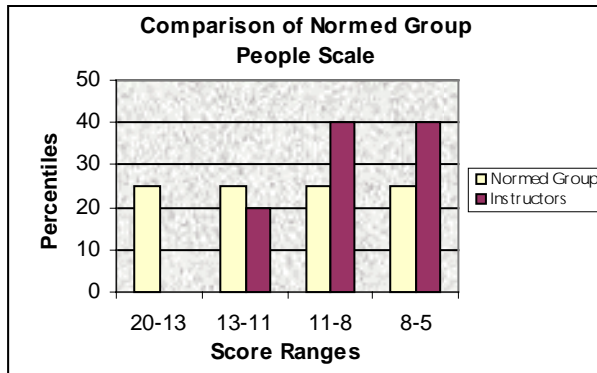


Figure 2. Comparison of the normed group with instructor participants for the Areas of Interest category scales.

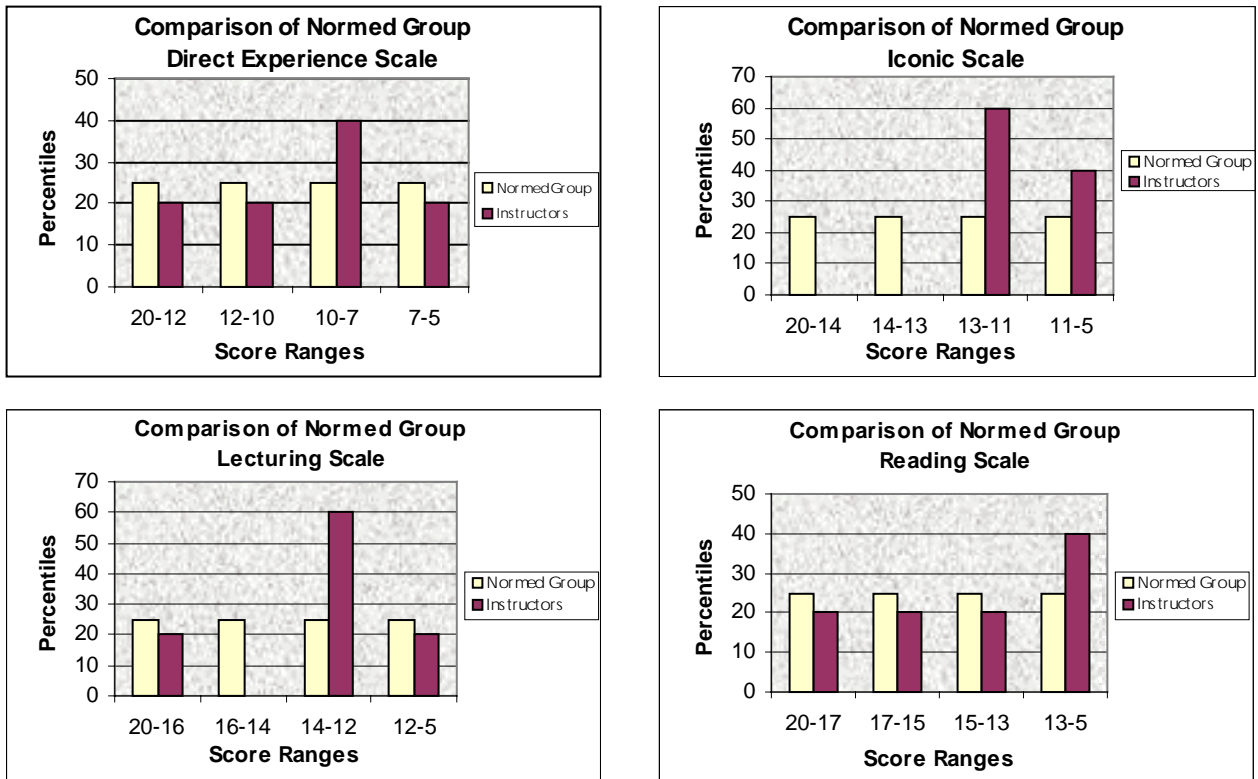


Figure 3. Comparison of the normed group with instructor participants for the Modes of Instruction category scales.

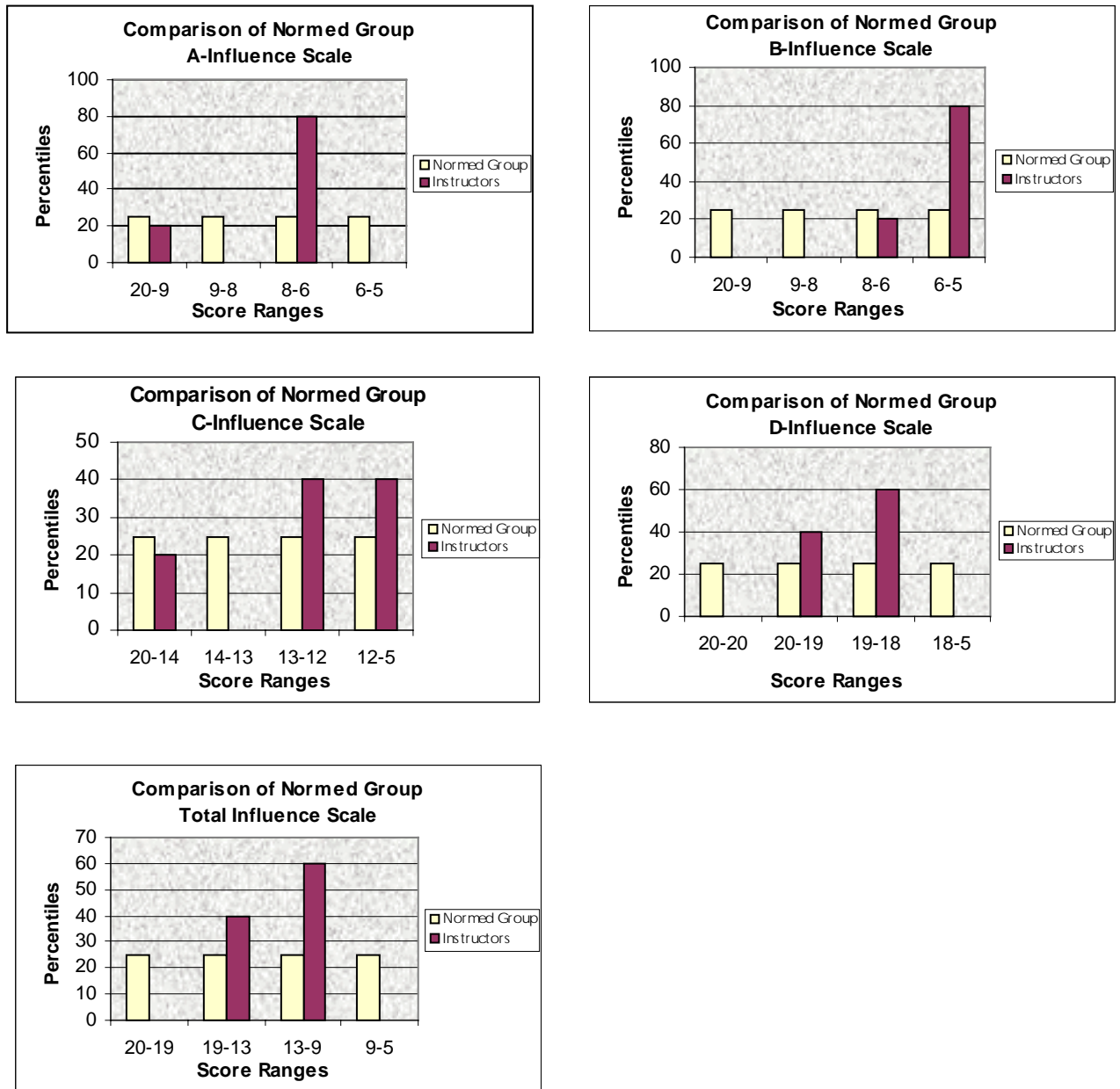


Figure 4. Comparison of the normed group with instructor participants for the Influence category scales.

student's responsibility to get the material whether they appear interested or disinterested. The group mean for the **D-Influence** scale was 19.6. The scores ranged from a low of 18.00 to a high of 20.00. Eighty percent (4) rated this scale 18.00. Compared to the norming sample, the participants in this study had a higher preference for **D-Influence** as shown in Figure 4.

Teachers who select **A-Influence** believe that they are responsible for the quality of learning. They believe students could perform better if they received the type of instruction needed to learn the material. They will try to vary their teaching approach and type of assignments to encourage students to become interested in the material. Teachers who select **D-Influence** believe that learning is the students' responsibility and that students should adjust or adapt to the teaching.

The final scale, **Total Influence**, expresses a conviction that learning performance will be affected by varying or adapting instruction methods. It is the weighted sum of the four individual preference scales, **A-, B-, C-, and D-Influence**. The group mean for this scale was in the moderate high range with 13.00. Compared to the norming sample, the participants in this study had a higher preference for **Total Influence** as shown in Figure 4. A high preference on the **Total Influence** scale indicates the belief that changes in learning will occur by varying or adapting instructional procedures.

To obtain the instructor typologies, raw scores for the scales within the Instructional Styles Inventory were converted into t-scores. The t-scores were then used in a formula to calculate two summary scores, labeled X and Y. The summary scores X and Y were used to locate the instructor's type on the Instructor Typology grid. The instructor typology identifies 9 distinct groups or types of instructors through a combination of 10 Instructional Style Inventory scales: Peer, Organization, Independent, Instructor, Direct Experience, Inanimate, Iconic, Qualitative, Reading, and Goal Setting. Figure 5 shows the basic relationships among the various types including the proportion of instructors that would be expected to fall into each of the types as determined by the sample from which the typology was created. The expected percentage is the percentage based upon the normed reference group. The actual percentage was obtained by dividing the number of participants who preferred the category by the five instructor participants.

The instructor type with the largest percentage of participants in the group was **Social/Conceptual** with two participants, 40%. Individuals in this category score high on the Peer, Instructor, Organization, Qualitative, and Reading scales and low on the Goal Setting, Independence, Direct Experience, Inanimate, and Iconic scales. Instructors who prefer this group tend to create opportunities for student interaction and they like to work with language-oriented materials. They may experience feelings of frustration if they are required to assign and supervise solitary self-directed tasks that involve concrete applications to real-world settings. These instructors' lesson plans tend to involve a balance of lecture and discussion formats.

There was a tie for three groups, **Independent/Applied, Independent, and Neutral**, each with one participant, 20%. Individuals in the **Independent/Applied** category score high on Goal Setting, Independence, Direct Experience, Inanimate, and Iconic scales; and score low on the Peer, Instructor, Organization, Qualitative, and Reading scales. They prefer for students to work alone and to use materials closely

Social/Applied^b 6.5% - Expected 0% - Actual	Social 11% - Expected 0% Actual	Social/Conceptual^b 17% - Expected 40% Actual
Applied 10% - Expected 0% - Actual	Neutral 11% - Expected 20% - Actual	Conceptual 10% - Expected 0% - Actual
Independent/Applied^b 17% - Expected 20% Actual	Independent 11% - Expected 20% - Actual	Independent/Conceptual^b 6.5% - Expected 0% - Actual

Figure 5. Instructor Typology with Expected^a Percentages and Actual Percentages of the Business Instructors (n=5)

^aThe proportion of instructors that would be expected to fall into each of the types based on the sample of 200 instructors from which the typology was created. A chi square test was run to determine if there were significant differences between the expected and actual categories. The value for expected was .333. The goodness of fit chi square value with four degrees of freedom for actual was 2.667. Neither chi square value was significant at the .05 level.

^bInstructors were more numerous in the Social/Conceptual and Independent/Applied types and less numerous in the Social/Applied and Independent/Conceptual types. This is due to the X and Y components being taken in an uncorrelated form when creating the Learner Typology was identified. In estimating the same components in the Instructor Typology, a moderate correlation of $r=.37$ surfaced between Social preferences which were associated with Conceptual preferences, and Independent preferences which were associated with Applied preferences. While this makes no substantive difference in comparisons between the two typologies, it does affect the proportions of instructors expected to fall into the types (Canfield, 1988).

related to real-world situations. These teachers are not particularly fond of socially interactive situations that involve lectures, reading, or language-intensive activities. They prefer individual labs and less-supervised technical practicums.

Individuals in the **Independent** category score high on Goal Setting and Independent scales and low on the Peer and Instructor scales. They prefer that students work alone toward individual goals. They are not particularly interested in providing opportunities for social interaction. They are likely to be comfortable with instructional techniques such as the analysis of case studies and the development of self-paced or programmed instruction. Individuals in the **Neutral** category show no strong preference for any of the scales within the Instructor Typology. They tend to be able to easily shift and tailor their instructional approaches to suit the needs of students or a particular piece of curriculum. However, the lack of strong preferences may also reflect a degree of noninvolvement. These individuals may at times find it difficult to be enthusiastic advocates. They may find it hard to motivate students.

A chi square test was run to determine if there were significant differences between the expected and actual categories. The chi square value for expected was .333. The goodness of fit chi square value with four degrees of freedom was 2.667 for actual. Neither chi square value was significant at the .05 level.

Research Question Two: What are the learning style profiles, including typologies, of students in specified business classes as measured by the Canfield Learning Styles Inventory?

To answer this question, the Canfield Learning Styles Inventory was administered to a total of 99 students enrolled in business classes. Student participant ages ranged from 18 to 62. The average age was 35. Of the 99 student participants, 54% were required to take the business course for their major. The participants responded to each question in the Learning Styles Inventory by choosing 1 for their most-preferred choice and 4 for their least-preferred choice. Each scale was totaled to produce a raw score. The lowest raw score indicated the most preferred scale and the highest raw score indicated the least preferred scale in that category.

Group means were calculated for each scale of the Learning Styles Inventory as shown in Table 4. The group mean represents the raw scores for the participants in the study. In the discussion that follows, each scale is linked to a normed percentile. The percentile compares the participants in this study to the normed reference group. The normed reference group was obtained by administering the Canfield Learning Styles Inventory to 2,544 community college students from the midwestern United States (Canfield, 1992). A percentile score of 75% to 99% represents a high (H) preference, 50% to 74% represents a moderate to high (MH) preference, 26% to 49% represents a moderate to low (ML) preference, and 1% to 25% represents a low (L) preference.

In the category of **Conditions for Learning**, the most preferred scale was **Organization** with a group mean of 11.48. The scores ranged from a low of 9.83 to a high of 13.86. Compared to the norming sample, the participants in this study had a higher preference for **Organization** as shown in Figure 6. The least preferred scale was **Independence** with a group mean of 17.63. The scores ranged from a low of 15.29 to a high of 22.94. As shown in Figure 6, the participants in this study had a higher preference for **Independence** as compared to the norming sample.

Table 4

Learning Style Profile for Business Students (n=99) Including Means,
Standard Deviations, and Ranges

Scale	Mean ^a	SD	Range
Conditions for Learning			
Organization	11.48	1.2	9.83 - 13.86
Detail	12.46	1.2	9.75 - 13.71
Instructor	12.96	.9	11.7 - 14.67
Goal	14.70	1.2	12.86 - 17.25
Peer	16.44	1.3	14.43 - 17.33
Competition	17.27	1.4	15.33 - 19.50
Authority	17.55	1.0	15.33 - 18.67
Independence	17.63	2.2	15.29 - 22.94
Area of Interest			
People	11.75	1.4	10.00 - 14.50
Qualitative	14.91	1.2	13.07 - 16.67
Inanimate	15.16	1.2	14.00 - 17.00
Numeric	18.71	1.5	16.25 - 21.94
Mode of Learning			
Direct Experience	12.30	1.3	11.14 - 15.83
Listening	14.60	1.7	11.67 - 17.14
Iconic	15.36	1.7	11.71 - 17.67
Reading	17.75	1.5	14.83 - 19.71
Expectation for Course Grade			
B-Expectation	10.12	.8	9.00 - 11.56
C-Expectation	13.63	1.3	11.56 - 15.41
A-Expectation	15.34	1.5	12.88 - 17.78
D-Expectation	20.89	1.1	19.11 - 22.25
Total Expectation	35.21	5.8	26.88 - 45.78

^aThe lower the mean, the higher the preference.

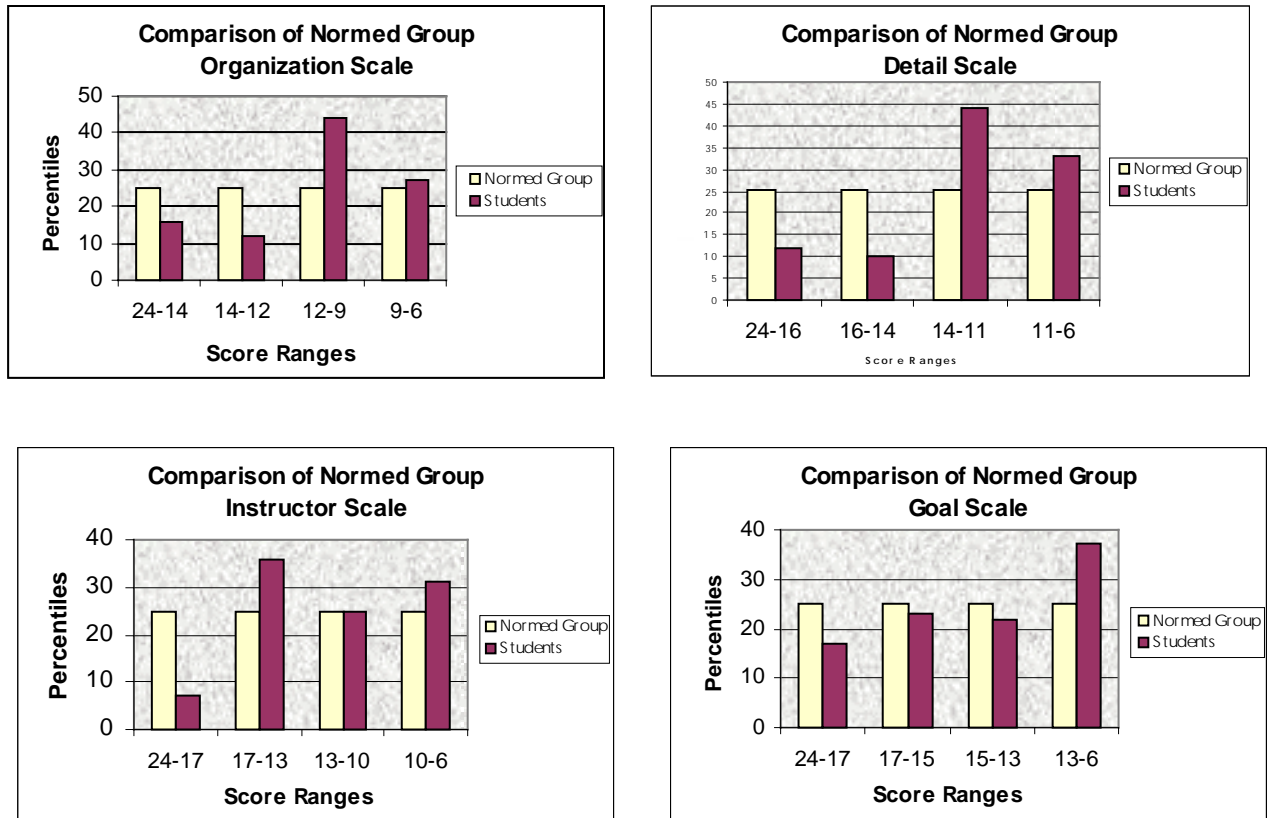


Figure 6. Comparison of the normed group with student participants for the Conditions For Learning category scales.

Figure continues

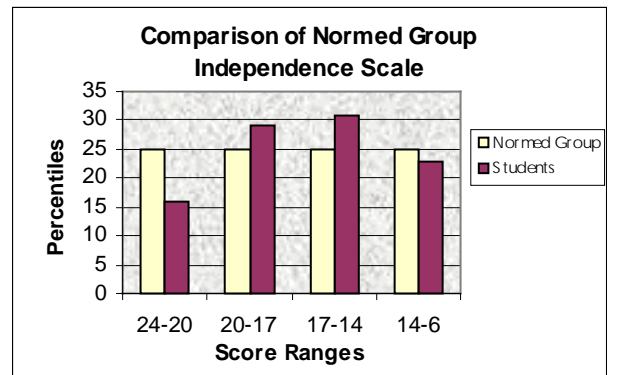
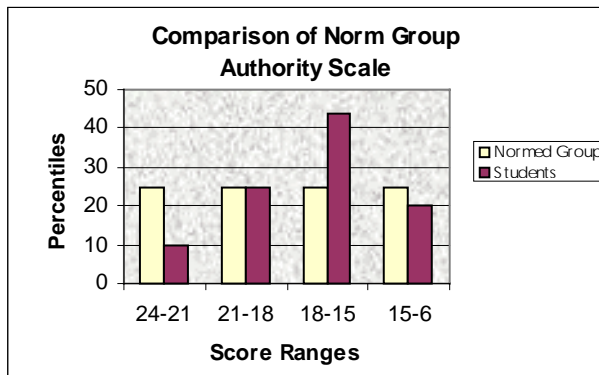
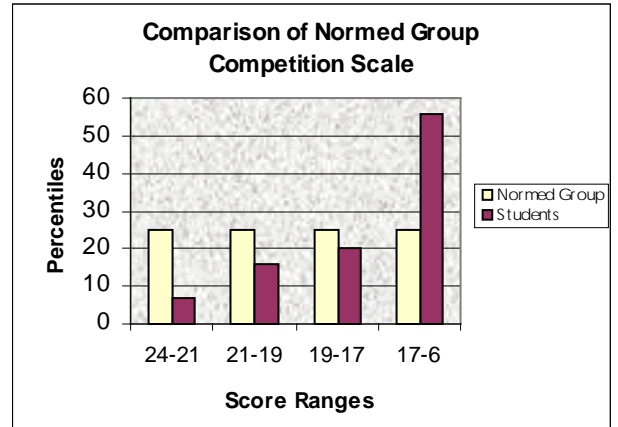
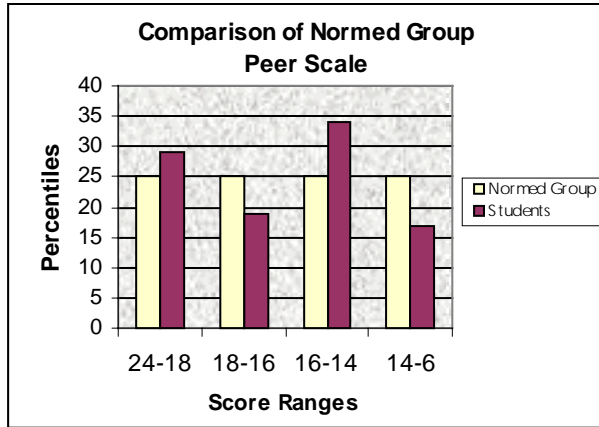


Figure 6. Comparison of the normed group with student participants for the Conditions For Learning category scales.

Learners who prefer **Organization** desire well-organized course work, meaningful assignments, as well as a logical sequence of activities. They need to know why things occur in a given order and manner. Material must be covered logically and systematically. A clear understandable path for development must be defined. In the formal classroom environment, learners who prefer organization appreciate and work well with lecture note outlines, course outlines, chapter outlines, and topical outlines. They are likely to receive well-organized presentations that are presented without diversion into unrelated topics.

The least preferred scale, **Independence**, is favored by students who like to work alone. They like to determine their own study plan, decide how they want to study, and how they want to do things. They prefer the personal freedom to develop the ways and means to accomplish their goals.

In the category of **Area of Interest**, the most preferred scale was **People** with a group mean of 11.75. The scores ranged from a low of 10.00 to a high of 14.50. Compared to the norming sample, the participants in this study had a higher preference for **People** as shown in Figure 7. The least preferred scale by the participants was **Numeric** with a group mean of 18.71. The scores ranged from a low of 16.25 to a high of 21.94. Compared to the norming sample, the participants in this study had a lower preference for **Numeric** as shown in Figure 7.

Learners who prefer the **People** scale enjoy activities that involve working with others. They will likely enjoy assignments that involve human relations or human resources management. The least preferred scale, **Numeric** is favored by students who like working with numbers and logic. They like to solve mathematical problems. Learners with a very low preference for the **Numeric** scale may need the instructor to motivate them or provide tutorial assistance to aid in successful performance.

In the category of **Mode of Learning**, the most preferred scale was **Direct Experience** with a mean of 12.30. The scores ranged from a low of 11.14 to a high of 15.83. Compared to the norming sample, the participants in this study had a higher preference for **Direct Experience** as shown in Figure 8. The least preferred scale by the group was **Reading** with a mean of 17.75. The scores ranged from a low of 14.83 to a high of 18.71. The participants in this study had a higher preference for **Reading** as compared to the norming sample, as shown in Figure 8.

Learners who prefer **Direct Experience** desire hands-on or performance situations. They like to directly contact the materials, topics, or situations being studied. They like to work with something tangible. In the formal classroom situation, these individuals enjoy real-life contact with the subject through clinical experience, laboratory or fieldwork, actual research with the subject matter, operation of equipment, or through the use of simulation.

The least preferred scale, **Reading**, is favored by students who learn through studying printed materials, books, articles, magazines and pamphlets. In the formal classroom, they prefer conventional textbook or library work assignments. They may be uncomfortable in a lecture environment.

The **Expectation for Course Grade** scale represents the level of performance anticipated. Students select the grade they think they will receive. The **B-Expectation** scale had the lowest group mean with 10.12. Scores ranged from a low of 9.00 to a high of 11.56. Compared to the norming sample, the participants in this study had a higher

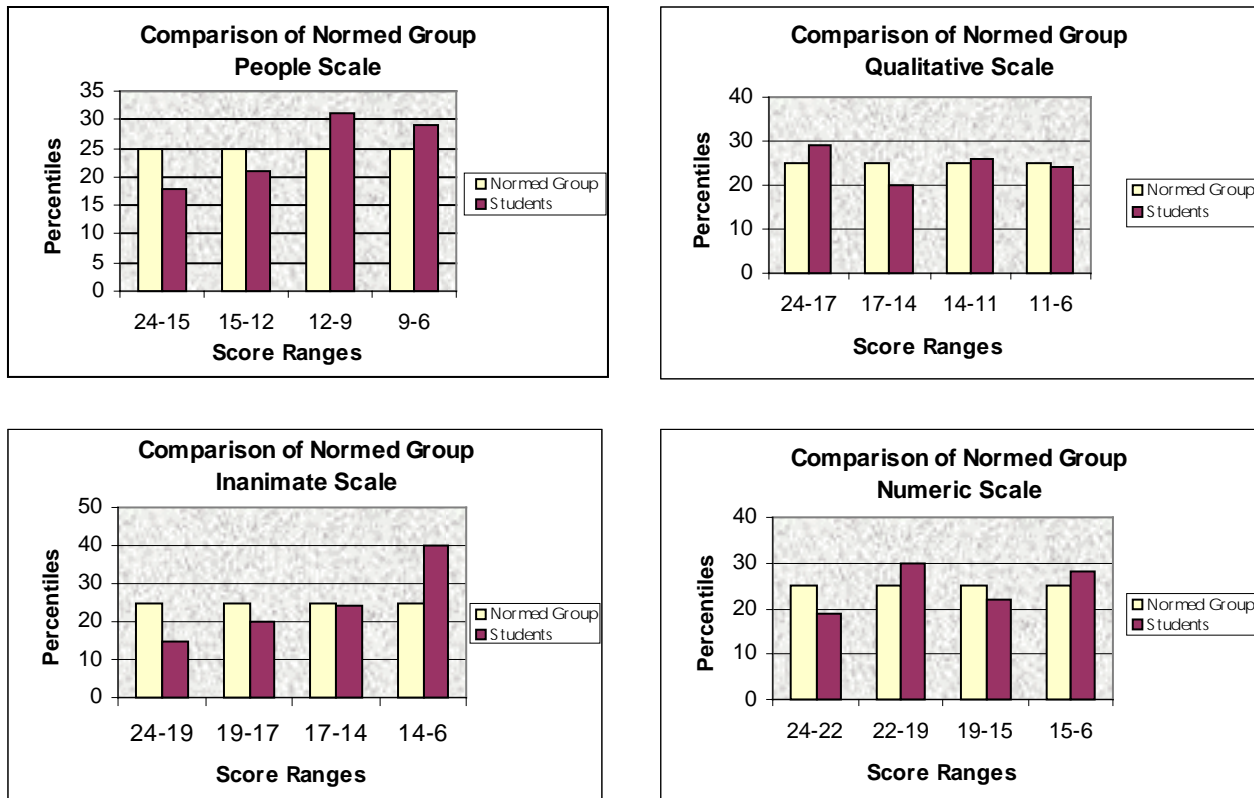


Figure 7. Comparison of the normed group with student participants for the Area of Interest category scales.

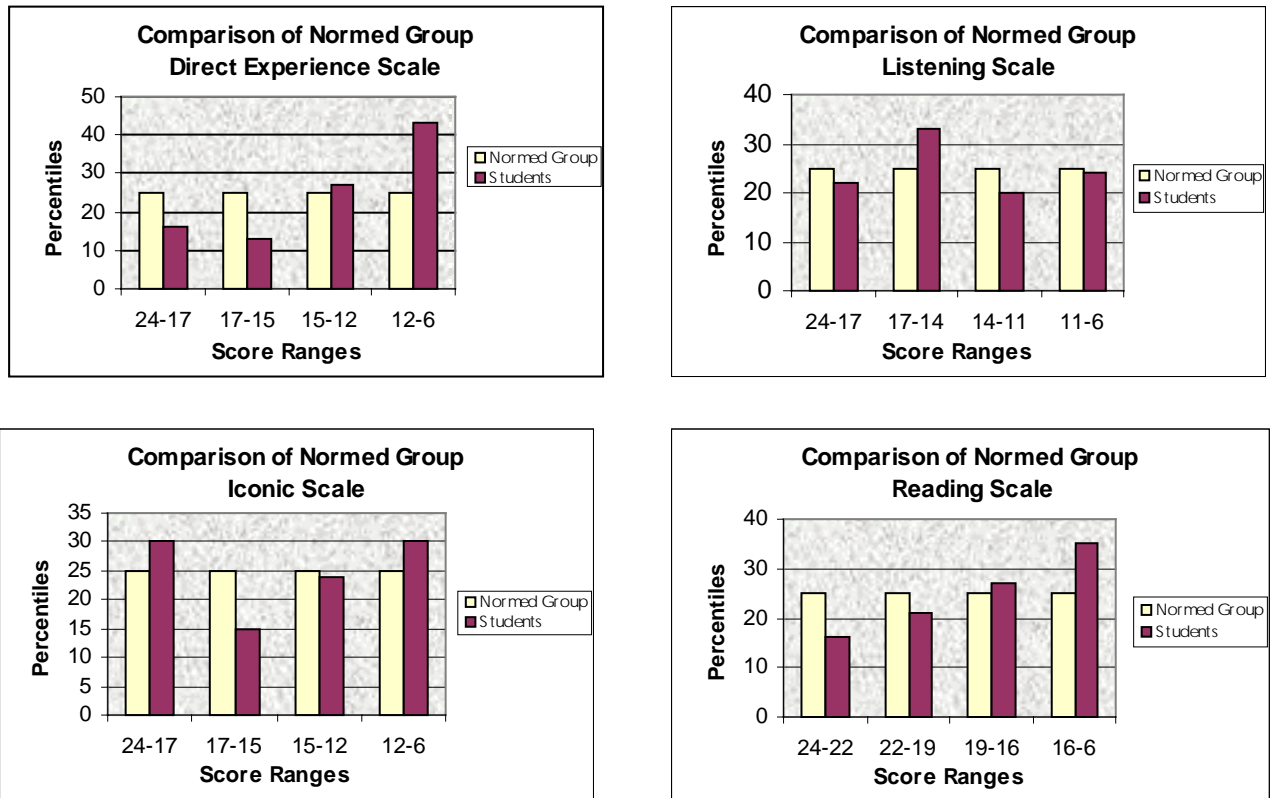


Figure 8. Comparison of the normed group with student participants for the Mode Of Learning category scales.

preference for **B-Expectation** as shown in Figure 9. The scale with the highest group mean was **D-Expectation** with a group mean of 20.89. The scores ranged from a low of 19.11 to a high of 22.25. Compared to the norming sample, the participants in this study had a higher preference for **D-Expectation** as shown in Figure 9.

Participants who select the **B-Expectation** scale expect to perform at an above-average level in a learning situation, but not necessarily at a superior level. They are more likely to expect to be in the top 25 to 33%. Learners who select the **D-Expectation** scale expect to do poorly or fail.

The **Total Expectation** scale is the weighted sum of the **A, B, C** and **D-Expectation** scales. The group mean for this scale is 35.21. The scores ranged from a low of 26.88 to a high of 45.78. Compared to the norming sample, the participants in this study had a higher preference for **Total Expectation** as shown in Figure 9.

To obtain the learner typologies, raw scores for the scales within the Learning Styles Inventory were converted into t-scores. The t-scores were then used in a formula to calculate two summary scores, labeled X and Y. The summary scores X and Y were used to locate the learner's type on the Learner Typology grid. The Learner Typology identifies nine types of students by correlating ten scales of the Canfield Learning Styles Inventory. Figure 10 lists the basic relationships among the various types including the proportion of students that would be expected to fall into each of the types as determined by the sample from which the typology was created. The expected percentage is the percentage based upon the normed reference group. The actual percentage was obtained by dividing the number of participants who preferred the category by the total number of participants (n=99).

The largest percentage of participants, 14%, preferred to learn in an **Applied** environment compared to 10.5% for the normed reference group. Students in this category score high on the Direct Experience, Inanimate, and Iconic scales and score low on the Organization, Qualitative, and Reading scales. They prefer to work on real-world experience activities. They would probably be frustrated with the use of language as a medium of information exchange, lectures, and preparatory reading. Preference is shown for instruction that incorporated practicums, site visits, or team labs.

The smallest percentages of participants were in the **Social/Applied**, **Social/Conceptual**, and **Independent/Conceptual** types, with 9% in each type. The **Social/Applied** learner scores high on the Peer, Instructor, Direct Experience, Inanimate, and Iconic scales and low on the Goal Setting, Independence, Organization, Qualitative, and Reading scales. This learner enjoys interacting with students and instructors in real-world experience activities. Working with solitary or self-directed activities that incorporate a strong reading or language component are not desirable. This learner prefers instruction that permits role playing, problem solving, and supervised practicums.

The **Social/Conceptual** learner scores high on the Peer, Instructor, Organization, Qualitative, and Reading scales and low on the Goal Setting, Independence, Direct Experience, Inanimate, and Iconic scales. Members of this group prefer interaction with instructors and students. They like instruction that provides a balance of lecture as well as discussion. They are less likely to enjoy working on solitary self-directed tasks that involve everyday real-world settings.

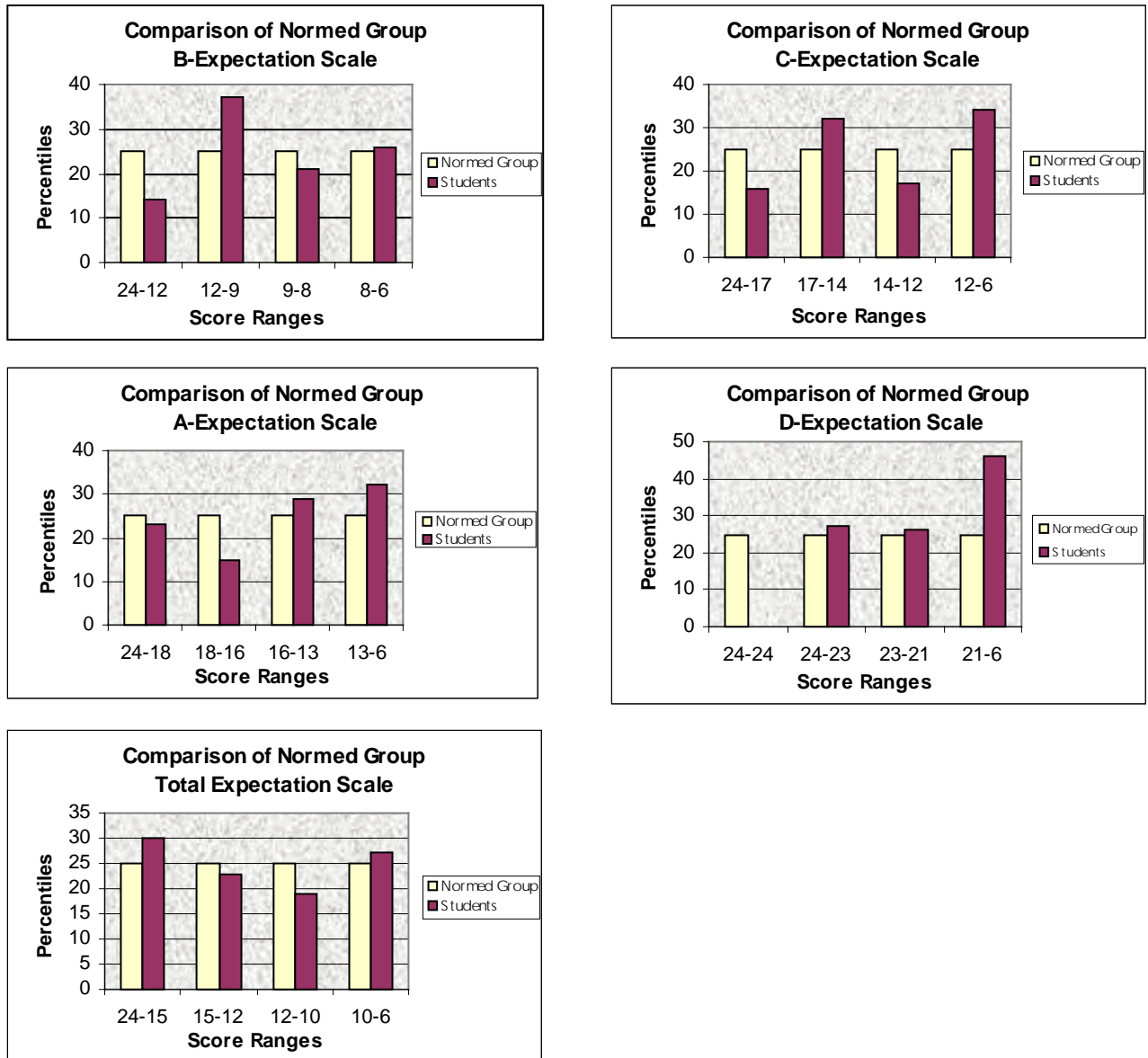


Figure 9. Comparison of the normed group with student participants for the Expectation for Course Grade scale.

<p>Social/Applied^a</p> <p>11.5% Expected 9% - Actual</p>	<p>Social</p> <p>11% - Expected 10% - Actual</p>	<p>Social/Conceptual</p> <p>11.5% - Expected 9% - Actual</p>
<p>Applied</p> <p>10.5% Expected 14% - Actual</p>	<p>Neutral Preference</p> <p>10% - Expected 13% - Actual</p>	<p>Conceptual</p> <p>10.5% - Expected 12% - Actual</p>
<p>Independent/Applied</p> <p>11.5% - Expected 11% - Actual</p>	<p>Independent</p> <p>11% - Expected 11% - Actual</p>	<p>Independent/Conceptual</p> <p>11.5% - Expected 9% - Actual</p>

Figure 10. Learner Typology with Expected Percentages and Actual Percentages of the Students (n=99) in Business Classes.

^aThe chi square outcome comparing the proportion of study participants to the normed group was 2.111. The goodness of fit chi square value with four degrees of freedom was 2.333 for actual. Neither value was significant at the .05 level.

The **Independent/Conceptual** learner scores high on the Goal Setting, Independence, Organization, Qualitative, and Reading scales and low on the Peer, Instructor, Direct Experience, Inanimate, and Iconic scales. They show a preference for working alone toward individual goals and on materials that are highly organized and conceptually organized. They do not prefer to work on activities that are socially interactive and closely tied to real-world situations. They enjoy instruction that allows for independent reading and literature searches.

A chi square test was run to determine if there were significant differences between the expected and actual categories. The observed value for expected was 2.111. The goodness of fit chi square value with four degrees of freedom was 2.333 for actual. Neither chi square value was significant at the .05 level.

Research Question Three: What is the percentage of match of teaching styles and learning styles across classes of business instructors?

The Canfield Instructional Styles Inventory was used to determine the preferred teaching style of the business instructors. The Canfield Learning Styles Inventory was used to determine the preferred learning style of their students. Students who matched the same preferred style as their instructors were grouped together. The degree of match and mismatch was determined by counting the squares either vertically or horizontally (but not diagonally) through the boxes of a 3 x 3 grid, counting the number of boxes you had to move through to get from the instructor's cell to the student's cell as shown in Figure 11. The number of style matches was divided by the total class size and multiplied by 100 to obtain the percent of match. The results of the percentage of match of teaching styles and learning styles across classes of business instructors as well as the degree of match and mismatch are shown in Table 5. The degree of mismatch by distances of 0 and 1 reflect an adequate fit between the instructor and the student. Distances of 2 and 3 indicate a moderate mismatch. A distance of 4 indicates a substantial mismatch.

The preferred teaching style of the instructors were: Instructor 1 and Instructor 2, **Social/Conceptual**; Instructor 3, **Independent/Applied**; Instructor 4, **Independent**; and Instructor 5, **Neutral**. Instructor 5 had the highest percent match with 8 out of 10 students, 80%, matching. Instructor 1 had the lowest percent match with 2 out of 17 students, 12%, matching.

Research Question Four: What is the relationship between students' success as indicated by course grades and a match between their learning styles and the instructors' teaching style?

To answer this question, the following null hypothesis was developed:

H₀1: There was no significant relationship between students' success as indicated by course grades and a match between their learning styles and the instructors' teaching style as measured by the Canfield Learning Styles Inventory and the Canfield Instructional Styles Inventory.

Table 6 summarizes the results of the analysis of variance. The independent variables were GPA: high achievers (2.5 to 4.0) and low achievers (1.0 to 2.4) on a scale of 4.0 and match (1) or non-match (0) of learning style and teaching style. The

Social/Applied 4 Student	Social	Social/Conceptual
Applied 3	Neutral 2	Conceptual
Independent/Applied	Independent 1	Independent/Conceptual 0 Instructor

Figure 11. The degree of match and mismatch determined by counting squares vertically and horizontally through the boxes of the grid.

Note: 0 represents the instructor type, 4 represents the student type. Boxes in the grid were counted horizontally and vertically from the instructor type to the student type. The degree of mismatch is 4.

Table 5

Percent of Match of Teaching Styles of Business Instructors (n=5) and Learning Styles of Business Students (n=99) and the Degree of Match and Mismatch^a.

Instructor Style	Number of Students	Matched Adequate Fit	Percent Matched	Moderately Mismatched	Substantially Mismatched
Instructor 1 Social/Conceptual	17	2	12%	11	4
Instructor 2 Social/Conceptual	18	6	33%	12	0
Instructor 3 Independent/Applied	37	12	32%	21	4
Instructor 4 Independent	17	8	47%	9	0
Instructor 5 Neutral	10	8	80%	2	0
Total	99	36	36%	55	8

^aDegree of Match and Mismatch:

distances of 0 and 1 = adequate fit or match

distances of 2 and 3 = moderate mismatch

distance of 4 = substantial mismatch

Table 6
Analysis of Variance Summary for Course Grade With Subjects Grouped
by GPA and Teaching-Learning Style Match (n=99)

Source	Df	MS	F	Probability
Main Effects				
GPA	1	3.279	9.533	.003
Match	1	.803	2.335	.130
2-Way interactions				
GPA, Match	1	.008	.228	.634
Error	95	.344		
Total	98	.430		

dependent variable was course grade.

The results of the 2-way interactions of the analysis of variance revealed that there was no significant relationship between students' success as indicated by course grades and a match between the instructors' teaching style and the students' learning style. The F-ratio of .228 was not significant at the .05 level. Therefore, the null hypothesis was not rejected. The main effect of GPA is significant at the .003 level with an F-ratio of 9.533.

Descriptive statistics for course grade means and standard deviations for GPA and match or non-match of teaching and learning styles are shown in Table 7. The mean score of course grades (4.72) for high achievers is significantly higher than the mean score of low achievers (4.00). Students whose learning style matched their instructor's teaching style had a higher mean course grade (4.80) than those who did not match (4.45); however, the means were not significantly different.

Research Question Five: What is the relationship between students' success as indicated by final exam scores and a match between their learning styles and the instructors' teaching style?

To answer this research question, a null hypothesis was formed:

H₀2: There was no relationship between students' success as indicated by final exam scores and a match between their learning styles and the instructors' teaching style.

The results of an analysis of variance as shown in Table 8 show that there was no significant relationship between students' success as indicated by final exam scores and a match between learning styles and teaching styles as measured by the Canfield Learning Styles Inventory and the Canfield Instructional Styles Inventory. The independent variables were the two GPA categories (high achievers and low achievers) and match or non-match of learning style and teaching style. The dependent variable was final exam scores. Final exam scores were assigned as A = 12, A- = 11, B+ = 10, B = 9, B- = 8, C+ = 7, C = 6, C- = 5, D+ = 4, D = 3, D- = 2, and F = 1. The two-way interaction F ratio was .052. The level of significance was .820. Thus, the null hypothesis was not rejected. Final exam grades were significantly different at the .014 level for GPA. Descriptive statistics for mean scores and standard deviations of final exam scores for GPA and match or non-match of teaching and learning styles are shown in Table 9. The mean final exam score of high achievers (10.72) is significantly higher than the mean score of low achievers (8.61). Students whose learning style matched their instructor's teaching style had a higher mean (11.13) than those who did not match (9.82); however, the means were not significantly different.

Research Question Six: What is the relationship between students evaluations of their instructors and a match between teaching style and learning style?

To answer this research question, a null hypothesis was developed.

Table 7

Descriptive Statistics for Students' Course Grades Used in ANOVA

	Number	Course Grades ^a Mean	Standard Deviation
Course Grade			
High GPA ^b	79	4.72	.53
Low GPA	20	4.00	.79
Match Instructor Preference	35	4.80	.41
Mismatch Instructor Preference	64	4.45	.73

^aCourse Grade: A = 5, B = 4, C = 3, D = 2, F = 1

^bHigh GPA = 2.5 - 4.0 on a 4.0 scale
Low GPA = 1.0 - 2.4

Table 8.

Analysis of Variance Summary for Final Exam Scores With SubjectsGrouped by GPA and Teaching-Learning Style Match (n=87)^a

Source	df	MS	F	Probability
Main Effects				
GPA	1	27.553	6.367	.014
Match	1	10.624	2.455	.121
2-Way Interactions				
GPA, Match	1	.226	.052	.820
Error	83	4.328	6.332	
Total	86	5.137		

^aOne class of 12 students did not have a final exam.

Table 9
Descriptive Statistics for Students' Final Exam Scores Used in ANOVA

	Number	Final Exam ^a Mean	Standard Deviation
Final Exam Scores			
High GPA ^b	69	10.72	2.04
Low GPA	18	8.61	2.38
Match Instructor Preference	31	11.13	1.71
Mismatch Instructor Preference	56	9.82	2.41

^aFinal Exam Scores:

A = 12
A- = 11
B+ = 10
B = 9
B- = 8
C+ = 7
C = 6
C- = 5
D+ = 4
D = 3
D- = 2
F = 1

^bGPA: 2 = high achievers (2.5 to 4.0 on a 4.0 scale), 1 = low achievers (1.0 to 2.4)

H₀₃: There was no relationship between students' evaluations of their instructors and a match between teaching styles and learning styles as measured by the Canfield Instructional Styles Inventory and Canfield Learning Styles Inventory.

An analysis of variance was conducted as shown in Table 10 to determine if there were significant relationships between student evaluations and teaching style and learning style match. The independent variables were the two GPA categories (high achievers = 2.5 to 4.0 on a 4.0 scale and low achievers = 1.0 to 2.4) and match (1) or non-match (0) of learning style and teaching style. The dependent variable was rating of instructors. Participants were asked to provide an overall evaluation of the instructor: poor = 1, fair = 2, good = 3, very good = 4, and excellent = 5. The ratings of instructors ranged from excellent to poor. The mean rating was Very Good, 4.16.

The results of the analysis of variance showed that there was no significant relationship between student evaluations of their instructors and a match between teaching style and learning style. The F ratio was 2.135 and the level of significance was .147. The null hypothesis was not rejected. Instructor evaluations, however, were significant at the .003 level for GPA.

Descriptive statistics for mean scores and standard deviations of instructor evaluations for GPA and match or non-match of teaching and learning styles are shown in Table 11. The mean instructor evaluation score of high achievers (4.34) was significantly higher than the mean score of low achievers (3.80). Students whose learning style matched their instructor's teaching style had a slightly lower mean for instructor evaluations (4.17) than those who did not match (4.27). Students who did not match the instructors' teaching style evaluated the instructor slightly higher than those who matched, but with a probability of .073 this difference was not significant.

Summary

The instructor participants favored **the Organization, People, Direct Experience, and A-Influence** scales. This outcome implies that they present the material to their students in a clear, logical, and organized manner. They like to create opportunities for students to interact in activities that relate to real-world experiences. Their least preferred scales were **Competition, Numeric, Reading, and D-Influence**. They do not believe that it is important for students to compare their performance with other students as a motive for learning. They prefer not to work with numbers and logic. They feel strongly that instruction methods do affect learning.

Student participants favored the **Organization, People, Direct Experience and B-Expectation** scales. This outcome implies that they like course work to be clearly organized and meaningful, and they prefer work that requires hands-on or performance situations. They like to interact with the instructor and their classmates in activities that are closely related to real-world experiences. They expect to perform at an above average level. Their least preferred scales were **Independence, Numeric, Reading, and D-Expectation**. These participants prefer not to work alone or work with numbers and solve mathematical problems. They do not enjoy examining written information.

Thirty-six percent of the students had learning styles that matched their instructor's teaching styles. Analysis of variance for research questions four, five, and six revealed no significant relationship between learning style/teaching style match and

Table 10.
Analysis of Variance Summary for Instructor Evaluations With Subjects
Grouped by GPA and Teaching-Learning Style Match (n=99)

Source	df	MS	F	Probability
Main Effects				
GPA	1	6.676	8.995	.003
Match	1	2.446	3.295	.073
2-Way Interactions				
GPA, Match	1	1.585	2.135	.147
Error	95	.742		
Total	98	.792		

Table 11

Descriptive Statistics for Students' Evaluation of Instructors Used inANOVA

	Number	Instructor Evaluations Mean ^a	Standard Deviation
<u>Instructor Evaluations</u>			
High GPA ^b	79	4.34	.81
Low GPA	20	3.80	1.06
<u>Match Instructor Preference</u>			
Match Instructor Preference	35	4.17	1.01
Mismatch Instructor Preference	64	4.27	.82

^aInstructor Evaluations: Excellent = 5, Very Good = 4, Good = 3, Fair = 2, Poor = 1

^bHigh GPA = 2.5 - 4.0 on a 4.0 scale
Low GPA = 1.0 - 2.4

student success as indicated by course grades or final exam scores. Further, no significant relationship existed between student evaluations of instructors and style match. However, course grades, final exam scores, and instructor evaluations were significant for the independent variable of grade point average.

Figure 12 provides a summary of the findings for the six research questions of the study.

1. **Research Question One: What are the teaching style profiles, including typologies, of the business instructors as measured by the Canfield Instructional Styles Inventory?** The most preferred scales identified by the instructors were Organization, People, Direct Experience, and A-Influence. The least preferred scales were Competition, Numeric, Reading, and D-Influence. Instructor typologies indicated that two instructors in the Social/Conceptual category, and one instructor each in Neutral, Independent, and Independent/Applied. The chi square outcome comparing the proportion of study participants to the normed group was .333 for expected. The goodness of fit chi square value with four degrees of freedom for actual was 2.667. Neither chi square value was significant at the .05 level.
2. **Research Question Two: What are the learning style profiles, including typologies, of students in specified business classes as measured by the Canfield Learning Styles Inventory?** The most preferred scales identified by student participants were Organization, People, Direct Experience, and B-Expectation. The least preferred scales were Independence, Numeric, Reading, and D-Expectation. Typology results showed 14% of the student participants were Applied, 13% were Neutral, 12% were Conceptual, 11% each for Independent/Applied and Independent, 10% for Social, and 9% each for Social/applied, Social/Conceptual, and Independent/Conceptual. The chi square outcome comparing the proportion of study participants to the normed group was 2.111 for expected. The goodness of fit chi square value with four degrees of freedom for actual was 2.333. Neither chi square value was significant at the .05 level.
3. **Research Question Three: What is the percentage of match of teaching styles and learning styles across classes of business instructors?** 36% of the students matched the teachers' teaching styles.
4. **Research Question Four tested the null hypothesis: There was no significant relationship between students' success as indicated by course grades and a match between their learning styles and the instructors' teaching style as measured by the Canfield Learning Styles Inventory and the Canfield Instructional Styles Inventory.** (F-ratio was .228, the level of significance was .634). The null hypothesis was not rejected.
5. **Research Question Five tested the null hypothesis: There was no relationship between students' success as indicated by final exam scores and a match between their learning styles and the instructors' teaching style.** (F-ratio was .052, level of significance was .820). The null hypothesis was not rejected.
6. **Research Question Six tested the null hypothesis: There was no relationship between students' evaluations of their instructors and a match between teaching styles and learning styles as measured by the Canfield Instructional Styles Inventory and the Canfield Learning Styles Inventory.** (F-ratio was 2.135, level of significance was .147). The null hypothesis was not rejected.

Figure 12. Summary of the findings for the six research questions of this study.