CHAPTER 3

METHODOLOGY

Introduction

This chapter sets out the methodological framework of this study, and the steps taken in conducting the research. It covers the rationales and research design. Following an overview of the study, the population and samples are described. The description of the design and instrument to be used is provided. Data collection processes and instrument scoring are also presented. The chapter concludes with an overview of the data analyses used.

The objective of this study is to explore and investigate the outcome of the congruence and incongruence between the teaching and learning styles on EMSs learners' achievements in Iranian universities. The independent variables of this research are teachers' teaching styles and learners' learning styles that were measured through the ILS (Index of Learning Styles) developed by Felder and Silverman (1988), interview and observation. The dependent variable is student achievement, which is measured through their final exam marks.

This chapter details the measurements of the variables and the methodology used in order to achieve the objectives of this study. It discusses the procedures for the sample, data collection tools, research procedure, research design, and the procedure for data analysis. Quantitative and qualitative data have been collected and analyzed to answer the research questions.

In this research, the focus is on Iranian students who are considered EFL learners. The Iranian education system requires students to learn and consider English as one of the foreign languages. The focus for the EFL learners in primary and secondary schools is primarily on English for communication, unlike in higher degree education such as institutes and universities where the focus goes beyond the ability to communicate effectively. For this level of learners, regardless of their major, the amount of knowledge that they need to process increases daily with the sources being in the English language. Some of these students have to attend private classes to improve their EFL skills. In many cases, the classes will not provide what the students need, so the student's participation in these classes will not lead to success. According to Benesch (1996), the cause of this problem includes not only different learning and teaching styles but also widely different needs and objectives of students.

The research method used for this study is the mixed method approach using the survey, interview and observation. In the first round of research the researcher used the survey to obtain the variety of the students' learning styles and their teachers' teaching styles. In the second round, the researcher used interview and observation to provide the necessary information for the related research questions and also to strengthen the results obtained in the first round of data collection.

Procedures of the Study

The research flow chart is displayed in Figure 3.1.

Methodology

Students

Teachers

Observation and interview

Questionnaires

Felder and Soloman (2006)

Felder and Soloman (2006)

Teaching styles applied in class

Sequential | Active | Visual | Sensing

Sequential | Active | Visual | Sensing

Classifying the teacher's teaching preferences, how they accommodate students' learning style preferences and how receptive are the students towards these new approaches

Stages in data analysis

Classify students' LS preferences and their teacher's teaching styles

Exploring the congruence and incongruence level between student LS and their teachers' TS

To determine the influence of selected demographic variables including **age, gender and parents' background** on learning styles preferences and student achievement

To display the level of congruence and incongruence between learning styles and teaching styles in university classroom setting

To compare levels of achievement among the participants who were given instructions that were congruent and incongruent with their perceived learning styles

To investigate the level of the congruency between the teaching styles of the teacher based on LSI result and class observation and interview
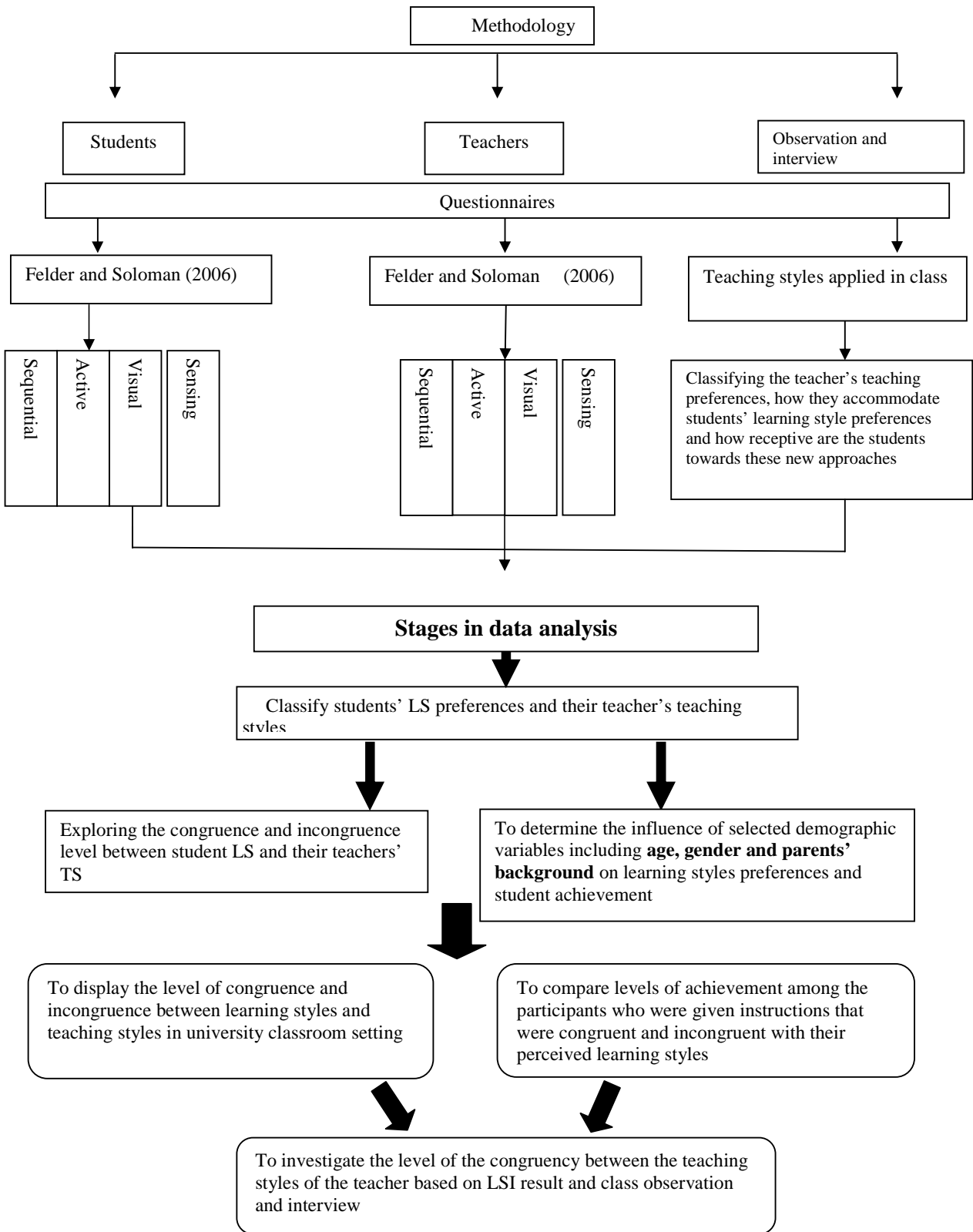
Figure 3.1. Study flowchart.

The purpose of this study is to suggest the effective teaching styles for Iranian EMSs lecturers based on the learners' method and preferred learning style. It is also aimed at assisting teachers in having a better understanding of the students' learning styles preferences in the class in order to enable them to choose the most suitable teaching styles based on student preferences. This study will help the EFL learners develop into successful learners through utilizing learning style preferences more efficiently and effectively. Through this methodology, the study seeks to provide some insight into how the relationship between learners' learning styles and lecturers' teaching styles preferences in class will help the learners to succeed in an educational setting. The following are the steps taken by the researcher in this study:

Step one: identification of learner's information through demographic questionnaire using:

a)   Oxford (1990) modified demography questionnaire (See Appendix A)

Step two: identification of students' and teachers' learning styles by conducting the survey:

b) Learning style survey, using the Felder and Soloman Learning Style Inventory (ILS). (See Appendix B)

Step three: identification of the teachers' preferred teaching styles by:

c)   Conducting an interview with teachers in three levels, at the beginning, middle and end of the data collection; however, the observation sessions were arranged between the three interview sessions. (See Appendix C)

d) Observing the teachers in their class to identify the teaching styles they will use to cope with handling different types of learning styles and how these teaching styles   accommodate the student's needs in   the classroom.

Sampling

Subjects for this study were from five undergraduate classes in the faculty of foreign languages in the main campus of one of the universities in Iran.

The researcher sent the participation invitation along with the overview of the study before starting the data collection. The researcher sent the questionnaire to the lecturers to obtain their level of interest in participating in this study; four levels of interest are as follows: Surely, probably, not sure, not at all. Out of ten lecturers, five (50%) marked as "Surely," they were willing to participate and they provided their timetable to the researcher in order to facilitate her schedule for data collection. The remaining five (50%) were three teachers (30%) who marked "probably" and two (20%) were under "not sure" category due to their limited time to finish their syllabus before the final exam.

The total initial participants of this study consisted of 310 university students in the main campus of one of the universities in Iran. The participants involved in this study are majoring in English as a Foreign Language (EFL); furthermore, they were from different age groups. This group of students can be categorized mainly as medium users of the English language because they have chosen English as their major. English language majors are expected to be fluent in both spoken and written English. The sample age range was between 20 to 45 years old.

As the survey method advances, the attention is drawn to proper sampling techniques and analysis. Since this study involves 310 students and 4 teachers, the questionnaire survey is the best data collection method available for describing and analyzing the number of participants who are considered a group which is too large for direct observation.

The sampling method selected for this study is convenient sampling, and it is used when the researcher is keen on getting the inexpensive data and the sample is chosen based on the researcher's convenience. In this study, during the first stage the researcher sent the participation invitation to the lecturers in Iran and asked them to show their willingness toward conducting this research in their class; however, out of the 10 invitations sent only 5 received a positive answer.

The subjects of this study were 310 English Major Student (EMS) undergraduates majoring in English as a Foreign Language and four of their lecturers at one of the universities in Iran. All the students were native speakers of Persian, all of whom intend to be teachers/translators/linguists/ of English at the different levels or enter a field where expert use of the English language is required. The description of the subjects is shown in Table 3.1.

All participants had at least 7 years of formal education in English. The participants were also enrolled in reading courses, all of which are required courses in order to attain the bachelors of English degree. These courses are designed in order to improve their reading comprehension. Students from this academic discipline were chosen to ensure a certain level of language proficiency (intermediate or above) required for discourse markers to be noticed and to show their facilitating effect (Perez & Macia, 2002).

Table 3.1

Description of the Subject Demographics

Factor	Sub-group	Number/percent (Sub-group)	
Class	Freshman	0	0
	Sophomore	100	32.30%
	Junior	120	38.7%
	Senior	90	29%
Gender	Female	158	51%
	Male	152	49%
Age	20-30	179	57.8%
	30 and more	131	42.3%
Years of learning English	2 years and less	133	42.9%
	2-5	130	41.9%
	More than 5	47	15.2%
Parents' educational background	Diploma and below	147	47.7%
	Bachelor and more	163	52.6%
English as Primary language	yes	1%	
	No	99%	

Instrumentation

There are more than 120 major learning style inventories available at the moment, either in print format or online (Teresapan, 2005). A number of the research studies on learning styles believed that teaching styles and learning styles are similar in many senses (Chu et al., 1997; Oxford et al., 1992). Regarding this similarity, Lyons (1984) stated that "Generally speaking, however, to this date research has not provided a theoretical model nor reasonable evidence to support this relationship" (p. 1). He stated the relationship (n=20) between teaching and learning style, with identifiable teaching style behaviors reflecting learning style preferences.

However, this study is based on the fundamental premise that learning styles and teaching styles might have differences, which are a need that is mirrored in both learning styles and teaching styles inventories. There are differences in definitions and underlying construct of the current models for them. Thus, it is not proper to compare a learning style measure designed from one construct, to a teaching style measure designed from another.

In the literature, two instruments that are well known for measuring both learning styles and teaching styles are (1) the Canfield Learning Styles Inventory (ILS) and Instructional Styles Inventory (ISI); (2) Hanson Learning Profile Indicator (LPI) and Silver, Hanson and Strong teaching style inventory (TSI). James and Blank (1993) suggested three criteria to be considered while selecting the learning styles and teaching styles inventories.

1. Conceptual base or the theoretical constructs used in developing the instruments should be strong and appropriate.

2. Considering and reporting of the reliability and validity based on the data.

3. Practical aspects such as ease of administration, scoring, cost and interpretation must be considered.

Sometimes, the same instrument is used to explain both teacher and learner but sometimes separate instruments are utilized for the learner as well as teacher. When the same instrument is used for both of the learning styles and teaching styles, the dimensions they are looking into are the same and comparative data could be easily matched. Considering the fact that the participants in this study were all EFL learners, therefore the English version of the instrument was used to collect the necessary data.

However, when the instruments are not the same, there would be difficulty in correlating the two types of data. Thus, in this study the researcher used the Felder and Silverman (1988) instrument for both learning and teaching styles. The rationale for this selection was the assumption that the "teachers teach the way they learn"; this means that the teachers teach their students based on their preferences (Dunn & Dunn, 1972). Related literature concerning this hypothesis is available in Chapter 2.

After considering a few learning style inventories, the researcher decided to choose the Learning Style Inventory (LSI) because it focuses on overall learning style, is highly recognized and also extensively used by many researchers all over the world.

Instruments

Four instruments were used in this study:

Part one: A demography questionnaire adopted by Oxford (1990) was used to acquire the relevant information. This part requires that students tick answers relating to gender, age, English language background before entering the university, English speaking countries they have visited for more than six months (if any), and parents' educational level (For details, see Appendix A).

Part two: Index of Learning Styles (ILS) (Felder & Silverman, 1988) for identifying the student's and teacher's learning styles (For details, see Appendix B).

Part three: Observation was used as a technique to complement a dominant technique (For details, see Appendix C).

Part four: Interview schedule for semi-structured interviews with the teachers regarding their teaching. (For details, see Appendix D).

Demography Questionnaire Based on Oxford (1990)

An adapted version of the questionnaire designed by Oxford (1990) was used to acquire the necessary information on respondents' background (For details, see Appendix A). The original questionnaire (Oxford, 1990) consisted of 17 questions. In this survey questions 1- 11 are designed mainly to acquire personal information such as name, study background, parents' background, job, culture, English background, age, gender, mother tongue while questions 12-17 discussed their interest in the English language, for example, how many foreign countries they have visited during the last six months. However, in this research, the researcher only used questions 1- 13 based on relevance to the theme of the study.

Therefore, this study looks at some of the following variables classified by Oxford (1989) which contribute to differences in language learning, such as age, sex, attitudes, target language, course level and number of years of study, metacognitive skill, motivational orientation and the purpose of language learning, motivation level, personality, learning style, cognitive style, aptitude, career/academic specialization, nationality, teaching style, and nature of learning task (Oxford, 1989). The personal variables considered in this study are age, gender, background of English language, and parents' educational background.

Felder and Soloman Learning Style Inventory

In 1988, Richard Felder and Linda Silverman explored learning instruments that aim specifically on different dimensions of learning styles among engineering students. Zywno (2003a) explained "…Three years later, a corresponding psychometric assessment instrument, the Felder-Soloman's Index of Learning Styles, was developed."

Zywno (2003) is one of the researchers who contributed a lot to the ILS validation and reliability through his research on the ILS instrument.

This index originally was designed to measure the learning styles of the instructors and students in engineering and the sciences; however it has been subsequently applied in a broad range of disciplines such as business courses (Ng, Pinto, & Williams, 2008), computer software (Bohlen & Ferratt, 1993), computer engineering (Zywno, 2002), agriculture (Cano, Garton, & Raven, 1992), CBT (Ford & Chen, 2001), construction management (Abdelhamid, 2003) and information technology (Kovacic, 2008).

Felder has researched over a decade about the learning styles of engineering students. His index of learning instruments (ILS) has been used in a growing number of studies exploring and characterizing how engineering students learn and what are the impacts of instructional design.

In 1988, Richard Felder and Linda Silverman formulated a learning styles model which is designed to display the most important learning style differences among engineering students and provide a good basis for instructors to devise an appropriate approach that addresses learning needs of all students (Felder, 1993; Felder & Silverman, 1988). Based on their model, students are classified as having the preferences for one category or the other in each of the following four dimensions: Active-Reflective, Sensing-Intuitive, Visual-Verbal and Sequential-Global.

1. Active-reflective: this refers to the differences between learning by trying something and learning by contemplation

2. Sensing-Intuitive: this refers to the differences between learning by knowing facts or details and learning by knowing the relationship

3. Visual -Verbal: this refers to the differences between learning more through pictures and figures and also reading and hearing.

4. Sequential - Global: this refers to learning by following logical steps and learning to see the bigger picture. Previously there were 5 dimensions (Inductive-Deductive), based on Felder and Silverman (1988) but the fifth dimension has been dropped from the index.

In order to assist the practical utilization of the Felder and Silverman learning styles model, Felder and Soloman (2006) invented an assessment tool that is known as the Index of Learning Styles (ILS). ILS is considered as a questionnaire with 44 questions that cover the 4 dimensions in the Felder and Silverman (1988) learning styles model. The ILS is available in as both online and paper-and-pencil version (http://www.ncsu.edu/felder-public/ILSpage.html).

Felder et al. (2005) reported reliability score from .56 to .77 using the Cronbach's alpha statistical technique for this instrument. In another unpublished study, Felder and Spurlin (2005) and Livesay et al. (2002) that was conducted on 584 learners at North Carolina State University, the reported Cronbach's alpha coefficients for index of learning styles were in the range of .55 to .76 .

The combination of the dimensions in the Felder- Soloman has added more value to their model, and it is unique in its type. The Active-Reflective model complements the Kolb learning style model.

The sensing-intuitive dimension was directly derived from the Myers-Briggs Type Indicator (MBTI), which is mainly based on the theories of Carl Jung. Also this dimension is similar to the Concrete-Abstract dimensions from Kolb's learning styles model. The active-reflective and also visual-verbal dimensions are taken from information processing theory. The sequential -global dimension parallels left-brain and right brain dominance theories (Felder & Spurlin, 2005; Larkin & Budny, 2005).

ILS is an instrument with 44 items and four dimensions, with 11 questions corresponding to each dimension in the ILS model. The range of data for each dimension is from 0 to 11, which means every 11 questions are designed to elicit the preference of the respondents in one of the dimensions of the Felder and Soloman (2006) learning styles model. This means that the learner's preference on a given scale does not necessarily belong to only one of the poles. It may be strong, mild, or almost non-existent. The ILS presents various situations and the respondent selects one of the dichotomous options that best describes him or her. The first version was created in 1991, but then it was revised in 1994 after factor analysis.

In 1996, the paper and pencil version was posted on the Internet but the online version was posted a year later in 1997. Currently the online version is available without fees for research purposes (Felder & Spurlin, 2005). It is also mentioned that the instrument has two applications. The first one is the instructor's evaluation of students' learning styles and use of the information to design the instructional plan in such a way that all learning styles will be addressed during the instruction. The second one is for the individual; the ILS can provide the learners with a picture about their weaknesses and strengths (Felder & Spurlin, 2005).

In the ILS, each dimension consists of two categories, and each category contains a score from 1 to 11.

Scores ranging from 1 to 3:   indicate mild or well balanced level preference between the two categories

Scores ranging from 5 to7: indicate moderate preference which means favoritism for one or two categories

Scores ranging from 9 to11: indicate a very strong preference which means difficulty is shown when there is no support from the situation where the category exists (Felder & Spurlin, 2005). Table 3.2 displays the different dimensions of the ILS based on Felder and Soloman (2006).

Table 3.2

Explanation of the Different Learning Styles Definition Based on Felder and Soloman for ILS Dimensions

Styles	Characteristics	Benefit From
Active	Improve retention and understanding of information by discussing or explaining it to others.	• Group activities in which members explain topics to teach other • Finding ways to apply or use the information
Reflective	Prefer to think about the material first.	• Periodically reviewing what has been read and thinking of possible questions and applications • Writing a summary of readings or class notes
Sensing	Like learning facts and solving problems using well-established methods; enjoy courses that have connections to the real world	• Connecting information to real life
Intuitive	Like discovering possibilities and relationships; like innovation and abstract information. Don't like courses that require memorization and routine calculations.	• Finding interpretations or theories that link the facts • Using care to read the entire question before answering and rechecking work to prevent careless mistake
Visual	Remember what they see; like pictures, diagrams, flow charts, demonstrations.	• Finding or drawing diagrams sketches, schematics, photographs, videos, CD-ROM study aids, etc., to describe course material • Using concept mapping to visually arrange key points
Verbal	Get most out of written and spoken explanations.	• Writing summaries or outlines of course material • Working in groups to hear classmates' explanations
Sequential	Gain understanding in linear, logical steps	• Fill in skipped steps by either asking the instructor or consulting references • Outlining course lecture material in a logical order • Relating new topics to things already known to strengthen global thinking skills • Working in groups to hear classmates' explanations
Global	Learn in large jumps, randomly absorbing material until they suddenly "get it"	• Skimming through the entire chapter to get an overview before starting to study specific information • Relating the subject to things already known to see bigger picture

Adapted from Felder, R. M., and Soloman, B. A. (n.d). Learning styles and strategies

According to Felder and Spurlin (2005), the test-retest reliability for the ILS ranges from .73 to .87 after four weeks and from .56 to .77 after ten weeks (Litzinger, Lee, Wise, & Felder, 2005). The internal consistency for the four dimensions varied from .51 to .69 for visual verbal, and from .41 to .54 for sequential -global. The results of factor analysis with ILS showed active-reflective, sensing-intuitive, and visual-verbal have an "orthogonal" relationship. On the other hand sequential-global and sensing-intuitive dimensions were described as "associated" (Felder & Spurlin, 2005).

A number of validation studies have been conducted on ILS construct validity and reliability (Livesay et al., 2002b; Zywno, 2003) and all of these studies stated that ILS is an adequate and proper psychometric evaluation tool for learning styles preferences of students in engineering specifically as well as other majors. On the other hand, Van Zwanenberg et al. (2000) believed that ILS scales are low in internal reliability; the robustness and construct validity of ILS have also been discussed frequently. The seeming contradiction can be resolved by considering the diverse idea on use of the ILS than the actual results. For instance, Livesay et al. (2002a) used the instrument to classify the learning preferences, consistent with the intention of the model's author whereas Van Zwanenberg et al. (2000) hypothesized that ILS can be used to predict academic performance and failure based on existing model theoretical assumptions. According to Messick (1995) and Thompson and Vacha-Haase (2000), to evaluate the validity of the instrument, many studies with detailed sample results and data sets are required. Zywno (2003b) observed that any type of survey that lasts more than 10 minutes was less likely to be completed by the students. To prove this, in 2000, when he administered the Kolb's ILS together with Felder-Soloman ILS to students, they kept asking questions regarding the meaning of some answers they were supposed to choose.

The same thing was repeated in 2001. Some of them simply choose one of the options regardless of the repeated explanation. Zywno (2003a) believed this situation can be explained by the student's inability in understanding some of the words.

However, the main rationales for choosing this instrument are as follows:

a. ILS validity has been tested in several studies (Felder & Spurlin, 2005; Zywno, 2003a).

b. ILS (Felder & Soloman, 2006) is a convenient instrument provided with clear explanation on dimensions and clear results to be analyzed.

c. The results of ILS can be linked easily to suitable settings (Paredes & Rodriguez, 2002).

d. ILS includes learning style preferences for learners and offers the insight into broadening the teaching styles based on students' learning style preferences (Kovacic, 2008).

e. The existence of the rich literature on ILS, which gives guidance in creating suitable materials for each dimension of ILS (Kovacic, 2008).

Observation

Observation is considered as a means of fleshing out quantitative research. The use of observation as a supplementary technique to complement a dominant technique is supported by Robson (1993). Therefore, using observation for the studied groups in a natural setting is considered an excellent data collection technique to fill in information gaps within the literature, the statistical data and even interviews. In this study, short term observation was conducted over a three month period.

In order to check the validity of any observational findings, the researcher undertook two types of observation: classroom and personal. Classroom observation came from the interaction between the:

1. Teachers and students in teaching time

2. Teachers and students while in the break time.

The teacher's inner language can be observed through their body language and other actions and activities in the class. From the sample population 4 teachers were selected to participate in observation regarding any information about the teaching style behaviors, with the focus of observation being on the preferences, techniques and methods they adopted to assist the learners to learn better. Observation enables the researcher to comprehend the nature of research regarding the instructor's experience (Patton, 1990) in terms of the lecturer's efforts to accommodate the learning styles versatility in the class and the learner's way of responding to it.

Observations also included the researcher's knowledge and observation of the Iranian students learning English as a foreign language. Kerlinger (1992) advised the use of observation when interaction and behaviors are variables in the study. He believed that there is no substitution for seeing the attitudes as directly as possible. Therefore, in this study the researcher conducted direct observation to validate that the behaviors associated with preferred styles, as measured by the ILS, are also those behaviors being displayed most often by teachers and their students in the university classroom setting. Each of the lecturers was observed in separate sessions while teaching their class which occurred for at least 20 minutes. Felder and Silverman (1988) provide examples for each style category and those definitions were used to define and describe each observation category.

Prior to conducting the observation, the two observers (researcher and assistant) spent approximately one hour reviewing and discussing the various learning and teaching styles and the behaviors associated with them. The observers then went to the class setting and conducted the observation, discussing the events as they were being observed to determine the appropriate styles and recording the behaviors in the class. Finally, there was a session with another observer in order to re-check, determine, receive and record observed behaviors in the appropriate style categories.

The two observers were present in the class environment, positioned in a way to see and hear behaviors and interactions between the lecturer and students in the class and also observe the lecturers. Subjects observed were selected based on their interest to participate in this research.

In order to reduce the impact of subjectivity and bias on the results, a neutral observer role was conducted with teachers unaware of what aspect of their job having been selected for the observation. Even though neutral observers will not participate in the group they are studying, they have to be alert of any presumptions they may hold that may affect their findings and even investigating the influence of the observer on the participants' behavior (Constable et al., 2005). The observer relied on the note taking and audio taping techniques to record the observation and information gathered.

Interview

Interview is considered as a common data collection method for individual interaction between two or more individuals. One of the characteristics of the interview, which makes it suitable for this study, was the flexibility and immediacy in data collection as well as the rich results (Bryman, 2001). However, interviews are considered as useful tools to seek the causation factors, and they also help the

interviewer to extract the interviewee's idea, opinions, values, reflection and experiences. In other words, interview provides the chance or, in other words, it creates the atmosphere for the people to talk their mind easily without their teachers or course mate being there to hear their words. In most of the studies done, interview is accompanied by observation and many researchers believed it is the most prominent method of data collection in organizational research (Bryman, 2001).

Thus the interview method is applied in this study to provide more information and also clarify the data collection done in the previous stages by the survey and observation.

During this study, I utilized multiple individual interviews with lecturers which were based on Patton's (1990) "Interview Guide" that advised the interviewer to determine the topics and issues in advance but the sequence and wording of the questions can be decided by the researcher during each interview session. Using this approach will benefit the data collection procedure to be more systematic for participants; however the interview will still remain in the conversational styles (Cohen, Manion, & Morrison, 2000).

All interviews were conducted in the interviewee's office; I was sitting facing the interviewee and I audio taped all the conversations and later transcribed them for analysis. For a sample list of individual interview questions, refer to Appendix D.

The main rationale of the interview questions is aimed at extracting in-depth qualitative information on teacher teaching styles and the way teachers cope with different learning styles preferences in their class and also to find out the likely causes of the phenomena being studied. I did transcribe interviews word for word. As I wrote the findings (Chapter 4), I tried to keep the authenticity of their words as much as possible.

That said, at certain times, I did correct some of their grammatical mistakes, in order to make their statements easier to understand. The changes that I have made include changing the verb tense, changing the descriptive words which were repeated many times in the interview; I did delete some of the repeated words to make the conversation more accurate and more understandable. I also omitted parts of the dialogue by using "…" to show breaks in between the statements. I also revised all the lengthy comments and I just mentioned the part which is the most relevant to the theme of the study and the interview. If I added some words I have bracketed them by using the [   ] symbols.

Finally, I have italicized the words which were emotionally emphasized by the interviewee; when participants added a great deal of emotion to certain words in their comments, I chose to italicize the word in order to draw the reader's attention to it.

The Structure of the Interview

All four teachers in the study were interviewed after the survey was administered and during class observations. The same set of questions was used in each interview. The flow of questions aimed to identify: How teachers help students with different learning styles preferences to achieve higher marks; how they would accommodate different learning styles when teaching (subject, e.g., reading or grammar); and what types of teaching styles they mainly use.

The answer to each question was written and audio taped by the researcher, who also acted as an interviewer. The verbal information and observation noted were then transcribed into text, and these descriptions were directly typed and saved in a file for closer examination and analysis.

Gall, Borg, and Gall (1996) stated that most of the research recommends 90 minutes as the maximum time allocated for the interview in which the interviewee can maintain the level of attention for the interview questions. In this research, to obtain the necessary and sufficient information, questions were designed to fit into a maximum time frame of 40 minutes to allow building of rapport, a brief review of the purpose of the research and interview, discussion of points the interviewees wished to elaborate, and other comments. The interview was structured into five parts (See Table 3.3).

Table3.3
The Flow of the Different Stages in the Interview for Current Research

Interview structure	Components
Part one: Introduction and warming up	• Casual chatting for warming up and building the rapport • Brief explanation of the purpose of research and interview • Reminding the participants of their rights and providing them the consent letter to read
Part two: Learning styles background	• Duration of studying English and also teaching English which is also obtained through demography questionnaires • Preferred teaching environment • Learning habits and the ways they have been taught in their own time
Part three: Actual and current practice in class	• Identifying the current and actual practice in class Identifying the weaknesses of the current teaching method and students' acceptance toward it • Level of awareness about the student learning style diversity
Part four: Thoughts about the teaching style that is based on students' learning styles preferences, how accommodating the teaching styles were in the class	• Whether the questionnaire structure was clear or vague • Identifying whether the results of the teaching based on students were satisfactory or not • Identifying the teaching styles they used in the class for different types of learners • What types of actions were taken to accommodate the different learning styles in the class?
Part five: Things that need to be adjusted or future plan	• Action that can be done by teachers to improve student learning • What types of actions should be taken to improve the teaching based on students' learning style preferences

The interview was designed to identify behaviors of the teachers toward the diversity of the learning styles in the class and the way they tailored their teaching styles based on the learners' learning styles preferences. However, other areas covered during the interview were about the difficulties and their views on the learning style questionnaires.

Pilot Study

Prior to the study data collection, a pilot study was conducted to finalize the data collection instruments and data collection procedures. The main objective of conducting pilot study was to establish the validity of the data collection instruments and detect the design flaws in the questionnaire instrument (ILS) or in the data collection.

Pilot Study Subjects

Subjects were drawn from undergraduate EFL major program in the faculty of foreign languages, Tehran University. The subjects and teachers for the pilot study were selected from different universities which were different from main participants of this study. Subjects received compensation for their participation in the form of extra 2 marks and a copy of their individual learning styles profile. A total of 40 students and two teachers took part in the pilot test.

Pilot Test Material

Data collection for the pilot study was completed within one session. The researcher used the laboratory, asked the learners to complete the online version of ILS, printed the online results, and gave them to the students.

Pilot Study Procedures

Data collection was conducted in a computer lab with 40 identical computers. As subjects entered the lab, they were free to choose which computer they wanted to use. They completed an informed consent form (see Appendix E for a copy of the consent letter). The subjects were asked to log into the website for the ILS (the website address was provided by the researcher on the blackboard). When all the participants confirmed that they were in the ILS web page, the researcher explained to them about the test and asked them to answer the questions honestly. She also asked them to feel free to ask if they see any ambiguity in the wording, meaning and so forth. Some of the students mentioned that they had problems choosing some of the items because some of the items are describing situations that are closely related in meaning. Thus, the researcher asked them to choose the one which is closer to the approach that they may take while in that situation.

After the students had notified the lecturers that they had completed the test, the researcher asked them to go to the result page and then print the page while they are in the lab. The printing facility was arranged based on the researcher's request. Thus, students were informed about their learning style categories based on Felder and Soloman (2006). In the early stages of data collection the researcher decided to use the online version for the data collection session but considering some of the problems predicted the researcher changed her mind about using the online version. Some of the problems which dissuaded the researcher from conducting the online version for the main data collection are:

1. Lack of vacant computer labs due to the lecturers' timetables.

2. Inconvenience in transferring the class to the lab

3. Not enough computers in the lab

4. Lack of interaction in the lab between the lecturer and the students; thus the researcher will not be able to perform the observation easily

Pilot Study Results

Many research studies have been conducted that dealt with the instrument validation. Van Zwanenberg et al. (2000), in their study, chose participants who were 139 engineering students and 145 business students at two universities in Newcastle. The Cronbach alpha reported was .41 to .65. However, in another study done by Livesay et al. (2002a), the alpha reported was .54 to .72. According to Tuckman (1999) an alpha value of .75 or greater is considered acceptable for the instruments that evaluate attitude and knowledge an alpha value of .75 or greater is considered acceptable for attitude and preference valuation. However, the instrument used in this study is to assess the learning style preferences of the learners; therefore, the alpha of 0.50 or greater is the acceptable value. The alpha values for all four scales of the Index of Learning Styles meet this criterion. However, the Cronbach alpha reported for this study was as follows:

Table 3.4
Results of the Cronbach Alpha for Pilot Study

Dimension	Number	Significant level	Alpha
ACT/REF	40	.05	.323
SEN/INT	40	.05	.475
VIS/VER	40	.05	.451
SEQ/GLO	40	.05	.471

Questionnaire Administration

Although questionnaire survey is considered as a powerful instrument for gathering data, one of the main criticisms of this methodology lies in its low-response or non-response rate. Where the response rate is low, the sample size can be too small for accurate analysis, and thus may result in bias (De Vaus, 1995). In this research, for controlling the factor of bias the researcher will avoid questionnaire administration by mail. After obtaining permission from the relevant authorities, heads of department, lecturers and students of the classes, the researcher will go to all of the selected classes to collect the data in person. Moreover, before the students start answering the questionnaires, the researcher will explain the purpose of the study and how to answer the questions properly. During the data collection time in each class, students will be able to ask the researcher any questions they have regarding the questionnaires.

One of the limitations of the questionnaire survey method may be due to inaccurate answers. In order to minimize this possibility, respondents will be informed that the questionnaires will have no impact on their course marks.

116

It must be mentioned that referring to the priority of the administration of the ILS and the demography, following consultation, the researcher decided to administer observation first followed by interview because she wanted to decrease the lecturer's sensitivity to the research.

Research Procedure

The research procedure is divided into two major phases:

Data Collection via Structured Questionnaire ILS and Demography Questionnaires

a) Purpose: To know the students better and to plan their further action based on the students background

b) Purpose: Listing the students' and their lecturers' learning styles preferences by ILS

c) Purpose: Exploring and listing the lecturers' preferences regarding the teaching styles based on ILS questionnaires. Exploring the lecturers' teaching styles was based on the hypothesis that to some extent lecturers teach based on their learning styles. The finding of the study done by Stitt-Gohdes, Crews, and McCannon (1999) supported this hypothesis.

Data Collection via Class Observation and Interview

a) Purpose: Observing the class and the teacher teaching styles in the classes in which the ILS questionnaire has been distributed before.

b) Purpose: Interviewing the teacher to get their opinion about the teaching styles they used in their class and the way they deal with different learning styles in the class. Table 3.5 displays the time table designed by the researcher for the interview and observation session.

Table 3.5

Time Table for the Interview and Observation

Session	Operation	Report
1st session	Ice breaking	
2nd session	1st interview	
3rd session	Observation	
4th session	Observation	
5th session	Observation	
6th session	Observation	
7th session	Observation	
8th session	Observation	
9th session	2nd interview	
10th session	Observation	
11th session	Observation	
12th session	Observation	
13th session	Observation	
14th session	Observation	
15th session	Observation	
16th session	3rd interview	

Variables

Following are the variables identified in this study.

Independent Variables

The first stage of the study determined the independent variables, the learners' learning styles and teacher' teaching styles. Style preferences were identified through the use of self-reporting, learning and teaching style inventories. As mentioned in Chapter 2, the researcher emphasized the fact that teachers teach in the way they were taught or learned best (Brown, 2003; Oxford et al., 1992; Peacock, 2001). Before conducting the inventories, the subjects were asked to give their permission to participate in this study through a consent form provided by the researcher. Subjects were assured, through the written consent form, that names would not be released or associated in any way with collected data except to match the student's styles with lecturer's styles in the classroom environment and with student's achievement.

Consent forms were distributed and thoroughly explained to subjects prior to the completion of the ILS. A demographic questionnaire requesting age, gender, years of experience in learning the English language, level of parent's education and the names of the lecturers were administered to each subject as well. The ILS was administered to the lecturers who show their interest in participating in the initial stage of the research. The researcher had to administer the inventory individually because some lecturers faced scheduling problems. Each lecturer was assessed based on his/her preference for one of the ILS styles.

Scoring the ILS: The ILS is available in two formats, online as well as paper and pencil form. Considering the accuracy issues in the ILS, the researcher decided to use the paper and pencil version for data collection. After obtaining the data, the researcher keyed in the data for each participant and got the results online. The next step was to save the results individually and file them under each class. Based on the research questions, the related analyses were conducted to answer the research questions.

As the second step in data collection procedures, the observation method was utilized. This study conducted direct observation to validate that the behaviors associated with preferred styles, as measured by the ILS are also those behaviors being displayed most often by the lecturers in the university classroom setting. Each of the lecturers was observed during the 4 separate sessions which occurred for at least 20 minutes. However some of the sessions lasted slightly more than 20 minutes; according to Gardner (1995) an observation time of 20 minutes to considered appropriate. Apart from considering the teaching styles of the lecturers, the observation was also used to see the level of accommodation to learner needs by lecturers in the classroom.

One of the weaknesses of the inventories is that they are self-reporting which means measures reported are subject to no external criterion to check responses. In order to check the construct validity of the ILS inventory, the researcher used the observation to facilitate the researcher in describing what exactly happened during the teaching time in class. Prior to data collection the data, the one assistant was trained regarding the observation point, which was derived from the teaching and learning styles by the Felder and Silverman (1988) definition. As the next step, lecturers were observed throughout the class. Observation data were also compared to the individual's reported style inventory to determine if observed behaviors in the class environment were reflective of the reported styles.

Finally, the researcher interviewed the lecturers to see their point of view of the possible ways to handle the students with different learning styles in their class.

Dependent Variable

In order to measure the dependent variable, student's achievement in the form of the final score was considered as the scale. The final exam was planned such that one and a half hours was allocated for each subject.

<p style="text-align:center">Data Collection Procedures</p>

The purpose of this study was explained to students. Then the researcher distributed the questionnaire and ILS test among the students to identify their preferences in terms of learning styles. The researcher also distributed the background questionnaire among the subjects to obtain the necessary information regarding age, gender, and family educational background.

Then the researcher conducted the ILS by Felder and Silverman (1988) learning style among the students and their lecturers to categorize them based on their learning style preferences. The students were given 30 minutes to complete their questionnaires, but this time limit is only an option for them. The purpose of the first step is to explore the learning style preferences used by EMS learners and enable the researcher to answer the research questions.

The researcher conducted the data collection procedure with the assistance of English language lecturers who taught the classes. Before embarking on this study, the lecturers who were assisting in data gathering received an introduction that explained the motive and purpose of the study.

Students received brief instructions on learning style categories based on Felder and Silverman (1988). The instructions involved a brief definition of learning styles and the named categories under ILS.

In addition, the researcher explained about the learning styles based on Felder and Silverman (1988) to familiarize the subjects with the different learning styles. During the reading of the instructions, subjects were given the opportunity to ask questions before completing the ILS. When conducting the ILS the researcher asked students to respond without any time constraint because she wanted them to respond appropriately without being under pressure to ensure reliability.

In the first stage, the data were collected via ILS. After conducting the ILS the results were analyzed by the SPSS program. Data obtained were calculated using descriptive statistics namely frequencies, mean and Standard Deviation to determine the overall patterns of the learning style preferences among learners as well as their lecturers participating in this study. At the end of the first step, the researcher obtained the list of the learning styles, which have been conducted by each group of learners based on their usage frequencies. She also attempted to look at the factors which affect the learning style preference among the students. Descriptive statistics such as means, standard deviations, frequencies, and percentages were analyzed for variables including gender, age, parents' educational background and duration of the years the learners learned English. Also the chi-square will be employed to examine whether there were statistically significant differences in the use of ILS by gender, age, parents' educational background and duration of English language learning. The chi-square test was also used to determine whether two variables, for example learning style and age, were independent of each other. Several types of statistical testing were also conducted using SPSS for the analysis. Pearson r correlation was employed to measure the extent of correlation between ILS conducted among the teachers and students.

As the next step, the researcher observed the teachers in the class in order to explore their teaching styles preferences or the behaviors which have not been mentioned in the ILS. In the next step, the researcher interviewed the teachers to explore how they handled the class with a variety of learning styles and what kind of strategies they used to overcome the situation. The research questions and hypothesis with data sources are listed in Table 3.6. This is later followed by a more detailed explanation of what the data sources entailed.

Table 3.6
Research Questions and Data Sources Entailed

Research questions	Instruments used
Q1:What are the learning styles and teaching styles preferences among the EMS learners and lecturers in Iran?	Questionnaire
Q2: How do personal factors, namely age, gender, number of years studying English and family educational background relate to learning style preferences for EMSs learners in a university classroom setting in Iran?	Questionnaire
Q3: Does the match or mismatch of teaching and learning styles impact on the achievement of EMSs learners in a university classroom setting in Iran?	Questionnaire Observation Interviews
Q4: What are the impacts of the independent variables on dependent variable on learner's achievements?	Questionnaire
Q5: What are the accommodations made by EMSs lecturers toward students' learning styles in a university classroom setting in Iran?(4 case studies)	Observation Interviews

Data Collection Methods

As this research involves an in-depth investigation of Iranian EFL learners through testing the link between the teaching and learning styles on student achievement, in order to achieve the objectives of this study, quantitative and qualitative approaches are adopted to obtain optimal results. Applying only one method could result in partial or limited results being achieved. In this study quantitative and qualitative approach are used in the following ways:

1. Quantitative research facilitates the qualitative research: the survey prepares the proper background or base for the qualitative research by highlighting participants' learning and teaching styles preferences for further in-depth observation and interviews.

2. However, the results of the interviews and observation are cross-checked against the results of the survey.

3. For the purpose of obtaining the information that cannot be acquired via survey, follow-up in- depth interviews and observations can fill the gaps.

Therefore, the combination of questionnaires, observation and interview is utilized for collecting data in this research. Each of these approaches has advantages and disadvantages in some aspects but not others. Thus it is recommended to employ more than one data collection technique to enhance the quality of data. However, this strategy of combining the quantitative and qualitative approaches is called "mixed method" that has been increasing in use since the early 1980s. Some of the researchers stated that there is a close association between the quantitative and qualitative approaches which enable them to be pressed into the service of each other (Bryman, 2001).

Data Analysis

All responses from the questionnaires survey will be statistically analyzed and organized to offer answers to the research questions detailed in Chapter 1. Descriptive and inferential analysis of the quantitative data will be examined using the Statistical Package for the Social Sciences (SPSS).

Descriptive statistics such as means, standard deviations, frequencies, and percentages will be analyzed for variables including gender, age, learning styles and teaching styles. Several types of statistical testing will be conducted using the SPSS for inferential analysis. Pearson correlation will be conducted to measure the extent of correlation between ILS and teaching style preference results. The chi-square tests will be used to determine whether two variables, for example learning style preference and age, were independent of each other. Analysis of variance (ANOVA) will be adopted to test for significant differences between means in order to compare and analyze variables. The main aim of these analyses is to investigate the issues in relation to student learning style preferences among EMSs learners as well as their teachers. Relationship between age, gender, parents' educational background and learning style preferences, relationship between learning style and teaching style preference will be explored.

As mentioned earlier, the findings of this study will determine the effective teaching based on individual differences among the EFL students in Iran. Literature review on learning styles recommends that there are two approaches regarding the matching of learning styles and teaching styles. The results of many studies implied that students learn more effectively when they are taught according to their learning style preferences and therefore, it is more practical to identify the learners' learning styles.

According to Kaur (2003), when there is a lack of a relationship between the learners preferred learning style(s) and the teachers' style(s), the class may not be useful for the students.

The following studies discussed the match and mismatch between the learning styles and teaching styles: DiStefano (1970), Koran, Snow, and McDonald (1971), James (1973), Witkin et al. (1977), Hudak (1985) and many more believed that learning is more effective when there is a match. On the other hand, Glass (1967), Nelson (1972), and Montgomery (1972) discussed that effective learning can be achieved only when there is mismatch between learning styles and teaching styles.

This study will also look at the level of the match and mismatch between the teaching styles and learning style and the impact of this match on student achievement. Learning style is considered as a general pattern while teaching style is considered as more specific for the language teachers.