CHAPTER 2

LITERATURE REVIEW

Introduction

Many researches have discussed the subject of adult education. Adult learners learn in a variety of ways and take different approaches in achieving their learning goals. These very special approaches of learning are referred to in the literature as learning styles (Blackmore, 1996; Claxton & Murell, 1987; Jester, 2000). The basic traditional educational system is based on student achievement rather than on learning. Nowadays, the primary focus has shifted from engaging students in learning through inquiry and knowledge-based learning to being able to pass tests or scoring high on college entrance examinations.

This chapter will discuss the concept of education relating to adult learners and review past literature on learning styles and teaching styles. It also investigates the use of learning style inventories to provide greater consonance between adult learning and teaching styles, the level of existing match or mismatch between these two categories and evaluates the impact of match and mismatch on learner achievement. Various learning styles will be discussed as to their relationship with teaching styles in class. The research questions are designed to explore the connections between learning styles and teaching styles and their impact on student achievement.

One important point in this literature review is to explore the major themes of learning styles, learning style inventories, teaching style inventories and teaching styles.

Felder and Brent (2005) explained that students have different backgrounds, strengths and weaknesses, interests, ambitions, senses of responsibility, levels of motivation, and approaches to studying.

The understanding of how students learn and how the teachers teach affect both students' learning and their achievement in class. Teachers attempt not only to teach students subject areas, but also to build skills in both their preferred learning methods, as well as the less preferred modes, so that students learn to adapt to situations.

De Vries (2005) suggested that college students from different cultures have different influences on their learning. Providing instructors with the necessary information about culture and its effects on student learning style preferences will enable professors to incorporate more preferred learning style methods into their teaching (Felder, 1996). Felder (1996) suggested that in order to improve achievement, incorporation of the learning styles must be clearly pictured by conducting different approaches. Felder and Spurlin (2005, p. 2) stated:

> When mismatches exist between learning styles of most students in a
>
> class and the teaching style of the professor, the students may become
>
> bored and inattentive, do poorly on tests, get discouraged about the
>
> courses, the curriculum, and themselves, and in some cases change to
>
> other curricula or drop out of school. (p. 2)

A gap in the literature pertaining to this particular group of learners exists, particularly when it comes to EFL learners in Iran. The objective of this study is to investigate learning preferences among the university students in Iran and their matching level with their teacher's teaching styles and its impact on student

achievement. Based on the findings, this study hypothesizes that the appropriate teaching styles that are aligned with students' learning preferences will influence their achievement. Previous studies on teaching styles have been reviewed in order to explain the link which may exist between two variables (learning preferences vs. teaching styles).

Many studies have been conducted that discussed learners' learning styles in higher education (Coffield et al., 2004; Demirbas & Demirkan, 2007; Duff & Duffy, 2002; Li et al., 2008; Lhori-Posey, 2003).This study reveals the specific learning preferences, which are fundamental for teaching styles in the Iranian university setting. The review of the literature therefore begins with looking at a review of the different definitions of learning styles and learning styles inventories. It is followed by teaching styles and their impact on students, on matching teaching styles with learning styles, the variables that influence learning styles, reviewing the researches done on the relationship between the language learning strategies and learning styles and other factors, which will affect second language acquisition.

Learning Styles Overview

The influence of learning styles on student success appears to be a much researched and debatable topic. The main idea of the learning styles approach is that students learn more efficiently when information is presented in a manner that matches their prefernces in terms of learning and processing of information (Montgomery, 1995, p. 1). Learning style research is aimed at considering the individual differences in learning behavior. However, considering the extent of the literature in this field over the last 30 years (Armstrong & Mahmud, 2008; Coffield

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et al., 2004; Demirbas & Demirkan, 2007; Duff & Duffy, 2002; Herbert & Stenfors, 2007; Hornyak et al., 2007 ;

Hyde, 2007; Kayes A.B., 2007; Kayes D. C., 2007; Lhori-Posey, 2003; Li et al., 2008; Reynolds & Vince, 2007; Sievers, 2007; Welsh et al., 2007), it is observed that in reality factors impacting on learner's learning styles are manifold to the extent that it may be exceptionally difficult to make sense of any particular individual beyond saying that the person is unique (Gardner, 1993; Willing, 1988).

There are three main reasons for studying the learning style concept in depth. Firstly, based on many studies, it is clear that learners have their own preferences regarding learning, and, in some cases, certain types of psychological characteristics are associated in certain "types" of individual (Smith, 2002; Stevenson & Dunn, 2001; Tennant, 1997). Secondly, there is evidence showing that the attempt to provide different learning styles may help learners achieve better results (Bull & Ma, 2001; Cassidy & Eachus, 2000; Rayneri et al., 2006; Shaughnessy, 1998). Finally, teachers should know how to develop a classroom methodology that is based on students' learning styles preferences.

The history of education suggests that students who are involved in the learning process are eager to achieve success (Dewar, 1996; Hartman, 1995). Once students are involved in their own learning process, they start to feel confident and their personal achievement levels will improve.

In a study done by Reid (1995) it isstated that learning style is the internally based characteristics of an individual for understanding new information. However, research in learning style shows that it is very difficult to offer a clear definition of it. Most of the researchers in this field offer their own explanation or analysis for the

learning styles concept. Focal points of research and interpretations are usually derived from:

1) Research, which is based on contextual approach of the students to learning concepts (Entwistle & Ramsden, 1983).

2) Qualitative approaches and analysis of the study processes that are observed in students' information processing (Schmeck, Ribich, & Ramanaiah, 1977).

3) Cognitive psychology.

4) Experiential perspectives.

5) The association of the diverse theories (Cano-Garcia & Justicia, 1994; Kolb, 1985; Sadler-Smith, 1997).

However, Sternberg (1997) mentioned that the learning style concept mainly refers to how people prefer to learn. On the other hand, Peacock (2001) and Willing (1988) explained that learning styles are habitual, natural and individual preferences in acquiring and processing information. Ellis identified learning styles as:

> … the consistent pattern of behavior and performance by which an individual approaches educational experiences. It is therefore the composite of characteristics cognitive, affective and psychological behaviors test serve as relatively stable indicators of how a learner perceives, interacts with and responds to the learning environment (Ellis, 2001, p. 149).

Riding and Rayner (1998) (quoted in Hillberg & Tharp, 2002, p. 1) defined learning styles as individual collections of learning strategies (manners in which learning tasks are responded to) integrated with cognitive styles (the way the information in stored and represented).

A study of available literature implied that there are several methods for categorizing learning style models. Many studies have discussed learning styles, the factors affecting learning style selection, the learning styles of the different learners and the impact of the key factors on learning style preferences.

Willing (1988) identified learning style as a combination of the factors, which showed how the learner prefers to learn or deal with the learning task. The word "learning style" first appeared in the 1970s. According to Riding and Cheema (1991), the word learning style was the replacement for the word cognitive style and in this definition cognitive style was a part of the learning style.

In another definition by Robotham (1999), it is considered as an interest in the whole procedure, which has been taken during the learning. Brown (2003) considered learning styles as the mediators between emotion and cognition. For example, a reflective style shows a reflective mood.

Many researchers suggest that many learners fall into more than one learning style category, but occasionally move from one to another depending on factors prevailing in the learning environment (Garner, 2000; Hsiao & Oxford, 2002; Kaplan, Kies, & Daniel, 1995; Loo, 1997; Reynolds, 1997; Stellwagen, 2001). Cornett (1983) suggests that even though individual learning styles are stable, maturation and environmental stimuli can influence the qualitative changes; for example, adults are more performance goal oriented, while children are more goal

oriented, which means children are prioritizing learning itself rather than results.Lyddy (1998) explained that changes happening in learning styles from childhood to adulthood are mirrored in the shift in educational methodologies employed in later education that emphasize performance rather than learning itself.

   He also recommends that when the education system does not encourage/reward learning, it will demotivate the active learners. Learning styles are considered a partial response to the learning environment and it happens when the students do not passively resign themselves to adopt a particular learning approach.

   How to improve the students' learning? According to Leithwood, Jantis, and Steinback (2000) identifying the learning style has been critically important to any educational environment. Similarly, researching about the learning styles of adults in university classrooms will bring understanding about how adults learn.

   However, assisting learners in order to understand their learning style preferences will benefit the instructors, and it will influence learners' academic achievement. The knowledge of learning style is important in any educational setting. However, one key challenge anywhere is to promote student academic success, which includes completing the course and graduation rates per year. Therefore, instructors attempt to apply teaching strategies in order to obtain such academic success.

All learners have a preferred learning style, which becomes evident when they are required to interact with various models of instruction. Learning styles are based on responses to questions on learning style instruments. The responses are, in fact, personal observations test of ability; therefore, validity becomes one of the most significant problems.

There is nothing to prevent the learner from answering the questions erroneously or according to how he or she believes that others would want the answers. In fact, learning style instruments are considered as self-reports and they reflect the person's understanding of his or her own learning style. A few of the learning style instruments will be discussed in this chapter.

Hill's Cognititve Style Mapping (CSM) was developed by Joseph E. Hill, president of Oakland Community College in Bloomfield Hills, Michigan, during the 1960s and 1970s. He defined learning style as the way students receive and process information (De Bello, 1990). Hill's model for learning style covers three factors:

1. Processing of theoretical and qualitative symbols

2. Modalities of inference

3. Culture

The purpose of style mapping was to highlight the individual cognitive style and create a program which benefits the most dominant learning style. After the initial mapping for an individual, a program is designed based on strategies that would emphasize learning performance. Hill's cognitive style inventory has been revised through the years but it is still considered a complex inventory due to the lack of reliability and validity (Hill, 1981; Curry, 1987, as cited in De Bello, 1990).

Robotham (1999) indicates that in order to improve the student's learning, we need to learn the way the students learn. Learning styles can be defined as the learners' preferred mode of dealing with new information. Lawrence (1984) stated that the term learning styles referred to learners' four traits as follows:

a) Cognitive style, which can be defined as a preferred way of mental functioning

b) Models of the attitudes or interest that influence a person's attention in a learning situation

c) Seeking the learning environment compatible with the learner's cognitive style

d) Outlook of using certain learning tools (learning strategies) and avoidance of others.

A group of researchers (Coffield, Moseley, Hall, & Ecclestone, 2004) designed the family of learning styles based on the available literature, and this was used as the fundamental basis for the detailed analysis in their study. They have reported five categories based on the different models, namely:

1. Constitutionally based learning styles and preferences

2. Cognitive structure

3. Stable personality type

4. Flexibly stable learning preferences

5. Learning approaches and strategies

With each one of these categories, they have discovered broad themes and beliefs about learning, the main concepts as well as definitions, and the leading "influential thinkers" in each category. Fig. 2.1 is the family tree of the learning styles done by Coffield et al. (2004).
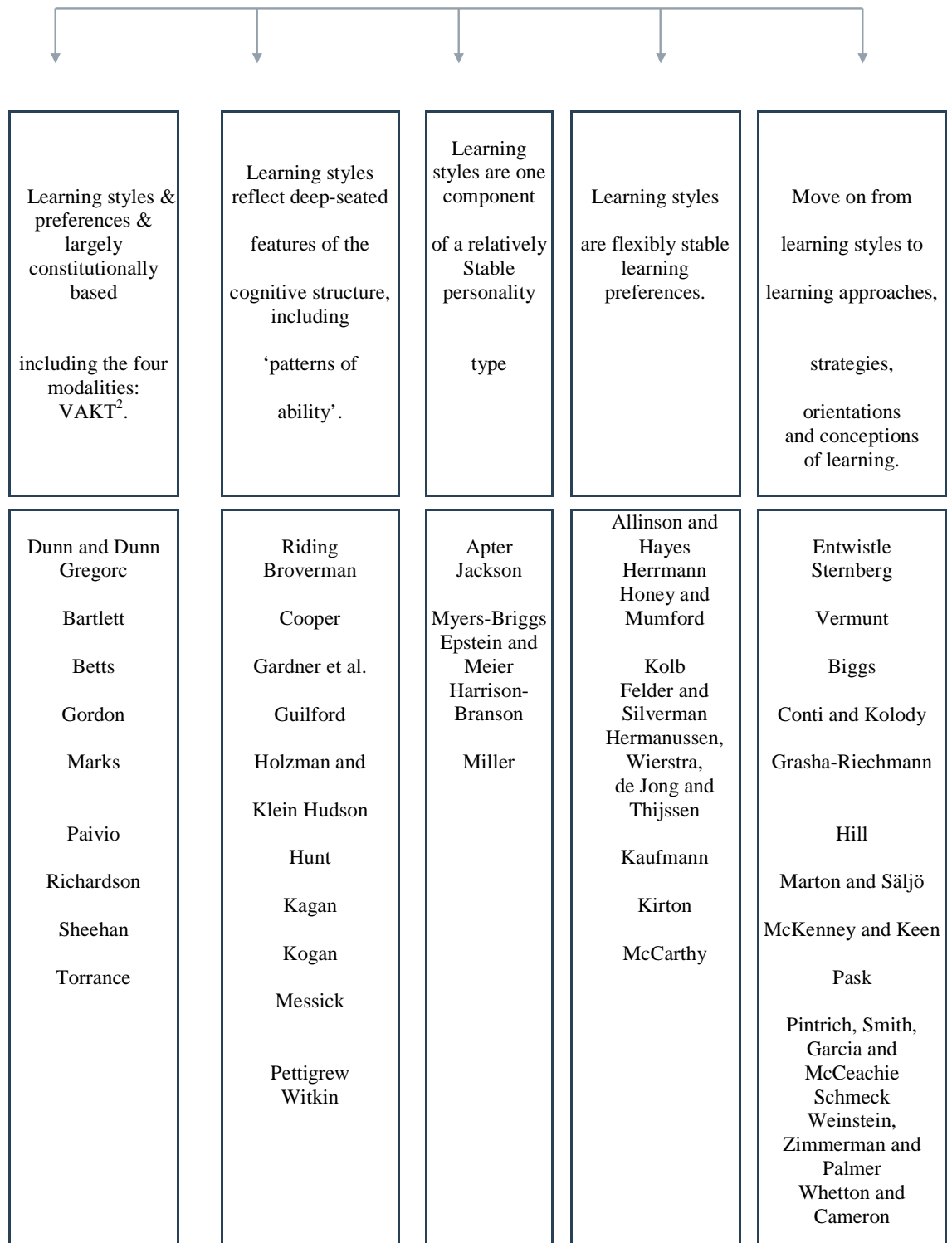
Learning styles & preferences & largely constitutionally based including the four modalities: VAKT^2.	Learning styles reflect deep-seated features of the cognitive structure, including 'patterns of ability'.	Learning styles are one component of a relatively Stable personality type	Learning styles are flexibly stable learning preferences.	Move on from learning styles to learning approaches, strategies, orientations and conceptions of learning.
Dunn and Dunn Gregorc	Riding Broverman	Apter Jackson	Allinson and Hayes Herrmann Honey and Mumford	Entwistle Sternberg
Bartlett	Cooper	Myers-Briggs Epstein and Meier Harrison-Branson	Kolb Felder and Silverman Hermanussen, Wierstra, de Jong and Thijssen	Vermunt
Betts	Gardner et al.	Miller		Biggs
Gordon	Guilford			Conti and Kolody
Marks	Holzman and		Kaufmann	Grasha-Riechmann
	Klein Hudson		Kirton	
Paivio	Hunt		McCarthy	Hill
Richardson	Kagan			Marton and Säljö
Sheehan	Kogan			McKenney and Keen
Torrance	Messick			Pask
	Pettigrew Witkin			Pintrich, Smith, Garcia and McCeachie Schmeck Weinstein, Zimmerman and Palmer Whetton and Cameron

Fig. 2.1. Family tree of learning styles.

Factors Affecting Learning Styles Preferences

A few factors have been reported as mainly contributing toward the learning style preferences. They include age, gender, educational level, proficiency level, study field, belief, attitudes and motivation, prior knowledge of learning styles, content, country's education system and teachers' teaching styles (Dunn, Dunn, & Price, 1979; Oxford & Ehrman, 1995; Reid, 1987). In terms of age, Reid (1987) identified that learning style preferences for older students were mainly towards visual and auditory modalities. Other studies (Cherry, 1981; Dunn, Price, & Sanders 1981; James & Galbraith, 1985; Keefe, 1987; Rossi-Le, 1989) have shown that visual style has dominated among adult learners. Barbe and Milone (1981) identified shifts that occur in learning style preferences as an individual matures. In the primary level, the learning style strengths are more defined with the dominant one being the auditory.

From the first through the sixth grade, visual and kinesthetic preferences dominate but high school age students show more tendencies towards the visual and auditory. According to researchers, this shift represents a change in the environment as students learn to read (visual) and write (kinesthetic). The relationship between the educational level and learning style preferences has been pictured in Reid's study as well as an earlier one.

Reid reports that graduate students had a greater tendency for visual learning than undergraduates did. The learner's academic background and experience were not specified in his study. Politzer and MacGroarty (1985) believed that previous educational experiences have an impact on cognitive styles and classroom behaviors of the learners from other cultures.

A study on adult native speaker learners of English showed that highly educated adults self-select learning style preference with greater accuracy (Cherry, 1981) and that their mean scores in all the dominant learning modes are higher (Galbraith & James, 1985).

Jacobs (1990) utilized several learning style instruments with African-American secondary school students and found a correlation between learning style preferences and achievement level. Based on his findings, high achiever learners showed higher usage of multiple learning styles. The findings of many other researches suggest that students with higher language proficiency had preferences for visual learning style (Cherry, 1981; Galbraith & James, 1985; Keefe, 1987; Rossi-Le, 1989).

Studies on US learners showed a shift towards visual learning styles along with learner maturity and ability to read (Keefe, 1987; Price, Dunn, & Sanders, 1979). Rossi-Le (1989) explored the relationship between kinesthetic learning style preferences and the subject's proficiency and work history. According to these findings the more proficient the English learners the more they preferred learning through interactive method and direct experiences with the language.

The education system of a country can influence the learning styles of the students. Different education systems value different learning styles. The finding of researches by Dunn and Griggs (1988, 1995) as well as Dunn, Beaudry, and Klavas (1989) showed that gender plays an important role in learning style preferences. Those who worked in the US for many years showed preferences for kinesthetic learning styles because they were used to a work environment that provided more experiential basis for learning than did the classroom.

According to these researchers, males need more physical mobility than females in the classroom and this means they learn better with kinesthetic and tactile learning styles. Another important factor, which plays an important role in learning style preferences, is subject matter. Reid (1987) reported that ESL students from specific major fields often preferred specific learning styles; for example, engineering students preferred tactile learning and students from science prefer visual learning.

Attitude can be considered as another factor in language learning (Brown, 1987; Ehrman & Oxford, 1989). According to Brown (1987), the affective side of the learner is one of the biggest influences on language learning. He believed that attitudes are strong predictors of motivation in any area of life, particularly in language learning.

Also, Litzinger and Osif (1993) claim that attitudes and motivation can define learning styles. Since attitudes are considered as one of the characteristics of effective learners and the learning styles that can evoke emotions tend to be visual, auditory, kinesthetic, and group styles, then these would be the preferred learning styles of those who have positive attitudes towards ESL. Teacher's style is another factor, which can be considered among the key elements influencing learning styles preferences. Cornett (1983) cited in McFadden (1986), and Marshall (1991), believed teachers' styles have a great impact on the learner's learning style preferences.

For many ESL learners, effective teaching is based on efficient delivery of information rather than active mind at work. Cummins (1989) recommends that students who have completed their formative schooling in a traditional style of

learning will need a persuasive rationale and preparation for a successful transformation to a model of teaching and learning that invites learners to "active generation of their own knowledge" and to cooperate with each other to increase each other's achievement (Johnson, Johnson, & Holubec, 1994).

Learning Styles and Strategies

Most of the theories of learning, including Gagne's types of learning and transfer processes, socio-cultural factors and personality are attempts to describe universal human traits in learning. These theories are trying to explain how the individuals learn, perceive, filter and restore information and how other factors will influence these procedures.

As learners, we are all exposed to human traits of learning and approach a problem or learn from a unique prospective. This study focuses on variation of learning styles, learning strategies and teaching styles that are utilized by learners and teachers to deal with the problems in certain contexts. Reid (1995) stated that learners need to be aware in order to be successful learners; sometimes they should "stretch" their preferred learning style.

They should understand that sometimes their language learning style might or might not be the best one for the language tasks given and because of that, some degree of style "stretching" or style flexing is required. Vann and Abraham (1990) mentioned that the best way to accomplish this is through the conscious use of learning strategies that do not fit one's learning style(s) but seem to be the most relevant for the given tasks. In a study on 520 adult learners in the USA, Oxford and Ehrman (1995) tried to explore the impact of language learning strategies as a key

factor in the success of highly educated EFL learners. The results showed a low but significant correlation between cognitive strategy use and speaking proficiency.

Relationship between Styles and Strategies

Looking at the history of foreign language teaching and learning, it has been noted that not many studies have looked at the relationship between learning styles and strategies. As far as Oxford (1989) is concerned, there is a relationship between individual preferred styles and choice of language learning strategies. Research by Ehrman and Oxford (1988) looked into the relationship between strategy choice and learning styles. The Strategy Inventories in Language Learning (SILL) instrument was used to evaluate the strategy choice among the learners and MBTI (Myers, 1982) was used to measure their learning styles.

The study by Ehrman and Oxford (1989) found a relationship between styles and strategies. Extrovert learners reported the frequent usage of effective strategies involving visualization, but the introvert learners reported frequent use of the strategies involving searching for and communicating meaning. The use of more strategies in four categories: affective, formal model building, functional practice, searching for, and communicating meaning is significant among the intuitive learners compared to sensible learners. Feeling-type people show more use of general study strategies compared to thinkers.

This study investigates the relationship between learning style preferences and teaching style preferences and it also suggests the best teaching styles which can be aligned with these preferences. However, the literature on studies related to the relationship between learning styles as measured by MBTI and learning strategies

measured by SILL imply the possibility of the existence of a relationship between learning style preferences and learning strategies.

In his study, Melton (1990) determined the learning style preferences of ESL learners living in their motherland where English is not spoken as a native language of the people. He carried out a study by using the same questionnaire on 331 ESL learners in the Republic of China. The findings showed that the Chinese learners preferred kinesthetic, tactile and individual learning as their major learning styles.

Theoretical Framework

> It is not enough just to do, and neither is it enough just to think. Nor is it enough simply to do and think. Learning from experience must involve linking the doing and the thinking.

Gibbs (1988, p. 9)

Learning style determines how learners will comprehend and process information and is important for the students as well as teachers (Diaz & Cartnal, 1999). Various theories have addressed learning styles. These theories included field dependence and field independence, creative and fast learning, holistic and atomistic learning, deep and shallow learning, theoretical and applied learning, active and thoughtful learning.

One of these theories, which has been mainly utilized in learning about learning styles is David Kolb's taxonomy. According to Kolb (the founder of the experiential learning theory) experience is an essential factor in learning (Rakoczy & Money, 1995). According to this theory, learning is considered as an active process of the individual's interaction with his environment and life occasions (Ridley, Laschinger, & Goldenberg, 1995). Holman, Pavlica & Thorpe (1997) considered

Kolb as one of the most influential researchers due to his firm theoretical base, which is lacking in other researchers' work.

According to Kolb (1984, p. 38) "Learning is the process whereby knowledge is created through the transformation of experience". Kolb's theory presents methods for curriculum structuring and sequencing and specifically how a session or course may be thought to improve learning. Kolb's theory proposed the idea that learning involves 4 stages which are sensing/feeling, watching/reflecting, thinking, and doing (Fielding, 1994). Kolb's four-stage model is a simple description of the learning cycle, which explained how to decode the experience through reflection into concepts, which are utilized as guides for active experimentation and the choice of new experiences.

Kolb's model involves four stages, which follow each other, namely concrete experience (CE), reflective observation (RO), abstract conceptualization (AC) and active experimentation (AE). They follow each other in a cycle. Concrete Experience (that is related to feeling) is followed by Reflective Observation (that is related to watching or evaluating). This may then be followed by the derivation of general rules describing the experience, or the application of known theories to it that is Abstract Conceptualization (related to thinking or explaining), followed by Active Experimentation that modifies the next occurrence of the experience. All this may happen in a short time, or over days, weeks or months, depending on the topic. According to Kolb (1984), learners are placed at one end of the two extremes:

a) Thinking and feeling, or b) Observing and acting. Figure 2.2 displays the two ways of understanding knowledge based on Kolb.
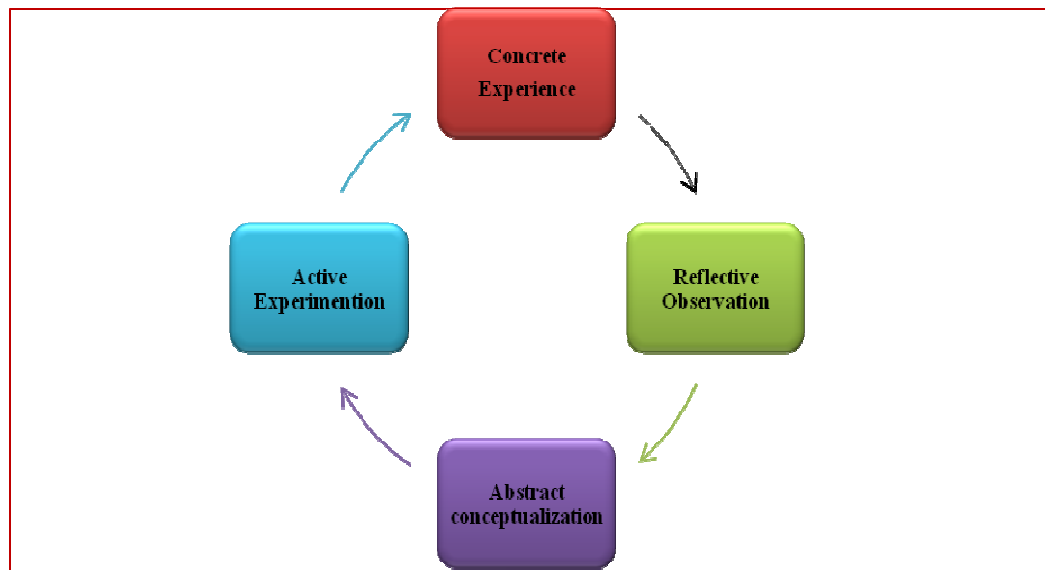
Figure 2.2. Two ways of understanding or transforming knowledge. Adapted from Atherton (2005).

These two dimensions organize four systems of the reflecting learning process as a cycle comprising four stages: concrete experiences, reflective observation, abstract conceptualization and active experimentation. In this model, concrete Experience refers to "knowledge by acquaintance", direct experience or according to Kolb's definition "Apprehension", which is opposed to "knowledge about" something, that is more theoretical, but more comprehensive (hence "Comprehension") and it is referred as Abstract Conceptualization (Atherton, 2005

Learning Cycles Based on Kolb Model

Kolb's (1984) experiential learning theory suggests four learning modes that combine to form two learning dimensions -- concrete/abstract and active/reflective. It is hypothesized that almost every individual utilizes each learning mode to some extent but has a preferred learning style resulting from the tendency to either learn through Concrete Experience (CE) or through the construction of theoretical frameworks (Abstract Conceptualization - AC) combined with the tendency to either learn through Active Experimentation (AE) or through reflection (Reflective Observation - RO). These learning style preferences are described by Kolb (1976, 1984) as Divergent (CE/RO), Assimilative (RO/AC), Convergent (AC/AE) and Accommodative (AE/CE).

Divergers

Learners use Concrete Experience and Reflective Observation.

These students prefer specific information in a detailed form, systematic and reasoned manner. Divergers take their time to comprehend the input information. Although these types of learners integrate Concrete Experience into their style, they prefer to observe before getting involved (Quinn, 1995).

Assimilators

These prefer to learn using Reflective Observation and Abstract Conceptualization. The learner incorporates observations into the world of existing concepts.

Convergers

The convergers learn better using Active Experimentation and Abstract Conceptualization. Kolb believed they will learn better by thinking and doing.

Accommodators

Finally, accommodators learn using Active Experimentation and Concrete Experience. The learner explores new concepts/ experiences and justifies them with the real world. These students are more motivated when they are actively involved in the learning process (Felder & Henriques, 1995).

Students move between learning cycles. Kolb stated that the actual process of growth in any single individual probably proceeds through successive alternation among these four stages. Learning is a dynamic process and it is based on the learners' needs for different abilities at different times. Therefore, it should not be assumed that students learn using only one style. Ideally, each student will possess a portion of each learning stage (Willcoxson & Prosser, 1996). Most of the students who have a preference toward a particular style are able to comprehend contents when presented in a different style (Joyce-Nagata, 1996). Figure 2.3 displays the four types of knowledge and learning styles based on the Kolb model.
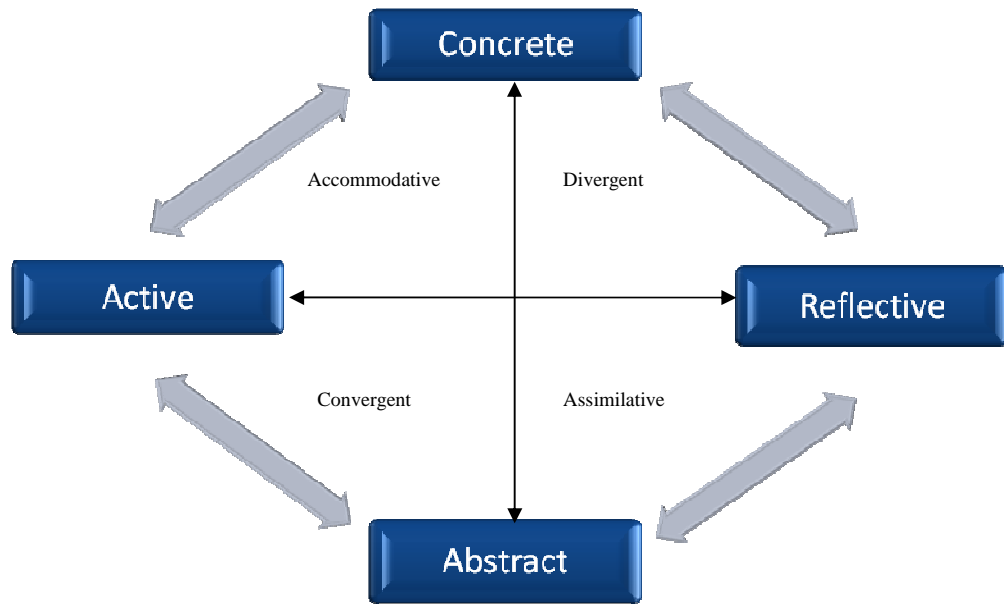
Figure 2.3. Kolb's Four Types of Knowledge and Learning Styles .
Source. Adapted from the Honey & Mumford (1982) typology   of learners.

Honey and Mumford (1982) have explored a typology of Learning Styles around this sequence, identifying individual preferences for each stage (Activist, Reflector, Theorist, and Pragmatist (Concrete) respectively). Figure 2.4 displays the characteristics of the different learners based on the Kolb model.
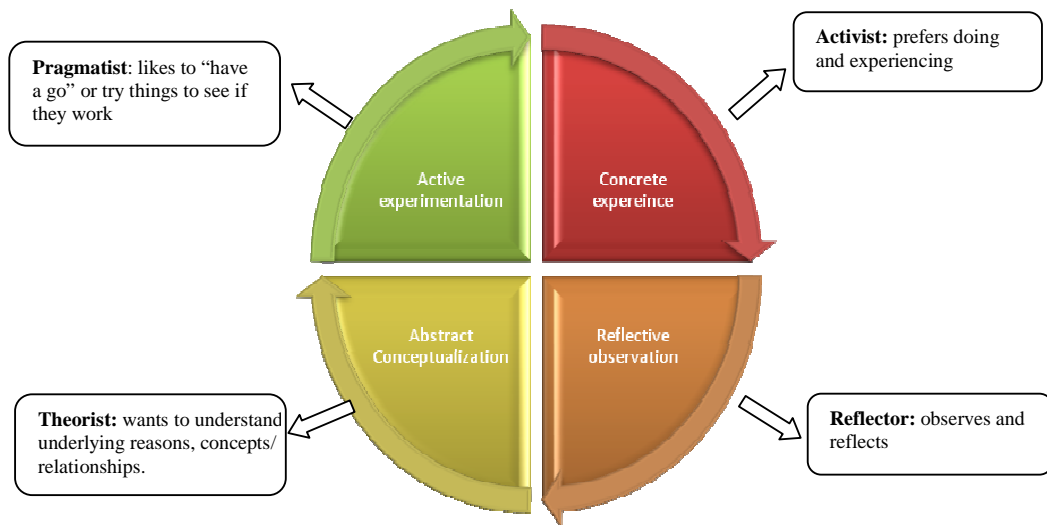
Figure 2.4. Characteristics of The Different Learners In Kolb Classification.
Source. Adapted from the Honey & Mumford (1982) typology of learners

Kolb's theory is based upon two fundamental assumptions; the first one is based on the idea that people learn as a direct result of their immediate, here-and-now experience, and that learning happens in all human settings. Learning is the method which people use to adjust and cope with the world from school to street, from educational laboratory to meeting rooms (Kolb, 1984).

The second one is that while people learn all the time, they develop different preferred styles of learning resulting from their unique set of experiences. In brief, learning style refers to how learners select, gain and incorporate new information, which thus affects the way learners solve problems, make decisions and develop and change their attitudes. The most important point is that learning styles determine what kind of learning experience each group of learners will find most effective, comfortable, and applicable to the tasks they undertake. Kolb (1984) believed that a learner's learning style develops because of certain factors such as heredity, life experiences, and the demands of the present environment.

Learners learn differently; styles through which information is presented will influence the student's ability to learn. Some learners grasp new material using a kinesthetic style while others prefer an auditory/visual style (Hartman, 1995). On the other hand, some individuals learn a new subject through role-playing or using a problem based method. Regardless of the learning style diversity, most teachers use only a small number of teaching styles. The student's performance would be evaluated normally a few weeks after the lecture is presented with an exam.

However, teaching style also varies greatly. Teachers must understand that students differ in their learning style and it is imperative to implement a variety of teaching styles to teach them effectively (Campeau, 1998). Incorporating varied styles of teaching in the lesson plan would enhance result in terms of student comprehension of the content (Hardigan, Cohen, & Janoff, 2003). Employing strategies to improve teaching effectiveness will occur if teachers match their teaching styles with the learner's learning style (Healey & Jenkins, 2000).

Considering the Kolb theory as an English teacher, it is noticeable that this theory displays a kind of intuitive appeal for what we already do as teachers. It is necessary to mention that this theory parallels the scientific research methods such as observation, hypothesis building, theory, and testing; thus, it can be easily applied to teaching. Experiential theory, like other strong theories, will open the door to the unknown beyond what we already know and transforms how we visualize and how we perform our role as teachers. The theory emphasizes the importance of learning from experience through experiential behaviors such as fieldwork or using ICT which is directly relevant to the planning of a lecture or seminar-based session. The main application of the theory covers:

- How to design the course outline   based on student learning style preferences

- Consideration of the teaching method that is particularly important at particular stages of the cycle.

In his research, Gibbs (1988) links Kolb's cycle to educational practice by linking the teaching methods (styles) to four learning styles in Kolb's model: planning for experience, increasing awareness, reviewing and reflecting on experience, and providing substitute experiences. Svinicki and Dixon (1994) suggest a similar list of instructional practices, which cover different aspects of the learning cycle. Nulty and Barrett (1996) believed that learning style preferences display the individual's abilities, environment and learning history. According to Kolb, learners learn better when there is a consistent relationship between instructional style presentation and their preferred learning style. Table 2.1 displays the relationship between learning styles and learning condition that will assist the learners to learn better.

Table 2.1
The Relationship between Learning Style and Learning Conditions

Learning style	Conditions under which learners learn better
Assimilators	When presented with sound logical theories to consider
Convergers	When provided with practical applications of concepts and theories
Accommodators	When allowed to gain "hands on" experience
Divergers	When allowed to observe and gather a wide range of information

Source. Adapted from Healey and Jenkins (2000).

Students prefer to choose what seems the easiest for them, which is to make use of their own learning styles. On the other hand, teachers may teach according to their own learning styles too and they assume that all their students can easily follow

the lessons. This confirms Kolb's idea that teachers should encourage students to be involved in all four steps of the learning cycle.

Kolb (1984) believed that when there is intentional mismatch between learning styles and teaching styles, "the hidden long term potentials benefits will be revealed." The aim is to make the student self-renewing and self-directed; to focus on integrative development where the person is highly developed in each of the four learning modes: active, reflective, abstract and concrete. Here, the student is taught to experience the tension and conflict among these orientations, for it is from these tensions that creativity springs. Felder (1996) stated that the extent to which students are learning in the class depends on a few factors such as their ability and their preparation, learners' learning styles and finally their teachers' teaching styles.

On the other hand, some of the research indicated that "effective teaching" is the main "predictor" for learner achievement (Mulalic, Mohd Shah, & Ahmad, 2009). This idea was opposed to those which considered the learners as the focal element in academic performance. Darling-Hammond (1997) stated that the teacher-training program should be redesigned to train teachers in handling the diverse learners in the class with their diverse teaching styles. Mulalic et al. (2009) suggested that:

> Teaching and learning styles should become one of the greatest interests of the educators particularly their relationship. However, one of the weaknesses of the research into LS is the lack of the investigation into the matching of teaching and learning styles. Theoretically, many variables exist in the educational literature but few researches dealt with the matching of teaching styles and learning styles (p. 102).

However, in behavioral theory (Skinner, 1980), the main focus is to deal with the obvious behavior and changes. This theory held that the learners will learn better if they are rewarded for their right answers. These rewards can appear as high marks or a type of high academic achievement. According to this theory, teachers should emphasize behaviors or the concepts through which the learners can work gradually toward higher achievements.

In behavioral theory, the cognitive aspects have been ignored while the behavior has always been emphasized. Cognitive theory (Piaget, 1971), on the other hand, emphasizes mental processes, and is based on the assumption that information should be saved and stored to be used in future (when the learning become learner relevant and built upon prior knowledge). In this view, cognitive information is normally arranged in "chunks" and is built in the memory of the learners, enabling the learners to make use of the information in future.

Piaget describes knowledge by emphasizing the two concepts of assimilation and accommodation. Assimilation is defined as a process whereby the learner incorporates development and understanding into a meaningful whole. Miller (1993) identified accommodation as a process where humans adapt their understanding and expectation to the reality and constraints of the social and physical world in order to arrive at clear understanding.

On the other hand, constructivist theory (Bruner, 1990) is considered as another alternative to the previous learning theories mentioned. In this theory, the focus is not on how learners absorb and store information but whether they are able to make the proper interpretation of the information and draw the proper conclusions.

Based on the theories mentioned, a majority of the theoretical and experimental studies on learning styles were based on Thelen's researches as cited in James (2001) who related learning styles to the "dynamics" of the group involved in research.

After the theories mentioned, the researchers (Myers, 1962; Gardner, 1983; Messick, 1984; Reid, 1987; Riding & Rayner, 1998) started developing new theories on learning styles. These researchers had an impact generally on the ESL/EFL course in the educational system in general and ESL in particular.

A study done by Williams (1983) commented that learners tend to be "left hemispheric" (these learners are good with performing the task related to mathematics, music and language) or "right hemispheric" (able to see the relation between the different parts and how to form the whole out of the parts). Another study on learning styles done by Witkin et al., (1977a) highlighted the differences between the analytical (field independency, that is when the learners are independent from the text) and relational (field dependency, when the learner are dependent on the text).

Some of the researchers (Reid, 1987; Williams, 1983; Witkin et al., 1977b) have discussed the significance of evaluating the learning styles and identifying them. In their research, they have mentioned that if the learners' learning styles are accommodated, this can "improve" their attitude toward learning.

Learning a second or foreign language is a very important procedure; therefore teachers are required to create a learning setting that addresses/accommodates the learners with different social and cultural background

and learners with different learning style preferences. Researchers (Brown, 2003) suggested that the teachers often teach the way they have learned, therefore ignoring the students' differences and preferences in terms of their learning styles; failure to accommodate their learning styles in the teaching plan will result in poor student performance and low marks.

Considering the important role of learning style in student achievement, it is suggested that educators should highlight, emphasize and consider the learning style versatility in the education environment, in order to be able to accommodate all types of learning styles when designing their teaching plan. Identifying the EFL/ESL learners' learning style type will encourage teachers to focus on student needs when planning their teaching plan. However, there is a need for adjustment between learners' and teachers' preferences that sometimes appear to be complementary, sometimes contradictory, and sometimes complicated. During the past two decades, researchers (Cohen, 1990; Ehrman & Oxford, 1989; Huitt, 2003; MacIntyre & Gardner, 1989; Reid, 1987) in the ESL/EFL domain studied learners' and teachers' characteristics that either hinder or assist progress in second language learning.

Despite the attempts to improve foreign language instruction, the fact remains that some adults are more successful than others when involved in learning another language. Chapelle and Roberts (1986) reported that studies dealing with individual differences in the learning process have mainly focused on questions such as what makes a good language learner and why some people are more successful in learning another language than others. Several studies discussed learner-related variables that affect language learning (Cohen, 1990; Ehrman & Oxford, 1989; MacIntyre & Gardner, 1989; Reid, 1987).

These studies identified variables such as motivation, learning styles, gender, course level, language learning strategies, previous experience in language learning and cognitive variables**.**

The Huitt Model

On the other hand, a transactional model developed by Huitt (1995) considered context, output, input and classroom process as the effective variables in making a successful learner. The transactional model developed by Huitt (1995) originated from a few models, which are "historically" linked to the Carroll model, particularly the Cruickshank (1985) model, Gage and Berliner (1992) and finally Proctor models (1984). Carroll's model (1963) focused on the "specific variables" that are related to school learning, whilst the transactional model proposed by Huitt (1995) focuses on "category of variables" and hypothesize that choosing "important outcome variables" will influence the selection of the important context, input and process variables.

The original version of the transactional model of the teaching/ learning process is designed to suggest the feasible answer to the question: Why are some learners more successful than others?   In order to answer this question, Huitt (2003) classified the reasons under the four following categories:

a) Context: all the outside factors which may have an impact on learning and teaching

b) Input: all the inside characteristics of learners and teachers which would be transferred to class.

c) Classroom process: attitude of learners and teachers in the classroom plus other variables such as classroom environment, teaching and teacher/student relationship

d) Output: any kind of learning in the form of achievement

The modified version of the transactional model (Huitt, 2003) of the teaching/ learning process will be used as the theoretical framework at the beginning. The modified version used in this study is based on two categories out of the four in the original version by Huitt (2003).

Huitt (2003) described input as "those qualities or characteristics of teachers and students that they bring to the classroom experience" (p. 6). As already noted, this study's focus is on matching/ mismatching of teaching styles and learning styles and its impact on student achievement. In this respect, learning styles and teaching styles are considered as the components of the teacher and learner characteristics, categories which they bring with them to the classroom in the Huitt (2003) model. Considering the aim of this study, the researcher chose the same definition for the Input category.

Regarding the achievement definition, Huitt (2003) maintains that "when we say 'How well or how much has the student learned' we mean 'How well have the students done on a standardized measure of student achievement in the basic skills'..." (p. 3). With regard to this definition and perspective, learning can be measured through the final achievement test in every course of study. For the purpose of this study, the current definition of achievement offered by Huitt (2003) will be used. A detailed description of the two involved categories in the study is reported here.

Input

In this study, input is considered the first and most important category. It refers to the teacher and student characteristics prior to their entry into the classroom. There are two subcategories under this category: Teacher characteristics and student

characteristics (Huitt, 2003). Teacher characteristics include the teacher's values and beliefs, knowledge, thinking and communication skills, performance skills, personality, and teaching styles. Ashton (1984) indicated that the teacher's beliefs and values (teacher efficacy) are the most important factors among teacher characteristics. Huitt (2003) mentioned that teacher efficacy is the measure of the teacher's belief on the issue that the teacher can teach and students can learn. He also classified other characteristics for the teacher such as teacher's knowledge, human growth and development, learning theory and the teaching/learning process (teaching styles). Among the teacher's characteristics mentioned, teaching style is one of the focuses of this study.

For the student's characteristics, Huitt (2003) identified these variables as: study habit, motivation, learning style, cognitive development, socio emotional development, moral and character development, and race/ethnicity. Among the student's characteristics, learning style is the focus of this study.

Output

Based on Huitt (2003), in order to answer the question "How well or how much has the students learned," the definition of learning is vital. In this regard, in the present study learning means high scores on the standardized measure of achievement in reading skills. Therefore, students' learning is judged based on their final scores, which constitute the output.

To sum up, there are three related variables involved in the theoretical framework used in the present study, namely: input, output, and context. A simple example of the interaction of the mentioned variables is presented in the next section.

Interaction

Huitt (2003, p. 11) described the following as the simple forms of interaction:

Context variables such as the size and region of the community impact

teacher and student characteristics while the context variables

associated with the family impact student characteristics. Of course,

there are other important context variables that could also be

considered as described above. Additional context variables associated

with school and state policies combine with teacher and student

characteristics to impact teacher behavior. Teacher behavior along with

student characteristics influence student behavior, especially those

variables associated with Academic Learning Time. Student classroom

behavior then influences teacher classroom behavior in an interactive

pattern. Student classroom behavior, therefore, is the most direct

influence on student achievement as measured by instruments

influenced by state policies. Student achievement at the end of one

school year then becomes a student characteristic at the beginning of

the next. (p. 11)

The following is the modified version of the Huitt (2003) model which

displays the interaction among the variables specifically teacher characteristics and

student characteristics. According to Huitt (2003), teacher and student characteristics

are influenced by the context variables; on the other hand, the combination of the

context variables and the family background affect the student characteristics as well

teacher characteristics. (However, the context variables have been modified and only

a few of the variables based on Huitt (2003) have been used in this study).

The focus of this study is evaluation of the impact of the match and mismatch between teaching styles and learning styles on student achievement. The chosen definition for the input and output of this study is based on Huitt (2003). However, among the variables mentioned in Huitt's definition for input, only one of each category will be discussed which are teaching styles from the teacher's characteristics and learning styles from learner's characteristics. Figure 2.5 is an adapted form of the model of the teaching-learning process based on Huitt (2003) which displays the interaction among the current variables within the scope of this study.
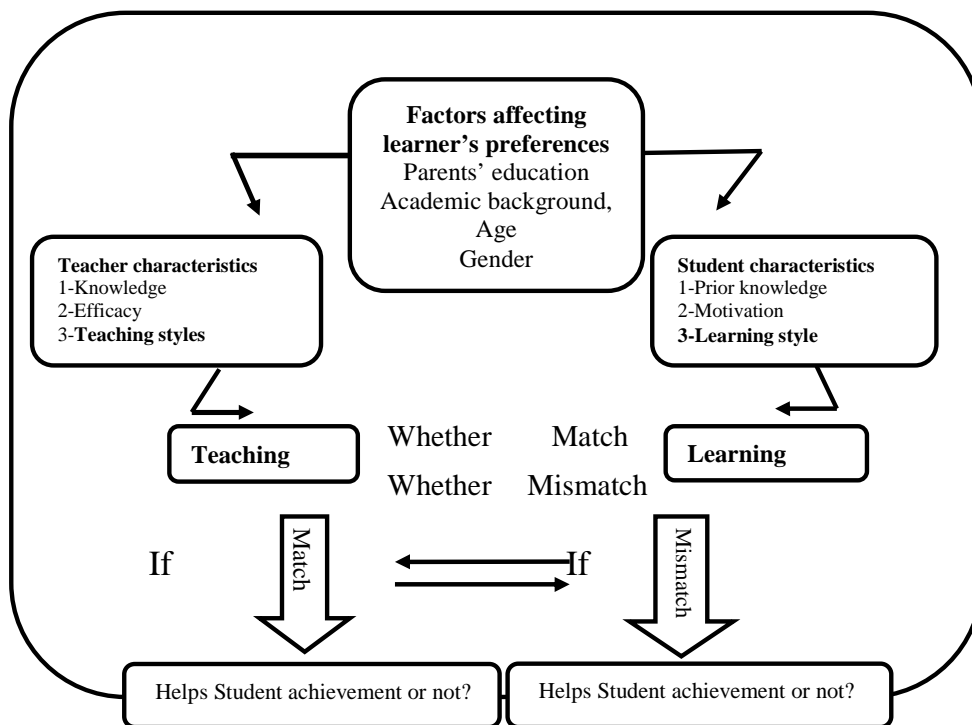

Figure 2.5. Adapted and modified model of the teaching-learning process based on Huitt (2003) which displays the interaction among the current variables within this study scope.

Categorizing Learning Styles Instruments

Hickcox (1995) and Sadler-Smith (1996, 1997) believed that lack of a proper instrument to measure learning styles resulted in there being various definitions that are considered as one of the main challenges in learning style research. To solve this

problem, Curry (1987) spent 5 years collecting data from 21 major learning style conceptualizations and instruments from North America, Europe, and Australia. The findings of his study proposed the three layer system to categorize the learning styles instruments based on the psychometric survey and empirical evidence:

The first layer, which is the central and fundamental layer, includes the instrument designer who observes the learning style as personality-related preferences and this includes Kagan (1964), Myers (1962), and Witkin, Oltman, Raskin, & Karp (1971). The middle layer refers to the information processing preferences, which include Biggs (1979), Entwistle and Ramsden (1983), Kolb (1985), Reinert (1976), and Schmeck et al. (1977).

The outer layer, which is about the interaction with the environment, looks at the learning style preferences in terms of relationship between instruction and environment; this layer includes researchers such as Canfield (1980), Dunn et al. (1986), Friedman and Stritter (1976), Goldberg (1963), Reichmann and Grasha (1976), Renzulli and Smith (1978), as well as Rezler and Rezmovic (1981). Figure 2.6 summarizes all these layers.
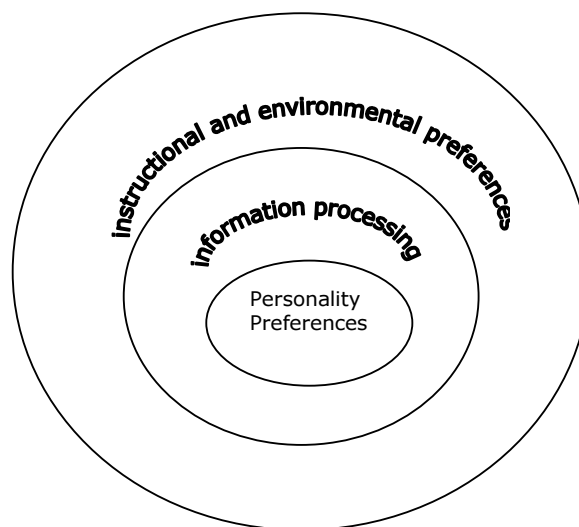

Figure 2.6. The layers of learning styles based on Curry (1987).

Many studies tried to categorize and clarify the different conceptualizations (Biggs, 1987; Guilford, 1967; Honey & Mumford, 1986; Kolb, 1984). Two of the best studies in the area of learning styles analysis are the studies by Rayner and Riding (1997), and Grigorenko and Sternberg (1995). In their study, Grigorenko and Sternberg (1995) discussed the origins of learning styles, their development, and the different explicative theoretical models. In another study, Grigorenko and Sternberg (1995), classified the approaches in three conceptualizations of learning style concept, which focus on cognition, personality, and activity. The following Tables 2.2, 2.3, 2.4 are the summary of their findings.

Table 2.2
Learning Styles Concept Based on Cognitive Center Approach

Approach	Focus	Result
Cognition center approach 1940-1970	Individual differences in cognition-reception	Identification and description of several styles, abilities and dimensions of cognitive processing
Rayner & Riding (1997)	General meaning of the learning styles	Identification of 17 different models and elaborating them
Brooks et al. (1985, cited in Rayner & Riding, 1997)	Manner & mode of the cognition	Question of *how*, it regards style as bipolar, from one extreme end to the other, value differentiated with each extreme having the adoptive value but under different situations

Source. Adapted from Rayner and Riding (1997) & Grigorenko and Sternberg (1995)

Table 2.3
Learning Styles Concept Based on Personality Center Approach

Approach	Focus
Personality-centered approach 1970s	Styles in relation to individual characteristics
According to Rayner & Riding (1997, p. 6)	Myers-Briggs model has influenced the general development of style based theory

Source. Adapted from Rayner and Riding (1997) & Grigorenko and Sternberg (1995)

Table 2.4

Learning Styles Concept Based on Activity Center Approach

Approach	Focus
Activity- centered or learning center approach	Styles related to various activities, setting and environment (emphasized educational perspectives that they developed a new concept which is learning style)
Rayner & Riding (1997)	12 different models classified into 3 subgroups It corresponds to the dimension of the learning process emphasized by researchers in process-based (Kolb, Entwistle, Biggs, etc.); Preferences-based (Price, Dunn, Riechman-Grasha, etc.) and cognitive-skill-Based (Reinert, Keefe, etc.)

Source. Adapted from Rayner and Riding (1997) & Grigorenko and Sternberg (1995)

Ellis (2001) explains another way of categorizing the learning styles models.

Table 2.5 displays the adapted version of the Ellis (2001) categorization.

Table 2.5

Suggested Model by Ellis for Learning Styles Models

Group	Researchers	Specification
Cognition, -Receiving , analyzing, acquiring the data	Jung, Myers-Briggs, Mok, Keirsey & Bates	Sensing/ intuition
	Barbe & Swassing, Dunn & Dunn	Visual, tactile, kinesthetic & auditory
	Gregorc, Kolb, Witkin and McCarthy	Field dependent-Field independent, Abstract-Concrete
Conceptualization, -Thinking, forming ideas, processing, memory	Jung, Myers-Briggs, Keirsey & Bates	Extrovert/Introvert
	Gregorc	Random/Sequential
	Kolb & McCarthy	Reflective Observation /Active Experimentation
Affect, Emotionally sensitive, feeling, value judgments	Jung, Myers-Briggs, Keirsey & Bates	Logical thinker / sensitive to feelings
	Dunn & Dunn	Impact of the factors such as light, design, sound and temperature

Source. Adapted from Ellis (2001)

Within the scope of this review, learning style models by Dunn and Dunn, Kolb, Myers-Briggs and Felder and Soloman will be reviewed.

Dunn and Dunn Learning Styles Model

Grigorenko and Sternberg (1995) in their study classified the approaches in three conceptualizations of learning style concept, which focus on cognition, personality, and activity. Tables 2.2, 2.3, 2.4 give a summary of their findings.

Generally, this is known as VAK (Visual, Auditory and Kinesthetic); learners use these styles to receive information but according to Clark (2000), one or more of these styles are considered as the dominant styles for the learners (p. 2). Clark also implied that the Dunn and Dunn model fell under the perceptual modality category due to its nature that is directed toward how we perceive information or in other words, it is based on reactions to the physical environment (Clark, 2000, p. 8).

Auditory learners have been described as logical, analytical and sequential thinkers. They are more comfortable with the traditional classroom setting since their needs and preferences are met in those setting. Considering their global thinking personality, they may run into problems, as their nature is not good with logical, analytical and sequential tasks unless they can see the whole picture. The fact that more than three fifths of the learner's learning styles are biologically imposed was proposed by Restak and Thies (quoted in Dunn, 1996, p. 1).

In the Dunn and Dunn model, four factors significantly differ between groups and individuals (Dybvig, 2004, p. 3). Factors include age, global versus analytical, gender, and different approaches of the low and high academic achievers toward learning. According to Dunn (1996) learning preference is action that will develop and reach the maturity level over time due to motivation levels,

responsibility, and considering the fact that for many people visual and auditory perceptual elements strengthen with age (Dybvig, 2004, p. 3). Gender is also another factor that can explain different levels of learning; the perceptual preferences of the male are visual, tactile and kinesthetic while female preferences are auditory.

Ellis (2001) noted that some studies questioned the quality and validity of research being conducted under the Dunn and Dunn model. Dunn (1996) highlighted the studies that support the hypothesis that academic achievement can be improved when the teaching styles are tailored based on the learners' learning styles.

Kolb Learning Styles Model

Kolb (1984) identified learning styles as methods of perceiving and processing information which are preferred by an individual. Among the major instruments for measuring the learning styles, Kolb's (1985) model of Learning Style Inventory (LSI, version 3), which characterized the learning styles from both dynamic and static ways, is one of the most popular learning style instruments, and has been widely used in different levels of educational settings such as schools, universities and management development.

Kolb integrates important items of the learning models proposed by a few of the researchers such as Dewey, Piaget, and Lewin (Cano-Garcia & Hewitt, 2000). His model is based on experiential learning theory and reflects two independent dimensions: perceiving and processing. These two dichotomies form four quadrants reflecting learning process as a cycle of four stages. Kolb envisaged two levels for consideration: a four stage learning cycle and a four-type definition of learning styles.

The Four stages include Concrete Experience (CE, such as 'feeling' or 'experience'), Reflective Observation (RO, such as 'watching' or 'examining'), Abstract Conceptualization (AC, such as 'thinking' or 'explaining') and Active Experimentation (AE, such as 'doing' or 'applying') that continuously repeat at a deeper and more advanced level (Heffler, 2001; Kolb, 1985; Raschick, Maypole, & Day, 1998; Skehan,1998). The four definitions are Diverting (CE/RO), Assimilating (AC/RO), Converging (AC/AE), and Accommodating (CE/RO). Each one of the categories has its own main unique characteristics that define an individual and his or her preferred learning styles.

These classifications are very useful in providing a learner with a clear outline of the underlying dimensions, which distinguish between important aspects of learning styles (Skehan, 1998). LSI has been utilized in different professions or occupational settings and for different purposes, ranging from computer programmers to physicians. It has been conducted and applied most widely in educational settings, management training as well as medical settings (Kolb, 1985). The Kolb inventory has 12 items, with four statements in each item.

Respondents ranked each statement in the order of 1 to 4, with (1) meaning 'least like you' and (4) meaning 'most like you'. As for scoring, the 12 numbers entered in each of the four columns were summed up, with each column representing: column 1= concrete experience (CE); column 2=reflective observation (RO); column3=abstract conceptualization (AC); column 4=active experimentation (AE). AC-CE (Abstract minus Concrete) score and AE-RO (Active minus Reflective) scores are then calculated to determine which of the four learning styles the learner fits into.

The reliability of the LSI was tested through the four basic scales and two combination scores that showed moderately high internal reliability based on Cronbach's alpha (Smith & Kolb, 1986), while reliability coefficient ranged from .73 to .88 (*N*=268). In another study with 619 people, Sims et al. (1986) reported that reliability coefficients ranged from .76 to .85 for the four basic scales of the revised LSI.

As intriguing as this model may sound, it has its critics. Greenway (2004) highlighted the weaknesses existing in this model. A key issue is the validity and reliability of the learning styles instrument. The idea of learning cycles is also considered not correct, especially in the sense that is closed, leaving no room for an information processing method. Greenway (2004) believed that the model lacks sufficient evidence on higher achievement that is based on matching teaching styles with learning styles in the classroom setting.

Myers-Briggs Learning Styles Model

Myers and Briggs categorize the learning styles based on personality types and under 4 categories. It categorizes the learners according to Carl Jung's theory types (Felder, 1996, p. 1). According to Clark (2000), the Myers and Briggs classification introduce four dimensions and 16 sub dimensions. This instrument includes 126 items which indicate the learners' preferences on dimensions in the Myers and Briggs instrument. The followings are the dimensions in the Myers-Briggs learning style indicators:

a) Extroversion versus Introversion (EI)

Basically, this indicates where an individual's energy originates. According to Jung's theory, the extrovert derives this energy from the outer source whereas the introvert obtains this energy from the inner world of ideas. Introverts are considered as reflective thinkers but less talkative whereas extroverts prefer to talk than think.

b) Sensing versus Intuition (SI)

Brightman (2006, p. 2) indicated that the sensing people are keen on details besides seeking facts; however, they prefer organized, structured lectures. Clark (2000) indicated that sensing learners mostly rely on their senses. They like innovation and not repetition. They are interested in practicality. On the contrary, "intuitive" learners (as identified in the Felder and Soloman categorization) like patterns and the correlations between them. They are keen on grasping new information.

c) Thinking versus Feeling (TF)

According to Felder (1996, p. 1) thinkers decide based on logic and facts. They are less emotional compared to their counterparts namely "Feelers". Conversely, feelers in the decision making stage allow their emotion to cloud their judgment and most of their assessment is based on "human consideration". They appreciate understanding and harmony.

d)   Judgers versus Perceivers (JP)

Brightman (2006) implied that Judgers are focused on completing the task at hand; they are more detailed and careful about the essential components of the items and they can be hasty while making decisions (p. 5).

On the opposite scale, perceivers are described as curious by nature, adaptable and unstructured. They usually initiate the task but they hardly accomplish it.

MBTI is known as a personality model but it is also related in some aspects to other models such as Kolb's regarding the similarity of the Jung theory that they share. Chapman (1995) highlighted the common point between this model and Kolb's.

The Thinking /Feeling dimension in MBTI is similar to the Concrete/Abstract dimension in Kolb, besides Extroversion/Introversion dimension in MBTI relates to Kolb's Active /Reflective dimensions.

Felder and Soloman Learning Styles Model

The instrument used in this study is by Felder and Silverman (1988); Felder has researched the learning styles of engineering students for over a decade. His Index of Learning instruments (ILS) has been used in a growing number of studies exploring and characterizing how engineering students learn and how this impacts on instructional design.

In 1988, Richard Felder and Linda Silverman formulated a learning style model which aimed at displaying the most important learning style differences among engineering students and provide a good basis for instructors to devise an appropriate approach that can address the learning needs of all students (Felder,

1993; Felder & Silverman, 1988). Based on their model, students' preferences are classified as having the preferences in one of the following four dimensions:

Active/reflective: refers to the differences between Learning by trying something and learning by contemplation Sensing/Intuitive: refers to the differences between learning by knowing facts or details and learning by knowing the relationship. Visual /Verbal: refers to the differences between learning more through pictures and figures and also reading and hearing.

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

The combination of the dimensions in Felder-Soloman has added more value to their model and it is unique for its type. The Active / Reflective model complements the Kolb learning style model. The sensing /intuitive dimensions were directly derived from the Myers-Briggs Type Indicator (MBTI), which was mainly based on Jung's theories. Also, this dimension is similar to the Concrete /Abstract dimensions from Kolb's learning style model. The active /reflective and also visual /verbal dimensions were taken from information processing theory. The sequential /global dimension parallels left-brain and right brain dominance theories (Felder & Spurlin, 2005; Larkin & Budny, 2005).

The Felder model has 44 items. The prompts present 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 charge for research purposes (Felder & Spurlin, 2005).

The instrument has two applications. The first one is the instructor's evaluation of students' learning styles and the use of the information to design the instructional plan. Therefore, all learning styles will be addressed during the instruction. The second one is for individuals; the ILS can give them the 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 to 7 indicate moderate preference which means a preference for one or two categories

Scores ranging from 9 to 11 indicate very strong preference which means difficulty may be shown when there is no existing support from the situation for the category (Felder & Spurlin, 2005).

According to Felder and Spurlin (2005) the test- retest reliability for ILS ranged from .73 to .87 after four weeks and from .56 to .77 after ten weeks (Litzinger et al., 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 the factor analysis with ILS showed active/reflective, sensing/intuitive, and visual/verbal are "orthogonal". On the other hand, sequential/global and sensing/intuitive dimensions were described as "associated" (Felder & Spurlin, 2005).

Litzinger et al. (2005) measured the validity of the instruments in a study; they did the factor analysis for ILS and identified eight factors, which are integrated with four scales. A number of validation studies have been conducted on ILS construct validity and reliability (Livesay et al., 2002a; Zywno, 2003) and all of these studies stated that ILS is an adequate and proper psychometric evolution tool for learning style preferences of students in engineering specifically as well as other majors.

On the other hand, Van Zwanenberg, Wilkinson, and Anderson (2000) believed that ILS scales are low in internal reliability. The robustness and construct validity of ILS have been discussed frequently. The seeming contradiction can be explained by the diverse ideas on use of the ILS. For instance, Livesay et al. (2002b) used the instrument to classify 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 the existing model's theoretical assumptions.

According to Messick (1995) as well as Thompson and Vacha-Haase (2000), to evaluate the validity of the instrument, many studies with detailed sample results and data sets are required. Zywno (2003a) observed that any type of survey lasting more than 10 minutes was less attractive and not completed by the students. To prove this, in 2000, he administered Kolb's LSI together with the Felder-Soloman ILS to students; he found that students kept on asking questions regarding the meaning of some of the answers that they were supposed to choose. The same thing was repeated in 2001. Some of them simply chose one of the options regardless of the repeated explanation. Zywno believed this situation could be explained by the student's inability in understanding some of the words.

Learning Styles and Academic Achievement

Many studies (Bull & Ma, 2001; Cassidy & Eachus, 2000; Rayneri et al., 2006; Shaughnessy, 1998) have been done to investigate the relationship between learning style and academic achievement. Blagg (1985) tried to find out whether learning style preferences of 51 learners registered in a graduate allied health education program can be considered as a predictive tool for academic success.

The variables in the Blagg (1985) study were significantly correlated ($p <$ .05). He conducted Canfield's learning styles inventory (LSI) with the multiple-choice portion of MCE, organization ($r = .32$), listening regarding the essay portion of MCE, seven learning styles variables are correlated, independent ($r = .40$), reading ($r = .37$),   in animate ($r = .38$), authority ($r = .39$). Based on his findings, there is no correlation between MCE and cognitive styles. These findings indicated that cognitive style does not appear to be significant but on the other hand, some of the learning style preferences can be considered as predictive factors for academic success.

In another attempt, Matthews (1991) compared the learning styles preferences and grade points of 796 undergraduate students. He used the Canfield (1992) LSI to identify students' preferred stylesand also used chi-square to show the significant differences between the LSI variables. "Social/ conceptual" ranked (14.4%) as the most preferred and "independent" (8.8%) as the least preferred.

The same study compared between students' educational major and learning style preference and the relationship was found not significant at .05 levels. Student learning style preferences are as follows: "Social /applied" styles (x = 2.62), Conceptual (x = 2.61), social (x = 2.57) were different from neutral preferences (x =

2.22) at the .05 level. These findings indicated the necessity for higher education institutes to include a variety of learning environments covering social and cooperative strategies in order to meet the needs of the first year students (Matthews, 1991).

The MBTI test was conducted on 89 first year medical students to determine if particular personality characteristics would predict the grade point average (Neral & Gandy, 1995). Analysis of frequency showed that preferences were fairly distributed among the 16 personality types.

The personality types being investigated in this study showed that the students with judging /perceiving preferences obtained higher GPA's than the rest. On the other hand, other researchers found no significant relationship between preferred learning styles and academic achievement. In research done by Harasym, Leong, Lucier, and Lorscheider (1995) on the relationship between the personality traits of 259 undergraduate nursing students and achievement in an anatomy and psychology course, achievement was evaluated by 6 examinations. Those with introvert/thinking traits achieved the highest scores whereas introvert/feeling achieved the lowest but the difference was not significant.

On the other hand, personality types measured by MBTI were not predictive of academic achievement in anatomy and psychology courses (Harasym et al., 1995). Harasym et al. (1995) used the Gregorc Style Delineator (GSD) on 260 undergraduate students in his research. All the four types of learning styles were represented whereas "concrete" to "sequential" and "abstract random" ranked the highest. Analysis of the results showed no significant relationship between learning style preference and the learner's achievement.

Another study which investigated the relationship between learning styles and academic achievement was done by Leiden, Crosby, and Fullmer (1990) among 79 medical student participants. The Lancaster Approaches to Studying Inventory (LASI) and the Inventory of Learning Processes (ILP) were applied to samples to achieve the learning styles preferences. The CGPA and National Board of Medical Examiners (NBME) results were used as indicators of achievement. The findings showed that there is no significant relationship between learning style preferences and academic achievement; this result was consistent with that of the previously mentioned study.

However, in some ongoing research it is suggested that academic performance in higher education is linked with avoidance of surface learning and conducting a strategic approach toward learning. Matthews (1996) cited researches done by McCauley and Natter (1980) and Miller, Always, and McKinley (1987), which suggest that learners with certain styles of learning perform better in an academic setting compared to the individuals with other styles.Matthews (1996) indicated that students who are field independent are more willing to do school work which displays a tendency toward the abstract, as opposed to the field dependent who have a tendency toward the concrete (Witkin et al., 1971).

Teaching Styles Overview

Grasha (1996) identified the teaching styles as "pervasive quality that plays an important role in several aspects of our teaching" (p. 1). This definition implies that teaching style is not considered as an accumulation of techniques but also looks at the teachers' personality and how this influences the way they select the instructional processes.

Brown (2003) identified the teaching behaviors as the beliefs that a teacher values and holds about the learners' role in the classroom setting. He further makes the point that some of the research seems to prove the hypothesis that most of the teachers will teach the students they way they have been taught; for example, teachers who have experienced learning in a lecture setting tend to teach based on the lecture.

Hilliard (1989) explained that, "It is important for teachers to be sensitive to and respectful of their students' cultural learning styles without stereotyping. Matching teaching styles to learning styles is necessary; a student's learning style is neither an excuse for poor teaching nor an index of low capacity".

Teaching styles include the teacher's personal behavior and media technologies chosen to deliver and receive information. Teaching styles can be classified in different ways resulting in a number of global definitions. Some are related to instructional modes such as recitation and lecture discussion, in query or role-playing (Hyman, 1970). Joyce and Weil (1972) suggest four broad categories of teaching models: social interaction, information processing, personal source and behavior modification.

Some other classifications are based on some dichotomies, such as authoritarian versus democratic styles, pupil-centered versus teacher-centered styles and traditional versus progressive style (Silvernail, 1979). Teaching styles can be defined as a teacher's personal behavior and the bridge used to transfer data to or receive data from learners.

Liu and Littlewood (1997) found that in most of the East Asian countries, teaching styles for EFL are based on the teacher-centered, book-centered, grammar translation method and also emphasis on rote memory. These traditional teaching

approaches have resulted in a number of typical learning styles in East Asian countries, one of which is the introverted style.

In East Asian countries, the students are looking to knowledge as something which is transferred by their teachers (Zhenhui, 2001). Harshbarger, Ross, Tafoya, and Via (1986) also found that Japanese and Koreans are quiet and shy in the language classrooms. They dislike the public display of their ideas or over display of their opinions and emotions, which is reflective of their introvert characteristics.

Liu and Littlewood (1997) found that for Chinese students "listening to teacher" is considered as one of their most frequent activities in the classroom. Dunn and Dunn (1972) explained that teachers teach the way they learned. As a result, some of the teachers are considered as traditional instructors and others are innovative ones. Nine elements of teaching styles are defined:

1) Educational philosophy

2) Student preference

3) Instructional planning

4) Student groups, (how the teacher permits learning to occur sociologically)

5) Room design (the way in which a teacher uses instructional areas to match the

   student's learning needs).

6) Teaching environment (the arrangement of scheduled number of available options

   to learners and the consideration for multilevel resources when needed).

7) Teaching characteristics (the value and standards a teacher holds as observed

   through a perceptional approach and how it is translated to learners).

 For example: teacher degree of flexibility

a) the perception of the material taught /learned.

b) the amount of direction and supervision provided to students.

8) Methods or styles of teaching.

9) Evaluation scales to determine student achievement.

Every teacher has a learning style. Studies indicate that one's learning styles preferences influence one's teaching styles (Gephart, Strother, & Duckett, 1980; MacNeil, 1980). Canfield (1992) analyzed the learning style preferences among program majors at universities, which indicated that learning styles are linked to program selection and/or teaching styles.

Heikkinen, Pettigrew, and Zakrajsek (1985) found that each group of majors had strong preferences for some of the learning variables. The findings also revealed the wide gap or variance between the elementary and secondary education majors along with significant learning style differences between male and female education majors.

Research on Teaching Styles

Medly (1972) stated that early studies from 1896 to the 1950s found a shortage or lack of any measurement scale to measure the effects of the teacher characteristics on student achievements.

The lack of reliable instruments can explain the lack of interest in this topic and also the delay in developing objective, valid and reliable methods of evaluating the effects of teaching styles and behaviors on student learning. Bennett (1976) indicated that teacher's styles involved many different variables that may demonstrate themselves through a variety of classroom activities.

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Later research (Silvernail, 1979) on teaching styles focused on certain components of different teaching styles which include feedback, the impacts of encouragement, the effect of criticism, the use of pupil ideas, making use of questions/structuring the activities/clarity of presentation, enthusiasm, classroom reward and "classroom climate".

Silvernail believed that teaching is considered as a complex act, and in order to make this act effective many variables are involved. An overwhelming number of researchers have established a bridge between selected teaching styles and behaviors and pupil achievement (Silvernail, 1979). Only two instruments are explored that investigate the use of learning style preferences and the teaching styles separately.

a) Canfield (1992, 1980) learning styles inventory and instructional styles inventory and

b) Hanson, Silver, and Strong's Learning Style Inventory (1980), and Teaching Style Inventory (1980). This would indicate that the majority of learning style models consider that learning styles and teaching styles are similar.

Lyons (1984) stated regarding the above matter, "Generally speaking, however, to this date research has not provided a theoretical model nor reasonable evidence to support this relationship" (p. 1). Lyons (1984) conducted a study using the MBTI in order to identify teaching styles of two teachers; then he compared the obtained results with subjects' preferred personality trait.

The findings revealed that there is a relationship between teaching styles and learning styles with identifiable teaching style behavior reflecting learning style preferences. Although the subject group was limited, the results provided a fundamental framework from which to build on this common theory.

Some studies have investigated the impact of teaching styles on students' achievement. In another study, Conti and Welborn (1986) investigated the impact of teaching styles on learners' achievement. The participants were 256 health professionals registered in allied health continuing education courses and 18 instructors; PALS and Canfield's LSI were used to measure teaching styles and learning styles accordingly.

The achievements of 837 students were measured and analysis of covariance revealed that teaching style had a great impact on student academic success. Students whose teachers had teacher centered styles were high academic achievers among the others. However, after checking the total hours of student attendance, it was shown that students of instructors with learner-centered styles had the highest academic achievement.

The Good or Successful Language Learner

According to Rubin (1975) and Stern (1975), the "good language learner" becomes the initial point for the interest in LLS studies. Rubin (1975) has identified the following strategies used by good language learners:

• Making reasoned guesses when not sure

• Making an effort to communicate and to learn through communication

• Finding strategies for overcoming inhibitions in target language interaction

• Practicing the language whenever possible

• Monitoring their speech and that of others

• Attending to form (i.e., grammar)

• Paying attention to meaning

The important thing to realize is that this list or other related lists used by the successful language learners cannot be generalized to all the good or successful learners because they do not necessarily apply the same language learning strategies. Even if they use the same or similar strategies, they will not use them with the same purpose nor in the same style. For example, one learner may focus on form during listening and speaking while another concentrates on other skills like reading and writing as well as form. While the first learner focuses on form in a general way, the second learner is far more analytical and pays attention to tiny details associated with the forms and rules associated with their use.

In a study done by Green and Oxford (1995) on successful and less successful learners, the successful learners were found to be using more language learning strategies compared to less successful learners. Students have to realize that in order to be successful learners, they need to "stretch" their learning style preference sometimes. Learners must be aware that sometimes their language learning style might or might not be the best for a certain task; to solve this problem, they need to go beyond their preferred learning styles. Vann and Abraham (1990) suggest that the best way to accomplish this is by the conscious use of learning strategies that do not match learner learning style(s) but seem to be relevant for the given task.

It is evident that good language learners employ distinct affective strategies. Language learning can be frustrating in some cases. In some instances, the foreign language can evoke the feeling of strangeness. Sometimes, the L2 learners have negative feelings towards the target language. Good language learners are more or less conscious of these emotional problems. They try to create associations of positive affect toward the foreign language and its speakers as well as toward the

learning activities involved. Training can help students to face up to the emotional difficulties and to overcome them by drawing attention to the potential frustrations or pointing them out as they arise (Stern, 1992, p. 266).

According to Macaro (2001) most researchers disagree about the notion of a particular category of "good language learner" because over the years research studies have revealed that there are distinguishable differences among equally successful language learners. The most recent view is that there are several criteria for a learner to be considered as successful; therefore, it is advisable to limit the definition of the good language learner to the prescriptive and ignore learner differences. However, it is generally perceived that successful learners are strategic in their learning.

Chapelle and Roberts (1986) stated that studies dealing with individual differences in the learning process have mainly focused on questions such as what makes a good language learner and why some people are more successful in learning another language than others. Several studies discussed learner-related variables that affect language learning (Cohen, 1990; Ehrman & Oxford, 1989; MacIntyre & Gardner, 1989; Reid, 1987). These studies identified variables such as motivation, learning styles, gender, course level, language learning strategies, previous experience in language learning and cognitive variables. Of these variables, language learning strategies and learning styles are relevant to this study.

During the past decades, researchers in the ESL/EFL domain isolated learners' characteristics that prevent or help progress in learning another language. In spite of attempts to improve foreign language instruction, the fact that some adults are more successful than others in learning another language still remains. In this study, this success has been looked at from the viewpoint of teaching style and

learning style match and mismatch, while success has been defined as achievement for this study.

Matching of Learning Styles with Teaching Styles

If it is practical to identify the learning styles of an individual, then it is logical to assume that matching the characteristics of instruction to that style would make the instruction more effective. Kolb (1976) explained that all learners have their own individual styles when they enter an educational environment; if the learning environment is at variance with the learner's style then it is likely the student will reject the learning environment. Kolb (1984) later mentioned that there were potential long-term benefits where there is a mismatch between learning style and teaching style:

> the aim is to make the student self-renewing and self-directed; to focus on integrative development where the person is highly developed in each of the four learning modes; active, reflective, abstract and concrete. Here, the student is taught to experience the tension and conflict among these orientations, for it is from these tensions that creativity springs.

Literature clearly identified that there is a long "debate" over the impact of this match. In relation to what is mentioned, Matthews (1991) stated that:

> while mismatching is appropriate for development reasons, students have more positive attitudes towards school and achieve more knowledge and skills when taught, counseled or advised through their natural or primary style rather than a style that is secondary or undeveloped, particularly when adjusting to a novel and new

situation that creates stress such as beginning experiences in higher education (p. 523).

Students in the same learning environment appear to learn in ways that often are dramatically different from each other. Butler (1983) suggested that the student-teacher interaction is influenced by the teacher's teaching style and student's learning style and this interaction leads to greater or less success in learning. Findings of the studies done by Dunn, Bruno, and Gardiner (1984) indicated that when students are taught through their style preferences, it will surely influence their achievement.

It appears that the most successful students tend to possess learning preferences that match the instructional method preferences of their teachers (Cafferty, 1980); therefore, it indicates that students are able to identify their own learning styles/ learning habit (Domino, 1970; Farr, 1971). Dunn (1982) explained that matched styles and resources resulted in significant increase in a) academic achievement, b) improved attitudes, and c) reduced numbers of discipline problems. Dunn and Dunn (1979) found that learning style preferences are different between the high achievers and low achievers. The findings of another study that compared the poor and good readers showed that learning style preferences are different between those with high reading achievement and low reading achievement (Murray, 1980; Price, Dunn, & Sanders, 1980).

The results of the study done by Zenhausern (1982) on good and poor readers demonstrated that, of good readers, half of the learners were right and the other half were left brained, but of the poor readers, 17 out of 19 were right brained preference learners (Zenhausern, 1982).

In different studies, students being tested for their learning styles reported either strong negative or positive preferences for selected elements that have been placed into their academic situations where they were taught in methods that matched or mismatched their self report preferences. The students who were reported as matched with methods showed higher achievement. On the other hand, the same students, when they were mismatched with their preferences, showed lower achievement.

Research on matching for achievement outcomes indicate that style matching could be strongly supported for affective reasons (Li et al., 2008). On the other hand, mismatch can lead to frustration, low performance and demotivation. This suggested the importance of "self-knowledge", "balance", and "alignment" in learning (Gregorc & Butler, 1984). Gregorc and Butler (1984) stated that the mismatch would generate new ideas and experiences, encourage development of new techniques and appreciation of how others perceive and process information.

Apparently, no single element can be identified and used as the sole factor for student higher achievement because many factors influence individual achievement. McCarthy (1987) stated that learners should be taught with all styles as identified by Kolb (1984) for successful learning. However, the stage that the learner tries to adapt and adjust his learning style to teaching styles can be seen as the process of learning to learn. The main goal is to make the learner as well as teacher aware about the styles they utilized so they would be able to adjust, adapt or modify them in order to increase learning achievement.

As mentioned before, learning styles are both stable and flexible. The level of flexibility depends mainly on individual style of thinking procedure. Interview and observation implied that some of the individuals could adjust easily to another

style when necessary while others faced difficulties (Cornett, 1983) and teachers can gain an appreciation of the variety of learning styles. They do respect learning style variety and adapt their teaching styles to observed differences in learning styles in the learning environment. Joyce (1981) reports success in helping teachers with multiple teaching styles to learn new models of teaching that facilitate student learning.

Teachers have various backgrounds when it comes to their educational beliefs or what they believe is their educational philosophy. Their belief acts as a facilitator, which involves how to teach, what to learn and why adults learn. Teaching styles have been defined as "unique qualities that are presented by the teacher in all learning settings, regardless of the material content" (Conti, 1991). Conti (1991, p. 81) stated that in the current educational setting there are two categories which are learner-centered and teacher-centered.

In the education field, the teacher-centered approach is a common one, and in this approach, learners are considered as individuals who have no prior experience or knowledge so the teacher should introduce them to learning activities. On the contrary, in the learner-centered approach, it is assumed that the learner has prior knowledge and experience and is willing to share the knowledge with others in the classroom.

Regardless of the teacher-centered or learner-centered approaches, teachers should be aware of their teaching style in order to create a better atmosphere for more effective student learning. There are many inventories, self-reports and self-assessments to evaluate teaching styles. According to Conti (1991) besides these instruments and inventories, other characteristics provide extra information about

teaching styles such as diversity of the student population, the educational setting and content and many more.

The idea of matching the learning styles and teaching styles is considered as a new idea among today's teachers (Bonham, 1989). In the ideal situation, it would be great if we could assess individual learning styles and assign the teacher whose teaching styles matches the learning styles of learners or perhaps convince the teachers to modify their teaching styles according to their students' learning styles.

Many learning style specialists (Barbe & Milone, 1980; Carbo, 1997; Dunn & Dunn, 1993; Jenkins, 1991; Leaver, 1998; Sarasin, 1999; as cited in Klein, 2003; and Woolhouse & Blaire, 2003) confirmed the theory that students will learn more and will enjoy the class experience and environment when they can use their preferred learning styles. In some cases, students are blamed when the classroom activity is not compatible with their way of learning.

Bonham (1989) cited in Ruhnau (2006) proposed a solution for this situation, that is by selecting the teaching approach which will "match" different learning styles. Even though this approach sounds practical in theory, considering the diversity of students learning styles in the "real world" it is not practical within the classroom. Another solution is to identify the learners' learning styles preferences and then assist them to widen their learning styles and develop their "learning comfort factor" (Bonham, 1989, cited in Ruhnau, 2006). Bonham (1989) suggested that before making a decision on how to match the learning style with teaching styles, five key questions must be explored. Figure 2.7 displays the five questions suggested by Bonham (1989).
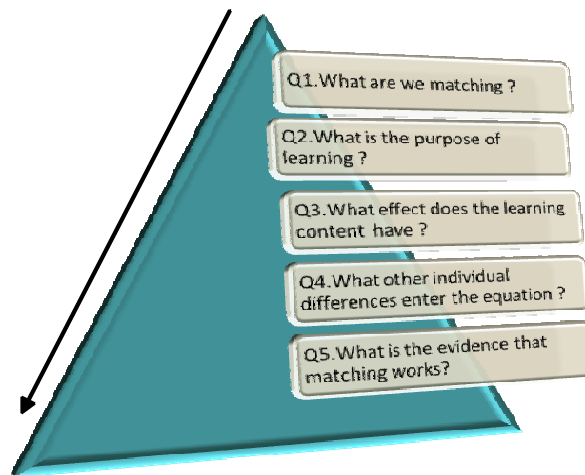
Figure 2.7. Five questions suggested by Bonham (1989).

What Are We Matching?

Many existing learning style and teaching style inventories and instruments are aimed at measuring and identifying the compatibility between these two variables (learning styles and teaching styles). 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 that they are looking into are the same and comparative data could be easily matched. However, when the instruments are not the same, there would be difficulty in correlating the two types of data.

What Is The Purpose Of Learning?

If a person needs to master a skill in a short time, what is the best tactic to make the teaching more beneficial? In such a situation, teachers should align and

match their teaching styles based on the learner's learning style. In a situation where the instruction is one-to-one this sounds a practical solution but it is impossible in a classroom setting. In such cases, the learner should extend his learning styles and align them closely with the lecturer's or teacher's teaching styles. There might be a mismatch between the learner and the teacher, but as mentioned before, matching learning styles to teaching styles is the best way for effective learning.

What Effect Does The Learning Content Have?

According to Ruhnau (2006) "learners need to develop flexibility within their learning style". As mentioned earlier, learners are required to use diversity of learning styles when they are involved in learning. Some of the learning settings require the learners to have more than one specific learning style in order not to be penalized or criticized for the lack of ability to handle the learning task.

What Other Individual Differences Enter The Equation?

Some people are not flexible when it comes to their preferences in terms of learning styles or teaching styles. Mostly, they are not comfortable with the change in their preferences. However, while the learning proceeds, one thing which must proceed with it is the matter of individual flexibility (either teacher or learner). According to Ruhnau (2006) "while the long range goal should be to increase flexibility in the educational setting, the lack of flexibility may have to be taken into account".

Dunn, Dunn, and Price (1982) as cited in Bonham (1989) believed that in a situation where the aim is to match learning styles with teaching styles, only the "strongest held learning style" should be considered. In learning style evaluation, the

score near the midpoint shows that the learner has no clear learning style preferences, and in this situation the concept of matching the learning style and teaching style may not be necessary for this group of learners.

What Is The Evidence That Matching Works?

The findings of the previous study (Terry, 2001) done in the area of matching the learning style and teaching style have been varied. Some studies found no or little evidence that this matching facilitates learning task improvement (Terry, 2001).

In some studies (Blixt & Jones, 1995; Hughes, 1992, as cited in Terry, 2001) the reliability issue of Dunn, Dunn, and Price's (1979) learning style inventory (LSI) has been questioned. One of the reasons for this variety is that past researchers made some assumptions about the learning goals and the learning content.

Research on Matching Learning Styles with Teaching Styles

A growing body of research on adult learners recommends that learning would be successful if the learner's learning styles are borne in mind (Dunn, Bruno, Sklar, & Beaudry, 1990; Larkin, Feldgen, & Clua, 2002). In addition, within the domain of physics and engineering, researchers pointed to the importance of aligning teaching with learning styles (Agogino & Hsi, 1995; Herrick, Budny, & Samples, 1998). After diagnosing the learning styles of an individual, the next logical step is to assume that matching the characteristics of the teaching styles would enhance instruction.

Students tend to enter a learning environment with the learning styles which they have developed before when the learning environment is different from the styles student will get in the new learning environment (Kolb, 1976).

In most of the cases when there is a match between teaching styles and learning styles there was a significant improvement in academic achievement. Table 2.6 shows the findings related to matching teaching styles with instructional environment preferred by students.

Table 2.6

Research Concerned with Instructional Setting

Researcher/Date	Sample	Subject Examine	Element Examined	Significant Achievement
DeGregoris,1986	6th,7th,8th graders	Reading Comprehension	Kinds Of Sound Needed	+
Della Valle,1984	7th grade	Word Recognition Memory	Mobility/Passivity Needs	+
Hodges,1985	7th,8th graders	Mathematics	Formal /Informal Design Preferences	+
Krimsky, 1982	4th grade	Reading Speed & Accuracy	Bright/Low Lighting Preferences	+
Lemmon, 1985	3rd,6th graders	Reading & Mathematics	Design & Time	+
Mac Murren,1985	6th grade	Reading Speed & Accuracy	Need for intake while learning	+
Miller, 1985	2nd grade	reading	Mobility/Passivity Needs	+
Murrain, 1983	7th grade	Word Recognition Memory	Temperature Preferences	-
Nganwa-Baguma, 1986	High schoolers	English	Formal/Informal design preferences	-
Pizzo, 1982	6th graders	Reading	Acoustic preference	+
Shea, 1983	9th graders	Reading	Formal/Informal design preferences	+
Stiles, 1985	5th graders	Mathematics testing	Formal/Informal design preferences	-

Source. Dunn and Dunn, (1993), *Survey of Research on Learning Styles.*
Key: *Positive finding, +
　　　*Negative finding, -

Understanding teaching style preferences is considered as one of the key factors to get and keep the students involved in learning. It entails understanding of students' learning style preferences, which will affect their performance negatively or positively (Birkey & Rodman, 1995; Dewar, 1996; Hartman, 1995). In a study by

Agogino and Hsi (1995), it was found that adjusting teaching methods according to the needs of different learning styles would benefit all students.

Schroeder (1996) stated that the "typical" learner's learning style profile is changing at college level nowadays and there is a variation of learning style preferences among learners. It is necessary to define the learning style preferences and plan how to address them when preparing materials for adult learners. Birkey and Rodman (1995) stated that there are differences in the way people learn and process information and that there are significant differences in terms of learning style measurement and definition of learning styles.

Therefore, one of the key points for teachers to consider is the different learning styles among the student population. The literature review has shown that many theories have discussed learning style and the number is still growing. However, one of the important questions that need to be answered is whether it is appropriate to redesign an instructional strategy when learning style may not be stable. Research has clarified that learning styles are not stable or fixed "constructs". Considering the fact that learning styles are not stable, redesigning the instructional styles based on them is inappropriate.

If we want to list down all the learning styles that linguists and researchers have explored, a very long list will emerge. Ausubel (1968, p. 171) identified 18 different learning styles; on the other hand, Hill (1972) highlighted 29 factors that contributed to learners' cognitive styles, including factors related to sensory, communicative, cultural, affective, cognitive and intellectual aspects.

In a study by Dunn, Dunn, and Price (1990) styles related to learning - teaching in general, and to second language learning in particular have been

highlighted. The findings of the study by Dunn, Deckinger, Withers, and Katzensttein (1990) concluded that teaching students based on their learning style preferences significantly increases the level of their achievements (See also Napolitano, 1986). Table 2.7 adapted from Witkin et al. (1977) and Allinson and Hayes (1996) gives a comparison between studies related to learning/teaching style match and mismatch.

Table 2.7

Studies Related With the Impact of the Learning Styles and Teaching Styles Match & Mismatch

Learning Is More Effective Where There Is A Match	**Learning Is More Effective Where There Is A Mismatch**
Di Stefano (1970)	Gehlman (1951)
Koran et al. (1971)	Glass (1967)
Grieve & Davis (1971)	Coop & Brown (1971)
James (1973)	Anderson (1972)
Carpenter et al (1976)	Nelson (1972)
McCleod & Adams (1977)	Montgomery (1972)
Witkin (1977)	Thornell (1974)
Hudak (1985)	Gorton (1975)
Canino & Cockerill (1988)	Kolb (1985)

Source. Adapted from Witkin et al., 1977 and Hayes & Allinson, 1996; cited in Robotham (2006).

In Table 2.6, for each research that supports matching instructional style and learning style, there is a study that rejects the matching advantages on learning outcomes. However, Streufert and Nogami (1989) and Messick (1984) proposed some evidence which implied that learners adapt their learning styles based on perceptions of the requirements of a learning task. Talbot (1985) suggested that learning styles differed according to the learning task taken, while Barris, Kielhofner, and Bauer (1985) debated that learning can change due to the duration of the course.

Some studies found that the mismatch exists and it has a bad effect on student learning and attitude to the class and English learning (Cortazzi, 1990, p. 54; Ehrman, 1996, p. 50; Felder, 1995, p. 21; Jones, 1997, p. 18; Littlewood et al., 1996, p. 71; Oxford, Holloway,& Horton-Murillo, 1992, p. 451; Reid, 1987, p. 91).

The findings of the following studies (Felder 1995, p. 28; Hyland, 1993, p. 83; Jones, 1997, p. 19; Kinsella, 1995, p. 170; Nelson, 1995, p. 17; Oxford, 1995, p. 116; Oxford et al., 1992, p. 451; Reid, 1987, 1995; Spolsky, 1989, p.110; Tudor, 1996, p.114; Willing, 1988, pp. 72–75) indicate that this match improves learning, attitude, behavior and motivation. Furthermore, Reid (1996, pp. 43, 47) indicates that matching teaching style with learning style gives all learners an equal chance in the classroom and creates an alert and aware student.

Felder (1995, p. 27) suggests that one method for overcoming the mismatch is a balanced teaching style, meaning teachers should try to accommodate all learning styles (Chu, Kitchen, & Chew, 1997, p. 13; Ehrman & Oxford, 1995, p. 67; Felder, 1995, p. 28; Hyland, 1993, p. 70; Kroonenberg, 1995, p. 84; Melton, 1990, p. 42; Oxford et al., 1992, p. 453; Oxford, 1995, p. 44–45; Reid, 1987, p. 101; Rossi-Le, 1995, p. 123). Willing (1988, p. 88) agrees and asserts that teachers should do this even if it conflicts with their idea of what is effective in class. Ehrman (1996, p. 129) suggests gradually "build[ing] an increased array of options" for class and homework, while Kinsella (1995, p.175) proposes "a deliberate multi sensory approach".

Willing (1988, p. 23) warns that we (students) must also respect teachers' styles, because adopting an unfamiliar style can reduce effectiveness. Finally, Table 2.8 displays some of the studies, which have been done in similar context with different instruments and different focus.

Table 2.8

Review of The Studies Done on Matching & Mismatching Teaching Styles & Learning Styles

Researcher & Instrument Used	Subject	Area of Focus	Details
Verster (2006)	Conceptual research	Suggesting the teaching style that is aligned with each learning style type to improve the learning	
Bell (2007) Felder & Silverman (1988)	Undergraduate(Navy Reserve Officers Training Corps), 7 participants	-Identifying learning styles of the participants -Identifying the Instructor teaching styles -Looking at match and mismatch between these two categories among the learners and their instructors	- All dimensions of the Felder was used among participants -Using the different teaching styles by the teachers - Findings showed there was congruency between the lecturer and the students.
Xiao (2006) -Observation -Interview -Questionnaire	L2 Chinese students learning language (Ireland)	-Mismatch caused by culture based differences in perception and attitude to ward different language teaching and learning styles in classroom-based setting -To reduce teacher-student style conflicts	- Chinese student learning habit will bridge the gap between the instructors' and learners' teaching styles and learning styles
Demirel (2004) (not mentioned)	Chemical engineering students	-Active learning by using work book strategy	-Investigating the match and mismatch between the teaching /learning styles. -Suggesting the use of workbook strategy for effective and affective learning.
Kovacic (2008) Kolb & Felder –Soloman -Student self- perception	Computing students and their lecturer	-Identify the closeness between the learners' and their teachers' learning styles and teaching styles match /mismatch	-Both indicators showed significant difference between student and lecturer styles. **Recommendation:** -How to bridge the gap between the styles of these learners.

Peacock (2001) PLSPQ (perceptual learning styles preference questionnaire)	EFL students & teachers	-Testing Reid's (1987, 1995) hypothesis on learning styles	-Styles used by learners are kinesthetic and group styles. -Styles used by teachers are kinesthetic and group styles.
Ford & Chen (2001)	-Student under the computer based learning course	-Match and mismatch between the teaching styles (breadth-first and depth –first) with students' cognitive style (FD/FI)	- The result showed that the match help the students to learn better and more effectively
Spoon & Schell (1998) Principles of Adult Learning Scale (PALS) both for teacher & learners	-Adult basic students and their teachers (vocational class)	-To examine the influence of student learning styles and teacher teaching styles on student achievement of basic skills	-Recommends teacher to use different teaching styles so they can make sure everybody benefits from the class
Bohlen & Ferratt (1993) Kolb (1984)	-Computer Science	-Are end- user learning outcomes (achievement, efficiency and satisfaction) affected by the mood of the teaching and their learning styles preferences? - Are end- user learning outcomes (achievement, efficiency and satisfaction) affected by the combination of the method of instruction?	
Cano, Garton, & Raven (1992) GEFT, group embedded figure test,	-Teachers majoring in agriculture	-Preferred learning styles of the teachers -Preferred teaching styles of the teachers -Personality types of the teacher	-Identify the teaching styles which are more suitable for the FD/FI teachers
Felder & Silverman (1988)	-No participants	-Explore the different dimensions of the learning styles and teaching styles -Introducing the learning styles instrument	-Explain the different dimension for the learning styles and based on the other research done they are suggesting the most suitable teaching style for each learning style dimension.
Abdelhamid (2003) Felder & Silverman (1988)	277 Learners from 5 different courses, 5 teachers	-To discover the learners' learning styles -To explore the teachers' teaching styles -To look at the possibilities of the matching and mismatching among the students and their teachers	-Looking at the teacher and learner disparity