

CHAPTER 2

LITERATURE REVIEW

Literature areas to be reviewed include brain-based/compatible learning, learning environment, and learner autonomy. The first section discusses brain-compatible learning theory, and brain-compatible learning principles in designing learning environment. The second part deals with the definition and functions of literacy-rich environment and environmental print. Finally, a review of the literature on learner autonomy with focus on learner autonomy in language learning and teachers' role is presented.

Brain-based/compatible Learning Theory

Recent brain imaging studies revealed that children's brains learned fastest and easiest during the early school years. Enriched environment should be made available for students (Jensen, 1998; Kaufeldt, 1999; Kotulak, 1996). From the recent findings of brain studies, it is proved that the brain decides which information to be stored. Therefore, when investigating the effectiveness of learning environment towards language teaching and learning, it would be helpful to have a brief understanding about the brain-based/compatible learning theory. In the following section, a brief introduction of brain-based/compatible learning and some brain-compatible learning principles are delineated.

Brain-based/brain-compatible learning. Brain-based/compatible learning is about how to improve the effectiveness of learning from the perspective of brain biology. According to Caine and Caine (1994), brain-based learning is about how brain learns (the rules of brain processing), and then organize teaching according to these rules. "Brain-compatible" coined by Leslie Hart refers to education designed to match setting and instruction to the nature of the brain. Brain-based/compatible

learning is a comprehensive approach to instruction and learning adopting current research from neuroscience.

With the help of technologies such as MRIs, EEGs, PET and CAT scans, neuroscientists finally could study healthy human brains and start to unravel the secret of how human brains function and learn. The brain cells regarding learning are neurons and glia. Learning occurs when a neuron sends a message to another (Jensen, 2000; McGeehan, 2001). New experiences and stimulus physically change the brain by causing neurons to sprout new branches named dendrites and increase communication among neurons across synapses. The physical basis of learning and memory is the synaptic leap of an electric impulse between the axon of one neuron and the dendrite of another (McGeehan, 2001). Marian Diamond of the University of California at Berkeley found that human brains maintain an amazing plasticity. An enriched environment would grow new neural connections and lead to a larger and heavier brain, which meant that the nerve cells were better able to communicate with each other (Diamond & Hopson, 1998). Jensen (2008) further stated, “This means that nearly any learner can increase his or her intelligence, without limits, using the proper enrichment” (p.189). He also mentioned that enhanced environmental stimulation can increase production of new brain cells which support better learning and memory (Jensen, 2008). Moreover, among the thousands of bit of sensory data humans process each minute, human brain is designed to make meaning out of the chaos. The brain pays attention to what is relevant and meaningful to personal daily life (McGeehan, 2001). It seems that both enriched environment and meaningful input are important factors to facilitate learning. What neuroscientists have decoded provides groundbreaking insights for educational practices (McGeehan, 2001).

By understanding much more about human brains, educators could design

curriculum, instruction methods, and environments that are most compatible with what is currently understood about how human brains function and learn (Kaufeldt, 2005). Scholars have taken information from brain studies and developed a series of brain-compatible learning guidelines and suggestions for teachers to use in the classroom (Caine & Caine, 1990; Diamond & Hopson, 1998; Hart, 1983; Jensen, 1998; Kaufeldt, 2005; McGeehan, 2001). Caine and Caine (1991, 1994) developed Mind/Brain learning principles that apply what we know about the function of the brain to teaching and learning. Jensen (1998) delineated the fundamentals and the current research on brain processes and their implications for teaching practice in his book *Teaching with the Brain in Mind*. Martha Kaufeldt (1999) in her book, *Begin with the Brain*, briefly describes concepts from brain research that educators can use to orchestrate truly brain-compatible classrooms. What those scholars and educators discussed provides teachers with systems and strategies to create a peaceful, successful, learning environment.

Principles of designing brain-compatible learning environment. Educational techniques that are brain-friendly would make instruction and learning more effective. (Caine & Caine, 1994; Jensen, 2008; Hart, 1983; Kaufeldt, 2005; McGeehan, 2001) Though it is just a starting point of applying brain-compatible learning theory in designing the learning environment, teachers have found this helps students take a giant leap in their learning (Kaufeldt, 2005; McGeehan, 2001). Among those brain-compatible learning principles, two essential principles of designing brain-compatible learning environment are discussed as follows.

1. Providing enriched environment and changing displays regularly in the classroom to stimulate brain development. The importance of providing rich environments is mentioned repeatedly in brain-based learning (Burch, 2004; Caine &

Nummela-Caine & Crowell, 1999; Fogarty, 1998; Jensen, 1998; Kovalik, 1994; McGeehan, 2009). Students spend eight hours a day, 200 days a year at school. Therefore, school teachers have the responsibility to provide a rich environment for students. Results from brain studies indicated that an enriched environment can contribute up to a 25% increase in the number of brain connections both early and later in life (Caine et al., 1999; Jensen, 1998, 2008; Kotulak, 1996). In other words, interaction of the brain with its environment suggests that the more enriched environment, the more enriched brain. The brain can grow new connections at any age, when it keeps receiving challenges, complex stimuli from the environment. First-hand experiences and real things which humans encounter evoke rich sensory input to the brain (McGeehan, 2001). While new connections grow in brain, new knowledge is stored. That means the brain has learned something new. Enriched environment is an essential element in facilitating learning.

In order to maintain an enriched environment, teachers have to change displays in the classroom regularly to provide stimulating situations for brain development (Burch, 2004; Caine et al., 1999; Jensen, 1998, 2007; Kaufeldt, 2005, Kovalik, 1994). Caine et al. (1999) suggested that teachers can use student-created materials and products to display and post on the bulletin boards and display areas. By challenging students to accomplish this task, their motivation is raised. At the same time, students have places for reflection and support for interpersonal intelligence.

In the field of language learning, rich and various target language input is needed. By enriching the language learning environment and adopting multiple teaching strategies, teachers could nurture students' brain and facilitate their language learning. (Caine & Caine, 1994; Jensen, 1998; Kaufeldt, 2005) While designing the language learning classroom, teachers can provide all kinds of posters with target language

print in the classroom. With the regular changing of language input and instruction strategies, teachers can challenge and stimulate students and facilitate their language learning. However, every teacher might have thought about that “Are those posters and language input effective?” “How can teachers assure that all students learn from what teachers have taught and provided to them?” In the following section, the importance of meaningful content is delineated.

2. Providing meaningful content: peripheral perception and conscious

learning. While students are placed in an enriched environment, how do they learn? Do they consciously or peripherally learn the rich input from the environment? In the field of brain-compatible learning, researchers suggest that peripheral learning and conscious learning both functions while human brains work (Caine & Caine, 1990, 1994; Jensen, 2007; Lombardi, 2004). Caine and Caine (1990, 1994) indicated two perspectives about this issue. The two perspectives are (a) Learning involves both focused attention and peripheral attention; (b) Learning always involves conscious and unconscious processes. Jensen (2008) mentioned that “the brain absorbs information from surrounding peripherals on both conscious and unconscious levels” (p. 57).

However, human brain stores most effectively what is meaningful from the learners’ perspective (Jensen, 1998; Burch, 2004; Kaufeldt, 2005; Kovalik, 1994; Mcgeehan, 2001). Human brain functions like a sieve. It collected information by the senses from the surrounding environment, and let go unimportant information (Fogarty, 1997). Human brains make decisions according to prior experience. New input must have emotional value and useful content or the brain efficiently ignores it (Burch, 2007; Fogarty, 1997, 1998; Jensen, 1998, 2008; Mcgeehan, 2001). That is to say, students receive all kind of information from the environment unconsciously, and

their brains decide which part of information they should pay focused attention. Through this process, students consciously choose and learn what is meaningful to them. For example, children may unconsciously grasp the information on the road signs on their way to a park though they do not intend to do so. While their teacher asks about what road signs they see on their way to school, they would consciously search the information from their brains and give answers. This is conscious learning. Students consciously select what information they need and store into memory. Therefore, teachers need to understand their students, provide meaningful content, and make students find useful and meaningful information from the learning environment.

Experts have delineated two ways that children learn intentionally and incidentally, both of which are environmentally influenced (Rieber, 1990). When children grow up, they learn things from their parents and environment incidentally. Incidental learning almost always takes place although humans are not aware of it (Marsick & Watkins, 1990). Rieber (1990) defined incidental learning as “learning those objectives which were not directly taught, but only implied through contextual cues provided” (p.483). In the field of language learning, it is believed that with more language input in the environment, students could learn from it. Teachers and experts suggested that by putting posters containing grammatical information about the target language on the classroom walls, students will absorb the necessary facts effortlessly (Chowdhury, 2009; Corin, 2000; Fortin, 2008). This is so-called peripheral learning. Some educators also mentioned that absent-minded students are able to pick up English in the classroom environment such as posters on the wall or from their environment (Corin, 2000; Fortin, 2008).

However, according to the brain studies, if the peripheral information does not

contain personal meaning, it will be ignored by the brain. Researchers mentioned that learners will not acquire everything from what they hear and see but from what they consciously notice. The eyes look and collect information for the brain, but it is the brain that determines what we see and how we see the information (Jensen, 2008; McGeehan, 2001; Smith, 1994). Not all learning is deliberate or intentional, but all learning does require attention and awareness (Schmidt, 1995). This reminds teachers the necessity and importance of consciousness in language learning (Richards, 2005; Rutherford & Sharwood Smith, 1985; Schmidt, 1990, 1995; Smith, 1994). In order to catch student's attention and to immerse them in the target language, many posters and bilingual signs have been posted on campus. How to make good use of those peripheral learning materials and facilitate language learning? This would need teachers' and parents' instruction. The important role of adults in scaffolding children's attention to the language input has been mentioned repeatedly (Hiebert & Raphael, 1998; Neuman, 1999; Roskos & Neuman, 2002). In order to help students learn those language posters teachers can design activities and assign tasks to students to make peripheral language input become meaningful.

It is believed that providing a rich environment is important for facilitating learning, to which neuroscientists have given biological evidence. Brain-based learning has been viewed as a combination of brain science and common sense. With the findings of neuroscience, educators could have a better understanding of human brains, the organ of learning, and thus design an effective learning environment to assure student success.

Learning Environment

Researchers have given various definitions to learning environments (Hannafin, Land & Oliver, 1999; Manninen & Pesonen, 1997; Wilson, 1995). According to

Wilson (1995), “a learning environment is a place where people can draw upon resources to make sense out of things and solve problems” (p.26) and should be a place where learning is fostered and supported. Manninen and Pesonen (1997) defined learning environment as place, space, or practice, whose purpose is to support learning. Hannafin et al. (1999) presented that learning environments consist of at least four elements: enabling context, resources, tools, and scaffolds. In a word, a learning environment gives sufficient resources to facilitate successful learning.

The importance of learning environments and its influence to learners have been discussed repeatedly (Bereiter & Scardamalia, 1989; Chang & Liu, 2004; Escamilla, 1994; Morrow, 1989; Roskos & Neuman, 2002 ; Smeets, 2005). Roskos and Neuman (2002) indicated that the well-established maxim in early childhood education is “the environment influences children’s behavior” (p.281). Children may explore their environment, find out problems and figure out the solutions in the environment. Morrow (1989) mentioned careful planning and preparation of the physical environment such as selection of materials and their placement in the classroom play an important role in a successful programme. Bereiter and Scardamalia (1989) proposed that "learners in supportive environments have high levels of self-efficacy and self-motivation and use learning as a primary transformative force" (p368).

Schools are places where learning takes place. It is significant to make schools become a suitable learning environment for students. Chang and Liu (2004) mentioned that environment on campus is one of the key elements in school education. Smeets (2005) stated “education should offer conditions needed to optimize learning and promote the transfer of knowledge and skills” (p. 344). A powerful learning environment is a place where rich contexts and authentic tasks are presented to students (Smeets, 2005). In a word, learning environments are fundamental places

where learners get sufficient and needed resources to enhance their learning.

In the field of language learning, to build a rich input and well-designed learning environment for learners is an essential factor toward successful leaning (Escamilla, 1994; Neuman and Roskos, 1997). Research has presented the effectiveness of a well-designed and enriched environment to native language learning (Hall, 1987; Hiebert and Raphael, 1998; Neuman & Roskos, 1989, 1997;). Hall (1987) indicated that children pick up words and use the language more often while they are settled in an environment with sufficient language input. Neuman and Roskos (1997) stated environments embedded with rich written language experiences create opportunities for children to be naturally involved in literacy-related events. Other researchers also delineated the importance of enriched learning environments for foreign language learning (Curtain & Pesola, 1994; Escamilla, 1994; Fortin, 2008). Escamilla (1994) asserted that language is learned in a supportive and encouraging context like the environment inside the bilingual classrooms. The study asserts that only when target languages, Spanish and English, have the same status outside the classroom in the school environment could students truly become bilingual and biliterate. Curtain and Pesola (1994) stated that children learn new languages best when (a) target language instruction is conducted in the target language with minimal use of native language; (b) learning occurs in a meaningful and communicative context. Visuals, props, realia, and concrete experiences are integral components of instruction. In a word, a literacy-rich environment is essential for foreign language learning. Unlike language learning in the L1 environment, resources and information needed to facilitate foreign language learning are not easily acquired in daily life. Thus, schools should provide sufficient and suitable resources to students.

To create a sufficient and effective language learning environment, literacy-rich

environment and environmental print should be taken into consideration.

Literacy-rich environment. In a literacy-rich environment, children get many opportunities to see how printed words are used for many purposes. Studies in the field of L1 and L2 support that children's literacy behaviors increase when they are placed in a literacy-rich environment. (Curtain & Pesola, 1994; Daniel, Clarke & Ouellette, 2001; Hall, 1987; Hiebert & Raphael, 1998; Nelson, 1995; Neuman & Roskos, 1989, 1990; Roskos & Neuman, 2002).

In L1 learning environment, according to Daniel et al. (2001), literacy-rich environments are composed of daily reading, extended discourse (talking or writing), experimentation with reading materials, book talk, and dramatic play. In other words, from books in the library, posters in a classroom, TV commercials to words in newspapers, advertisements or even brand names in daily life, all of the inputs create a literacy-rich environment. Children are known for being natural language learners (Curtain and Pesola, 1994). They learn the mother tongue easily and fluently at the early age of six. Hiebert and Raphael (1998) mentioned "if teachers provide rich experiences, children will develop literacy naturally because of either their linguistic disposition or cognitive reasoning abilities" (p. 14). After a print-rich environment was created, children spontaneously used twice as much print in their play than they did prior to the environmental changes (Hall, 1987; Neuman & Roskos, 1989). A literacy-rich environment has the potential to improve students' access to print and enhance their understanding of the functions and forms of literacy (Roskos & Neuman, 2002). What has been delineated above indicates how a literacy-rich environment facilitates children's native language literacy.

In L2 learning environment, researchers have also proposed the importance of a literacy-rich environment in the target language (Curtain & Pesola, 1994; Enright &

McCloskey, 1988; Nelson, 1995). Rich and authentic target language materials and resources are key components in foreign language programs (Curtain and Pesola, 1994). All these materials facilitate meaningful communication in the target language. Nelson (1995) indicated that giving non-native students a chance to use the target language in natural and meaningful situations in the classroom enhances their second language acquisition. Children could easily acquire the foreign language if they are immersed in the environment where the target language is used frequently. The importance of a literacy-rich environment had been mentioned repeatedly in language learning environment (Assink, 1994; Curtain & Pesola, 1994; Daniel et al., 2001; Hiebert & Raphael, 1998; Morrow, 1989; Neuman & Roskos 1993; Prior & Gerard, 2004; Roskos & Neuman, 2002). A literacy-rich environment gives children opportunities to actively use the target language, to communicate with each other and to enhance their literacy.

Nevertheless, each child is a unique individual. What is appropriate to one student might not be suitable for another one. Teachers thus play an important role for designing the literacy environment. Morrow (1989) mentioned before planning instruction, teachers need to prepare appropriate materials and provide a literacy-rich environment for students.

However, a literacy-rich environment can not assure the success of literacy development. Many researchers emphasized that meaningful input and interactions between children and adults are critical conditions as well (Curtain & Pesola, 1994; Daniel et al., 2001; Hiebert & Raphael, 1998; Kuby & Aldridge, 1997; Marsh & Hallet, 1999; Neuman & Roskos, 1992, 1993; Roskos & Neuman, 2002; Tao & Robins, 2005). Children's literacy learning occurs through meaningful use of reading and writing (Hiebert & Raphael, 1998). Hiebert and Raphael (1998) proposed that

“school has been designated as the context where children become facile with the higher level tools of the culture” (p. 21) and most children’s literacy experiences occur mainly in school. The important mission of teachers and school administrative staff is to make school filled with meaningful literacy inputs. Environmental print (EP) is surely a good resource. It is inexpensive and easily available from daily surroundings (Manning, 2004). Besides, EP is usually the first contextualized and meaningful print which children encounter (Hallet, 1999). It appears around us in daily life and provides opportunities of meaningful interactions for children and adults. However, the environmental print in school is still insufficient (Morrow, 1989).

Environmental print (EP). In daily life, there are lots of written language such as labels on drinks, candy, cookie bags, advertisements, and T-shirts (Teale, 1986). Logos, road signs, billboards, clothing labels, coupons, and fast-food paraphernalia also appear everywhere. The print found in the natural immediate environment of children is defined as environmental print. (Aldridge, Kirkland, & Kuby, 1995; Hall, 1987; Kirkland, Aldridge & Kuby, 1991; Kuby, 1994; Kuby, Kirkland & Aldridge, 1996; Manning 2004; Teberosky, 1986; Westwood, 2004). Morrow (1989) delineated that “the environmental print that children tend to know best appears on food containers, especially those for cereal, soup, milk, and cookies....” (p. 122). Children can easily recognize lots of print appearing on the fast-food logos, road signs, traffic signals, names of popular store chains (Morrow 1989). They do develop concepts and construct knowledge about the functions and uses of print through engagement with print in everyday or natural environments (Kirkland et al., 1991; Teale, 1986). Recognizing and comprehension of environmental print is a literacy experience children often engaged in before reading print in books (Kuby & Aldridge, 1997, 2004).

Manning (2004) stressed “the use of environmental print is powerful in the early childhood classroom.” (p. 1). Researchers highlighted that children with no confidence in their literacy development begin to feel competent and respond to environmental print enthusiastically when teachers use EP as instruction materials in class. That is because recognizing environmental print gives children confidence and reinforces their achievement in literacy development (Hallet, 1999; Hiebert & Raphael, 1998; Manning, 2004). Lots of children in their native language become readers naturally as they start to make sense of the environmental print (Curtain & Pesola, 1994). To foster beginning readers in literacy development, the emergent literacy perspective recommends highly the continuation of functional literacy through print-rich environment in schools (Smith, 1994). Enright and McCloskey (1988) defined environmental print as “all the print that naturally exists in the “real world” surrounding the classroom” (p.173). For example, on campus there are signs on doors including office, teachers’ lounge, posted bulletins, announcements, schedules, labels on equipment and materials. In other words, all these teacher-made or commercial print and student-created print make classrooms a print-rich environment (Tao & Robinson, 2005). By encouraging students to actively use the environmental print in the literacy development activities, teachers could facilitate students’ construction of meaningful speech-print connections both for first language and second language students (Enright & McCloskey, 1988).

What is mentioned above is mostly about how EP is used and how it works in the native-language environment. In the EFL learning environment, the lack of target language input is common. Compared with the first language, the foreign language program does not exist in the environment filled with public written information in the target language (Curtain & Pesola, 1994). However, repetition is a key factor in

language learning. Very few students can memorize a word or a structure after being exposed to it once or twice (Fourgeaud-Cornuejols, 1990). Teachers should try to provide students with a rich literacy input environment. Environmental print in the target language is an essential element of designing and setting up the foreign language classroom (Fortin, 2008). By the use of posters, bulletin boards, displays, passwords, language ladders, signs, calendars, and so on and on, teachers could make the target language print exist in the classroom and make it available for students (Curtain & Pesola, 1994). In other words, learners who have opportunities to see and read the target language repeatedly could better enhance their literacy development.

Environmental print is a good source for children's early literacy development. In Desuggestopedia (Suggestopedia), Georgi Lozanov also suggested teachers present as many language inputs as possible through peripheral materials, such as wall posters. He believes that children can acquire those inputs as much as they can. Some researchers asserted that children could learn things incidentally from the environment (Marsick & Watkins, 1990; Rieber, 1990). Indeed, children are influenced by the hidden curriculum unconsciously (Huang, 1990). Huang (1990) mentioned that the design of school buildings, decoration on campus and the print appears in the environment are the so-called hidden curriculum. It has great influence on children who spend most of their time at school. The bilingual environment in the school is also a kind of environmental print. The more time learners immerse in this environment, the more easily they will be affected. Language learners may acquire more knowledge when they are exposed to the target language environment longer.

However, there is no guarantee that children in a literate society will become readers (Assink, 1994). Tao and Robison (2005) pointed out teachers' significant role in directing students' attention to the print and producing the print-rich learning

environment for students. Researchers suggested that adopting environmental print as a supplementary material for language learning would be a good way to enhance children's confidence in recognizing words (Assink, 1994; Enright & McCloskey, 1988; Tao & Robison, 2005). Making active use of print materials in classroom will alert students to the power of print and facilitate their literacy growth (Enright & McCloskey, 1988; Tao & Robinson, 2005). Environmental print which is meaningful and authentic to learners catches students' attention and motivates them to study it. Teachers' assistance and instructions are necessary in promoting the effectiveness of environmental print in language learning.

Learners could learn more if more target language is easily accessible. Environmental print is inexpensive and accessible material for learners. In the native language learning field, especially in the early-childhood learning stage, lots of studies mentioned about this, and various experiments have been done to prove the effectiveness of the EP instructions (Aldridge et al., 1995; Curtain & Pesola, 1994; Daniel et al., 2001; Hall, 1987; Kuby, 1994; Kuby et al., 1996; Manning 2004; Teberosky, 1986; Westwood, 2004). Most of the studies approve that the EP instruction worked and enhanced children's literacy and learning interests (Curtain & Pesola, 1994; Daniel et al., 2001; Hiebert & Raphael, 1998; Kuby & Aldridge, 1997; Marsh & Hallet, 1999; Neuman & Roskos, 1992, 1993; Neuman, 1999; Tao & Robins, 2005).

Almost every elementary school has EP on campus. In an EFL language learning field, there are theories proposing the effectiveness of EP instructions. However, few investigations have been conducted to prove the effectiveness of EP instructions. In fact, most EFL teachers in Taiwan make lots efforts to provide EP in English for students. However, there are few studies, if any, done to investigate the effectiveness of environmental print on learners.

Learner Autonomy

In EFL learning environment, especially in elementary schools, it appears that teachers do their best to post as many English materials as possible, including posters, environmental print, and books. Many teachers believe such materials are for autonomous learning. However, do students surrounded in such a learning environment spontaneously learn from those materials without teachers' instruction? By reviewing theory of learner autonomy, teachers' role is delineated.

Learner autonomy in language learning. Holec's (1981) project report to the Council of Europe was viewed as a key document on autonomy in language learning. He defined autonomy as "the ability to take charge of one's own learning" (Holec, 1981, p.3). Little (1991) stated autonomy as a capacity which enables individuals to determine their goals, define the content and process of their own learning. Benson (1997) further mentioned that autonomous learners are obliged to take charge of their own learning. Learners must become aware of their role as learners (Usuki, 2002). In the field of foreign language learning and teaching, learner autonomy is defined as learners who are both willing and able to take responsibility when learning language, including setting their own goals and choosing didactic materials, and process (Holec, 1981; Schalkwijk, Esch, Elsen & Setz, 2004). Only when children are interested in and willing to learn the target language will learning behaviors occur. Littlewood (1996) stated two components which make up autonomy in language learning: ability and willingness. In other words, autonomous learners would have knowledge and skills to make appropriate choices and have enough motivation and confidence to take responsibility of learning. All humans have the capacity to develop autonomy; however, that capacity might be different for everyone (Crabbe, 1996). Hence, teachers have to work with individual potential.

Teachers' role in autonomous language learning. Does autonomous learning mean teachers are no longer needed in students' learning process? Usuki (2002) stated learner autonomy is a matter of learners' internal attitudes, and teachers' attitude toward students might hold the key to learner autonomy. In order to develop learner autonomy, teachers should give students more freedom in choosing materials and activities, adapt the learning process to students' preferred learning styles and encourage more collaborative learning in order to develop learner autonomy (Esch & Elsen, 2004). It does not mean teachers' instruction and intervention should be banned in autonomous learning environment (Esch, 1996). There has been a tendency to marginalize, or even exclude teachers from the learning process and view this as the best method for self-directed learning (Voller, 1997). However, this is a misunderstanding of learner autonomy. In fact, teachers play an important role in developing autonomous language learning and help to train learners gain necessary skills to become autonomous learners.

In autonomous language learning, there is a change of teacher's role. Scholars described teachers as facilitators, helpers, counselors, advisers and resources to students in autonomous language learning (Benson & Voller, 1997; Benson, 2001; Usuki, 2002; Voller, 1997). Teachers transform into other roles as instructors, supervisors, and coaches to foster learner autonomy (Schalkwijk et al., 2004). Also in foreign language learning, teachers even become conversation partners to communicate with students in the foreign language meaningfully. Researchers indicated that while teachers move away from more directional roles, their role as facilitators, guides, and coaches is crucial to students' learning (Short, Kaufman, Kaser, Kahn & Crawford, 1999; Maloch, 2005). The change of teachers' role from a directed and authoritative role to a coach, a supervisor, an adviser, a facilitator, a

conversation partner assists students in acquiring the necessary skills of autonomous language learning.

In order to assist students in acquiring the necessary skills of autonomous language learning, teachers have to cultivate students' ability to choose the appropriate material by themselves. When students have questions, teachers serve as an adviser to offer them advice. It is also important for teachers to guide and prepare their students with the skill of learning and strategies for solving problems.

Researchers have indicated that "in autonomous language learning, teachers will have to pay more attention to learning strategies and to improving the learners' approaches to learning tasks" (Schalkwijk et al., 2004, p.181). Usuki (2002) mentioned that the teacher needs to give appropriate information and advice to learners. In a word, to facilitate autonomous language learning, teachers should try to equip students with learning management skills, metalinguistic and metacognitive awareness, and attitudes (Broady & Kenning, 1996).

In an autonomy-focused classroom, learners are encouraged to reflect on their learning experiences. They learn both the target language and the learning process itself (Nunan, 1996). As educators, we should teach and cultivate students learning skills and ability to learn by themselves instead of stuffing them with the content of textbooks. None of the textbooks contain enough knowledge and information. Instead, teachers can equip students with necessary skills to become autonomous learners. An autonomous learner knows how to plan and design his own learning project to achieve his goal.

With the remarkable advances in communication technology, computer and internet, and the trend of globalization, the availability of foreign language resources, especially English, increases. Despite the richness of resources for learning English in

their daily life environment, many learners still did not know which is useful material for language learning (Ryan, 1997). Hence, teachers have to guide students to be aware of the resources in daily life and to instruct students to use those resources.

Environmental print mentioned in this study is one of the resources for language learning. Teachers hope students would pay attention to those posters and learn more about the target language. Nevertheless, does every student notice the existence of environmental print on campus? How do students look upon environmental print on campus? Under the context of native language learning, studies on the effectiveness of environmental print showed that it still needs teachers' and adults' assistance and intervention towards language learning (Daniel et al., 2001; Hamner, 2002; Hiebert & Raphael, 1998; Kassow, 2006; Kuby & Aldridge 1997; Maloch, 2005; Manning, 2004; Morrow, 1989; Neuman & Roskos, 1993; Prior & Gerard, 2004; Roskos & Neuman, 2002). Researchers suggested that both exposures to EP and collaborative interactions from more capable adults are important factors in learning environmental print (Neuman & Roskos, 1993). In other words, environmental print learning resulted from interaction with adults who followed children's natural curiosity and allowed children to direct their own learning experience (Kassow, 2006). Teachers play a key role to guide students to acquire language knowledge from EP. If teachers did not take any measure to function those environmental print posters on campus, it might be insignificant to post EP on campus.

The above examples of EP studies in L1 have suggested that learners still need teachers' guidance and assistance to make successful autonomous language learning possible though surrounded by rich language learning materials and resources. Under the context of foreign language learning, what influence do the use of EP and teachers' roles have on learners? Studies have prescribed teachers' roles as facilitators,

guidances, counselors, and coaches in autonomous foreign language learning (Benson, 2001; Cheng, 2007; Usuki, 2002; Ryan, 1997; Schalkwijk et al., 2004). Schalkwijk et al. (2004) also described teachers as conversation partners with students to practice communication in the foreign language. However, few studies showed the effect of teachers' role in the use of EP in foreign language learning. Does EP help to increase students' interest in foreign language learning? Without teachers' instruction and guidance, could students become autonomous learners in foreign language learning? Further investigations would be needed to explore the answers.

Benson (2001) mentioned "Out-of-class language learning is a new area of study of great importance to the theory and practice of autonomy."(p.203). Related research discusses about "what learners do outside the classroom" and "how their classroom learning fits into their broader orientations towards language and language learning" (Benson, 2001, p.203). In the situation of autonomous learning, teachers still play an important role in helping autonomous learners moving towards their goal. In the language classroom, teachers are facilitators. They have to create a classroom climate conducive to language learning and provide opportunities for students to use and practice the language and to reflect on language use and language learning (Richards, 2005).

In an EFL learning environment, to empower students to make effective use of the potential language-learning materials in their daily life is an important issue, "especially when their need for the target language seems rather remote to them and they thus have relatively low immediate motivation to learn"(Ryan, 1997, p.215). School bilingual environment may give students more opportunities and access to target language. Both the materials selecting and autonomous learning take place out of the classroom. As a language teacher, besides instruction of language, helping

students acquire the ability of autonomous learning is significant as well.

Conclusion

In this chapter, the brain-based/compatible learning and its principles in designing leaning environment have been reviewed. Literacy-rich environment and environmental print were also discussed. In L1, environmental print is a readily available and supplementary material in language learning. Studies on the effectiveness and use of EP were delineated. Researchers have found that both exposure to EP and meaningful interactions with adults facilitate students' native language learning. In the final part of literature review, teachers' role in autonomous language learning was delineated.

However, little literature focuses on the effectiveness of EP to EFL learners. Although there are theories mentioned the effectiveness of EP in EFL learning environment, little studies have been done to investigate and prove this.

With the trend of globalization, EP in English seems to appear around people's life in an EFL country such as Taiwan. In recent years, public authorities have invited government agencies and non-government organizations to create an English living environment in Taiwan. There are more bilingual signs in parks, transportation, schools, etc. However, there is little research or evaluation done to investigate the effectiveness of this bilingual environment, especially on children's foreign language learning. As EP exists in nearly every elementary school, it is important to have a clear idea about the effectiveness and functions of EP and to make sure it is worth making more efforts to put EP in the classroom or on campus. Thus, the purpose of the present study is to investigate the effectiveness of elementary school's environmental print (ESEP).