

Chapter 2

Literature Review

Provided as a background to the current research, this literature review has several focuses. First, the Grade 1-9 Curriculum Guidelines are discussed because the principles and learning objectives of the domestic curriculum reform are closely related to the instructional innovation and the features of PBL with IT, and then the literatures on the PBL take the majority of the chapter. Finally the relationship of PBL and EFL teaching and learning with IT is synthesized.

2.1 The Reform of the Grade 1-9 Curriculum

2.1.1 The Grade 1-9 Curriculum Guidelines

A large-scale basic curriculum reform since 2001, known as Grade 1-9 Curriculum, has overwhelmingly and profoundly changed the basic structure of the public education here in Taiwan. The Ministry of Education initiated curricular and instructional reforms in elementary and junior high school education in keeping with the 21st century and the global trends of educational reform (MOE, 1998, 2004, 2006a). It revised the curriculum structure from subjects to learning areas and provided better integration between and among them. The learning areas were Language Arts, Mathematics, Science and Technology, Social Studies, Health and Physical Education, Arts and Humanities, and Integrative Activities. The terms of them meant the contents of learning, not the titles of subjects. In addition, six major issues, Gender Education, Environmental Education, Information Technology Education, Human Rights Education, Home Economics Education, and Career Development Education, were infused into the teaching of each learning area. Each learning area aimed to develop students' core competence in:

1. self-understanding and exploration of potentials
2. appreciation, representation, and creativity
3. career planning and lifelong learning
4. expression, communication, and sharing
5. respect, care and team work
6. cultural learning and international understanding
7. planning, organizing and putting plans into practice
8. utilization of technology and information
9. active exploration and study
10. independent thinking and problem solving

(Cited in MOE, 2004)

Teachers in each learning area were abided by the curricular integration with the six major issues and were expected to adopt team teaching, if it is needed, to foster the core competences of students'. Under the general guidelines, each learning area had specific curriculum rationale and Competence Indicators of its own.

2.1.2 English Education in Language Arts

For the purpose of fostering national development and international relationship, providing quality English education and information technology have become the premier policy in Taiwan (Executive Yuan, 2005). The goals for English learning in the Grade 1-9 Curriculum emphasized natural and joyful language learning environment in order to motivate and cultivate students' interests and communicative ability. Various, practical and interesting materials and activities enriched students' learning experience rather than teachers' mechanical instruction were adopted to enrich knowledge in language. To abide by the core competence in Grade 1-9 Curriculum Guidelines, 114 competence indicators (or benchmarks) were designed to

define students' implements of English learning (MOE, 2006a). They focused on listening, speaking, reading and writing of languages, developing basic communicating competences, cultivating learning interests and methods, and understanding of culture and social customs. The guidelines encouraged teachers to integrate multiple sources of materials, teaching aids, computer and multimedia to achieve the goals (MOE, 2006a, 2006b).

The guidelines suggested the instructional resource or tools, but EFL teachers in Taiwan, especially in junior high school, accustomed to teaching English with a focus on the language components almost without linkage to other subjects or issues. English was also independent in the language learning area under the curriculum reform. Encountering the educational reform with IT issues and interdisciplinary integrations, the professional discipline EFL teachers took in the past lags far behind the overwhelming trends of educational innovation (Chao, 2004, 2006). How to capture the rationale of the integration or the crucial issues in the curriculum guidelines and to fulfill the innovation in the classroom settings need to be concerned in-depth and pragmatically (Huang et al., 2004).

2.1.3 The Backwash

Because of the policy that IT education was infused into each learning area, in-service teachers, except for ones with IT professional backgrounds, were required to take computer literacy training and testing (MOE, 2001). Research these years has showed that teachers' attitudes toward the policy turned from negative to positive side, but teachers were still unaware of application of IT for instructions in language classroom; this was true even with junior teachers with IT backgrounds (Chang, 2003; Chao, 2004; Chiang, 2002; Chiu, 2002; Lin, 2002; Wu, 2002; Yeh, 2002). The studies also suggested that teachers anticipated demonstration or in-service training of

practical instruction. However, few solutions actually filled the gap between the concern and the practice, especially in the domain of English teaching and learning (Huang et al., 2004). Meanwhile, English is still an independent subject in basic public education. How English teachers integrate different learning areas into the English course remains a challenge. Little literature concerned about the prerequisite of pedagogy of IT infusion and English integrating curriculum (Huang et al., 2004).

The researcher conducted a qualitative study in order to continue the unachieved elements of the former research, revealing the challenge, the process of problem-solving and the implement of IT in English teaching. With the description of the two cases, who worked on project-based telecommunication activities for EFL instruction and learning, the researcher intended to disclose the potentials of the instructional innovation of EFL and to understand how it was possible to integrate many learning areas.

2.2 Project-based Learning

2.2.1 Introduction and Background

Project-Based Learning is a learning strategy engaging learners in learning activities. The constructive instruction provided learners the opportunity to experience inquiries of meaningful topics rather than using stiff teaching plans to direct learners to a learning target or learning outcomes (Harris & Katz, 2001). It spouted from the architectural and engineering education movement in Italy during the late 16th century (Knoll, 1997). Knoll outlined the history of project method into five periods: (A) the beginning of project work at architectural schools in Europe from 1590 to 1765, (B) project learning as a regular teaching method and its transplantation to America from 1765 to 1880, (C) working on projects in manual training and in general public schools from 1880 to 1915, (D) redefinition of the project method and

its transplantation from America back to Europe from 1915 to 1965, and (E) rediscovery of the project idea and the third wave of its international dissemination from 1965 till now (Knoll, 1997). William Heard Kilpatrick (1871-1965), professor at a teacher's college, pioneered to push the idea of projects providing purposeful activities in the early 1900s (Solomon, 2003; Wolk, 1994). It began to be called "Project Based Learning" (PBL, in short) as a method of teaching and learning about 28 years ago (Thomas et al., 1999).

For a century, educators such as John Dewey (1859-1952) have advocated the benefits of experiential, hands-on, learner-centered learning (Thomas et al., 1999). In the early 1900s, John Dewey, the most influential philosopher on education in the twentieth century, appealed "learning by doing." He believed that the fundamental principle of the school was a form of community life (Dewey, 1897). That is, the school was as a mode of social life. Children's learning should not be separated too abruptly to a number of special studies or subjects, like language, math, history, without relation to the social life. The discipline of the school should proceed from the life of the school as a whole, not be conveyed directly from the teacher. The teacher was engaged in the formation of the proper social life, not in the training of individuals. The adult entered into the child's life, and observed the child's interests so as to seek for the material which would work most readily and fruitfully (Dewey, 1897). Dewey's philosophical pragmatism, concern with interaction, reflection and experience, and interest in community had highly influenced many of the writers, such as Coyle, Kolb, Lindeman and Rogers, who had influenced the development of informal education over the same period. His philosophy influenced educators, like Boud, Kolb and Schön, to advocate the benefits of experiential, hands-on, student-oriented or learner-centered learning (Ryan, 1995).

This conception also coincided with constructivism and constructionism.

Constructivism supported that learners constructed knowledge by interaction with the environment and in different ways. Through inquiry learning activities such as investigations or conversations, learners acquired new knowledge based on their current knowledge (Beach & Myers, 2001; Perkins, 1991; Vygotsky, 1978, 1986).

Constructionists (Papert & Harel, 1991) further developed the notion of learners' construction of knowledge by emphasizing that learners learned best when they were producing an artifact, such as a play, a report, a chart or a painting, by collaborating with others and reflecting upon (Kafai & Resnick, 1996). Kafai & Resnick also emphasized that the learning projects had to absorb the learners in learning and that the productions had to be meaningful to the learners. Thus more and more teachers have engaged learners in the theme-based curriculum design, challenging projects and interdisciplinary activities to enrich and extend the curriculum (Moursund, 1999).

2.2.2 Definition and Features

So far, project-based learning has not had a universally acceptable or exact definition of itself (Markham et al., 2003). The diversity of its features also resulted in the variety of PBL research and development activities. Table 2.1 on the next page shows definitions taken from some educational institutions or literature.

Table 2.1

Reference Sources on the Definition of PBL

<u>Reference Sources</u>	<u>Definition</u>
Buck Institute for Education (BIE)	<ol style="list-style-type: none"> 1. Authors: Markham, Larmer, & Ravitz (2003, p.4) 2. Definition: Standards-focused PBL is “a systematic teaching method that engages students in learning knowledge and skills through an extended inquiry process structured around complex, authentic questions and carefully designed products and tasks.”
Grant (2002)	<ol style="list-style-type: none"> 1. Author: M. Grant 2. Definition: Project-based learning is centered on the learner and affords learners the opportunity for in-depth investigations of worthy topics. The learners are more autonomous as they construct personally-meaningful artifacts that are representations of their learning.
Laffey, Tupper, Musser, & Wedman (1998, pp.73-86)	<ol style="list-style-type: none"> 1. Authors: Laffey, Tupper, Musser, & Wedman 2. Definition: Project-based learning “is a form of contextual instruction that places great emphasis on student problem-finding and framing, and which is often carried out over extended periods of time.” and it “centered on relatively long-term, problem focused, meaningful units of instruction that integrate concepts from a number of disciplines or fields of study.”
Newell (2003, p. 5)	<ol style="list-style-type: none"> 1. Author: R. J. Newell 2. Definition: Project-based learning emphasizes depth of understanding over content coverage; comprehension of concepts and principles rather than knowledge of facts; development of complex problem-solving skills rather than learning building block skills in isolation. Project-based learning emphasizes student interest rather than following a fixed curriculum; emphasizes a broad, interdisciplinary focus rather than a narrow, discipline-based focus; uses direct, primary, or original sources rather than texts, lectures and secondary sources; emphasizes data and materials developed by students rather than by teachers.

San Mateo County Office of Education	<ol style="list-style-type: none"> 1. Author: <i>San Mateo County Office of Education</i>, n.d. 2. Definition: Project-based learning is a model for classroom activity that shifts away from the classroom practices of short, isolated, teacher-centered lessons and instead emphasizes learning activities that are long-term, interdisciplinary, student-centered, and integrated with real world issues and practices
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Warschauer, Shetzer, & Meloni (2000, p. 68)	<ol style="list-style-type: none"> 1. Authors: M. Warschauer, H. Shetzer, & C. Meloni 2. Definition: Project-based learning involves the organization of a series of learning activities on a particular theme or topic of relevance to the interests and daily lives of students.
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The researcher concludes the features of PBL by synthesizing the definitions above that PBL is an organized instruction to involve learners in real life inquiry with a learning theme for the holistic development of knowledge, skills and affection.

Thomas (2000) did a research review on PBL from the various definitions and concludes five criteria of PBL as centrality, driving question, constructive investigations, autonomy, and realism (p. 3-4). The meanings of them were:

1. *Centrality*: Projects in PBL are the centers, not the suburbs of the curriculum. They are teaching strategy and students acquire the central concepts or the discipline through the projects.
2. *Driving question*: The questions or problems students encounter, or the activities, artifacts, and presentations students are devoted to must be conducted for the intellectual purpose around the central concepts and principles of a discipline (Blumenfeld et al., 1991).
3. *Constructive investigations*: An investigation is a guided process to the learning goal through inquiry, knowledge building, and resolution. It could be design, decision-making, problem-finding, problem-solving, discovery, or

model-building processes. After the investigation through the transformation and construction of knowledge, new understandings or new skills become on the part of students (Bereiter & Scardamalia, 2000).

4. *Autonomy*: PBL projects basically are not led, planed or wrapped by teachers.

The outcomes of them are not predetermined. They allow a great deal of student autonomy, choice, unsupervised work time, and responsibility.

5. *Realism*: Projects give them a feeling of realistic or authenticity to students.

The characteristics of them may contain the topic, the tasks, the role play, the context, the collaborators working with students on the project, the products, the audience for students' presentation, or the judgments on the products or performances. PBL allies real-life challenges with authentic (not simulated) problems or questions and the solutions in the end have the potential to be implemented.

In addition, PBL has also been considered a method of teaching as well as a way of learning. Moursund (1999) elicited significance and elements of PBL for the teachers and students.

For the teachers, a typical PBL project lasted for a long time. It probably surpassed couples of weeks or a semester, even a whole year. PBL, therefore, was conceived as the unity of learning. On the ground of instruction, the significance to the teachers was that PBL had explicit educational objectives founded on Constructionism, the contents were authentic, the learning was real for the purpose, the assessment was conducted through the process and the roles of teachers were assistants or councilors instead of direct instructors. Undertaking the project, teachers also became learners (Moursund, 1999).

For the students, PBL was different from the traditional way of learning that they were poured the knowledge by the teachers. On the ground of learning, the

significance to the learners was that PBL emphasized learner-centered and internal motivation of learners, who were inspired through division of labor and collaboration of accomplishment, urged actively to work on the tasks instead of passive learning about the knowledge, and allowed constantly to revise or refine the artifacts or presentation. The learners were required to complete the tasks or products in the end, which were challengeable and were potential to reach higher skills or capabilities for learners (Moursund, 1999).

With the prosperity of technology, PBL was enriched with multimedia and information from the Internet (Moursund, 1999). Students used computer tools, software or hardware, to undertake tasks such as composing essays, graphics or multimedia, analyzing numerical data, and surfing and collecting information. Online applications, synchronous or asynchronous, such as email, forums, weblog, net meeting and others, fostered communication and collaboration to the world outside the classroom. The hyperlink served the access to the websites or webpage of the institutions or the remote substantial locations for information search. Students could further understand various global phenomena (Campbell, 2003; Solomon, 2003). Their works could also be published on the Web for browse by real audience worldwide, not just a single teacher, class, or school. Technology also enhanced multiple assessment or evaluation. Some programs, for example, could track and record students' performance so as to assist teachers' classroom management and provided parents with the tracks of children's learning (Solomon, 2003). Technology was counted among the cognitive tools for PBL (Blumenfeld et al., 1991; Jonassen, 2000), and computer literacy has been taken into account as part of potential capability to enhance PBL or other learning or teaching approaches (Moursund, 1999; Warschauer, 1995). Telecommunication activities with cross-cultural understanding via email to the world has been also a sort of theme-based learning experience

(Wilkenson & Sherman, 1996).

The features of PBL with IT appeared alluring and innovative out of the traditional lecture and study. We should, however, pay attention to the instructional process involved so that students had the potentials to perform as the benefits mentioned above. The following sections turn to the instructional construction and the language learning issues when undertaking PBL with technology.

2.3 The Rationale About Project-based Learning

PBL presented an involving instructional method scaffolding learners to construct their knowledge actively and independently. PBL also had strong supporting theories for successful implementation (Diehl, Grobe, Lopez, & Cabral, 1999; Grant, 2002; Thomas, 2000). This section first reviews the main rationale relative to PBL and then addresses the issues with language learning.

2.3.1 Constructionism

Constructionism was a theory for both learning and instruction (Papert, 1993). It recently has become one of the influential philosophies for its emphasis on inquiry and learner-centered instructional and cognitive process. The constructivist learning theories was historically proceeded by Dewey, Piaget, Bruner, Vygotsky and among others. Constructivist learning affirmed that knowledge was constructed in the mind of the learner, not merely delivered from the teacher. Papert distinguished constructivism from constructionism:

The word with the v [Note: constructivism] expresses the theory that knowledge is built by the learner, not supplied by the teacher. The word with the n [Note: constructionism] expresses the further idea that happens especially felicitously when the learner is engaged in the construction of

something external or at least sharable (Papert & Harel, 1991, p.3).

Although learners could potentially construct and present knowledge without producing external artifacts, the processes of construction apparently generated remarks that learners produced through social interaction with others. A classroom based on constructionism had to have many elements to promote a learner-centered learning environment. In the environment, teachers acted as facilitators to guide students on the way of learning. Learners were assigned tasks to implement the target capability within the instructional goals (Grant, 2002). Several scholars, practitioners, and educational foundations had proposed the instructional process or elements that encompassed PBL by constructionism, for example, *Buck Institute for Education* and *Contextual Learning Resources* (Han & Bhattacharya, 2001; Thomas et al., 1999; the websites of the institutes are showed in Appendix A). Han and Bhattacharya (2001) outlined the elements typically for educational settings and classrooms as followed:

1. Presentation of rubrics which define expectations
2. Dialogue on interpretation of the assignment
3. Exploration of multiple strategies for tackling the assignment
4. Inquiry/learning discussion
5. Presentation of work
6. Projects which include revision and development of an idea
7. Learner collaboration
8. Learners working with professionals in the outside world
9. Learners engaging in “genuine,” authentic real-world tasks

(Cited in Han & Bhattacharya, 2001)

As to PBL with IT, Grant (2002) took *WebQuests* for example to present an instructional model highlighted the elements:

1. an introduction to “set the stage” or anchor the activity
2. a task, guiding question or driving question
3. a process or investigation that results in the creation of one or more sharable artifacts
4. resources, such as subject-matter experts, textbooks and hypertext links
5. scaffolding, such as teacher conferences to help learners assess their progress, computer-based questioning and project templates
6. collaborations, including teams, peer reviews and external content specialists
7. opportunities for reflection and transfer, such as classroom debriefing sessions, journal entries and extension activities

(Cited in Grant, 2002, p.1)

With the elements addressed above, PBL was not the kind of games or curriculum for fun as some teachers or educational administrators misunderstood. Teachers should elaborate on the instruction with the concerns of scaffolding and context before undertaking PBL in the classroom (Chao, 2006). PBL in the classroom also related to the real life and social interaction. Followed on the constructionism, situated learning theory with the concepts of social interaction is discussed next section.

2.3.2 Situated Learning Theory

Situated learning occupied a part of characteristics of PBL and was a general theory of knowledge acquisition. The theory asserted that learning occurred with the authentic activity, context and culture. Apart from Piaget's notion that learning was embedded within the minds of individuals, Vygotsky, the social constructivist, stressed that the social interaction developed knowledge cognition and language acquisition. Vygotsky argued, “Learning is a necessary and universal aspect of the

process of developing culturally organized, specifically human psychological function” (1978, p. 90) and

Every function in the child’s cultural development appears twice: first, on the social level, and later, on the individual level; first, between people (interpsychological) and then inside the child (intrapsychological). This applies equally to voluntary attention, to logical memory, and to the formation of concepts. All the higher functions originate as actual relationships between individuals (p. 57).

In other words, social learning is prior to development of cognition. Lave, an anthropologist, and Wenger, a computer scientist, defined learning as situated in communities of practice, not within the minds of individuals (Lave & Wenger, 1991). Social interaction was an imperative element of situated learning. Most classroom learning activities involved knowledge that was abstract and out of context. Lave insisted that learners became more active and involved when they immersed in the community of practice which encompassed certain objectives and behaviors to be acquired. Moreover, situated learning was usually authentic rather than deliberate (Lave & Wenger, 1991).

The concept of situated learning also has been applied in the context of technology learning activities for schools. Holistically, situated learning with technology presented a number of important characteristics. Many researchers conceived that knowledge was best acquired in learning environments in which the following characteristics were rooted:

1. Provide authentic context that reflect the way the knowledge will be used in real-life
2. Provide authentic activities
3. Provide access to expert performances and the modeling of processes

4. Provide multiple roles and perspectives
5. Support collaborative construction of knowledge
6. Provide coaching and scaffolding at critical times
7. Promote reflection to enable abstractions to be formed
8. Promote articulation to enable tacit knowledge to be made explicit
9. Provide for integrated assessment of learning within the tasks

(Cited in Herrington & Oliver, 1995, p. 237)

Furthermore, PBL usually proceeded with group work, telecommunication activities or collaborative learning. Scholars like Collins, Brown, Duguid, Newman and Holum valued students, immersed in the real life learning or social interaction, collaboratively achieved learning tasks. Collins, Brown and Newman (1989) emphasized the idea of “cognitive apprenticeship” that it supported learning by enabling students to acquire, develop and use cognitive tools in authentic activities. The learning outside and inside school developed through collaborative social interaction and the social construction of knowledge. Collins, Brown, and Holum (1991), exemplified that Dewey set up a situated learning environment in his experimental school by students’ designing and building a clubhouse, addressed situated learning in cognitive apprenticeship for several purposes:

1. to understand the purposes or uses of the knowledge they are learning
2. to learn by actively using knowledge rather than passively receiving it
3. to learn the different conditions under which their knowledge can be applied
4. to induce the abstraction of knowledge through learning in multiple contexts

Coincided with the situated learning theory, Blumenfeld et al. (1991) described the benefits of project-based learning as the elements to enhance most students’ interests and values, including variety, challenge, choice, collaboration and closure by answering real questions, and to support students’ self-fulfillment. They learned best

when involved in meaningful, real-life, collaborative, problem-solving environments. When the learners interacted with peers, they also constructed their knowledge and adjusted their behavior. On the other hand, when the learners undertook the inquiry activities with the communities outside the school, they also had the chance to “judge” the learning target through their observation and then to respond their reflections or actions. PBL, by the social learning within the group or outside the school, also disciplines learners’ critical thinking (Newell, 2003). With the learning from and applying to the real life, PBL usually was esteemed as a holistic learning with human concern.

Therefore, the teachers had to design the projects with a set of teaching strategies which guided students through in-depth studies of real world topics, and they could effectively scaffold content and activities to amplify the skills and capabilities of students. The structured but flexible framework with features guided the teaching-learning interaction. When teachers implemented the project successfully, students could be highly motivated, felt actively involved in their own learning, and produced work of a high quality (Chard, 1998; Cheng, 2004; Moursund, 1999).

Education reform in the past decade in Taiwan has demanded “to involve all aspects of daily life that correspond to the students’ mental and physical development” (MOE, 1998, 2004). For English teaching and learning, authentic experiences or situations have been emphasized. Some English teachers in Taiwan have applied PBL to EFL instruction (Cheng, 2004; Hu, 2003; Tzeng, 2002). The next section involves EFL instruction in PBL.

2.4 Project-based Learning for EFL Instruction

Project-based instruction has been a strategy for whole language learning that could socialize students into language and literacy skills with independent learning

ability (Beckett & Slater, 2005). It was introduced to the second language education about thirty years ago to correspond to the notion of learner-centeredness. Since then, PBL has also taken part of popular language and literacy activities at various levels and in various situations (Kobayashi, 2003; Levis & Levis, 2003; Mohan & Beckett, 2003). Richards and Rodgers (2001) announced the coming “post-methods era” that “new ‘breakthroughs’ continued to be announced from time to time, such as Task-based instruction, Neurolinguistic Programming, and Multiple Intelligences, and these attract varying levels of support” (p. 244). Synthesizing the features of PBL discussed above, PBL for EFL/ESL instruction encompassed all or part of the characteristics of the new waves. However, it was true that the critical research on the EFL/ESL pedagogies of the new breakthroughs was needed (Richards & Rodgers, 2001), and there was few research on project-based instruction in general and much fewer on ESL students’ perceptions of it (Beckett, 2005; Thomas, 2000).

An EFL/ESL classroom instruction reflected a teacher’s beliefs and principles. Bailey (1996) addressed the principles of PBL instruction for EFL/ESL learners as follows:

1. Engage all learners in the lesson.
2. Make learners, and not the teacher, the focus of the lesson.
3. Provide maximum opportunities for student participation.
4. Develop learner responsibility.
5. Be tolerant of learners’ mistakes.
6. Develop learners’ confidence.
7. Teach learning strategies.
8. Respond to learners’ difficulties and build on them.
9. Use a maximum amount of student-to-student activities.
10. Promote cooperation among learners.

11. Practice both accuracy and fluency.
12. Address learners' needs and interests.

(Cited in Richards & Rodgers, 2001, p. 251)

The principles Bailey addressed above apparently overlapped the concerns of language teaching. From the angle of language use, we communicate and interact with the environment and others with language, conveying various topics and thoughts beyond the language itself. Learning English or other languages are the same. Thus, we can conclude the components of a language from the characteristics of communicative view as follows:

1. Language is a system for the expression of meaning.
2. The primary function of language is to allow interaction and communication.
3. The structure of language reflects its functional and communicative uses.
4. The primary units of language are not merely its grammatical and structural features, but categories of functional and communicative meaning as exemplified in discourse.

(Cited in Richards & Rodgers, 2001, p. 161)

With the components above, levels of objectives in a communicative approach Piepho (1981, p.8) itemized are the following:

1. an integrative and content level (language as a means of expression)
2. a linguistic and instrumental level (language as a semiotic system and an object of learning)
3. an affective level of interpersonal relationships and conduct (language as a means of expressing values and judgments about oneself and others)
4. a level of individual learning needs (remedial learning based on error analysis)
5. a general educational level of extra-linguistic goals (language learning within

the school curriculum)

(Cited in Richards & Rodgers, 2001, p. 162)

Therefore, Richards & Rodgers synthesized the practitioners of communicative language teaching and find that instructional materials, instead of real life interaction, had the dominating role of foster communicative language use in the classroom interaction. The current materials used in communicative language teaching were labeled as text-based materials, task-based materials, and realia. Numerous textbooks were designed with themes and tasks to deliver communicative approach, but some of them were written around largely structural syllabus. Text-based materials took a crucial part of the language instruction. With the textbooks, tasks inside were prepared to support the communicative language learning activities by various of games and role plays, usually in the form of pair students. There were still others working for drills and practice in interactional patterns. Reality or “authentic” materials in the classroom were advocated in communicative language teaching, but most were the language-based realia like visual sources for tasks or activities (2001).

Natural approach argued that foreign/second language acquisition should be in a “natural” way, paralleling first language development in children, and claimed that we could correct ourselves from the learned knowledge when we communicated (the mirror hypothesis, Krashen & Terrell, 1983). Therefore, the instructional materials came from the world of reality instead of the textbooks. In order to fit with the needs and interests of the learners, content selection should interest students and foster a friendly, relaxed atmosphere (the affective filter hypothesis, Krashen & Terrell, 1983), and should offer large exposure to vocabulary for readiness for basic communication. Comprehensible and meaningful practice activities were prior to the production of perfect accuracy.

EFL/ESL learning also encompassed different learning styles for individual

personalities and experiences (Lightbown & Spada, 2006; Oxford, 1990). In the 90s, Dr. Howard Gardner elicited Multiple Intelligences (MI in short, 1983, 1993 and 1995) that human cognitive competence was pluralistic, not unitary. The theory aroused the learner-centered instruction to meet students' diverse needs or interests, and recommended broader intellectual development for individual learner. Gardner reminded that the individual should be encouraged to use their preferred intelligences in learning, and the instruction and assessment should be carry out by multiple dimensions (Gardner, 1993). Educators should be acquainted with the diversity of the learners in their learning styles and potentials. Gardner also emphasized the cultural background of multiple intelligences. Each culture was apt to emphasize particular intelligences (Gardner, 1993).

According the new trend of language learning, "the field of language teaching has no monopoly over theories of teaching and learning" (Richards & Rodgers, 2001). Research in neuroscience and psychology has extended cognitive and behavioral models of learning. They supported that knowledge, thinking, doing, and the contexts for learning were tied together. Learning was partly a social activity; it took place within the context of culture, community, and past experiences. Learners not only responded by given information, but they also digested and used what they knew to explore, discuss, produce, and create. At last, they could carry out solutions. The process of learning was a series of life learning (Thomas et al., 1999). Language learning and use also concerned about the integrative ability development. The features of PBL had overlaps with the rationale of the language teaching and learning, even diverse learning styles. Therefore, PBL has much connection and support to the language learning.

2.5 Project-based Learning for EFL Instruction with IT

Recently, technology had been used to enhance instruction, especially the Internet. With the developing technology, Gardner also suggested the learning with a computer might engage multiple intelligences (1983, p 390). Technology, with its alluring benefits, was used as a cognitive tool and the computer was applied into PBL for students to extend their capabilities (Blumenfeld et al., 1991; Brown & Campione, 1996). Information sources such as reading materials, encyclopedias, and dictionaries were easily available on the Internet or on computer disks and CD-ROMs.

Information technologies also catalyzed project-based learning in science, language arts, fine arts, social studies, and other curriculum areas, “because the computer provides access to data and information, expands interaction and collaboration with others via networks, promotes laboratory investigation, and emulates tools experts use to produce artifacts” (Krajcik, Blumenfeld, Marx, & Soloway, 1994, pp. 488-489). With the well organized instruction, PBL with IT made the knowledge construction process explicit, and made learners aware of the process (Brown & Campione, 1996).

In recent years, IT has been applied in many areas of language education (Bush & Terry, 1997; Campbell, 2003; Chappelle, 2001; Warschauer, 1996; Warschauer & Healey, 1998). Researchers on Computer-assisted language learning (CALL) have identified some enhancement of language learning with computer technology, including phonetics, grammar, vocabulary, reading, writing, translation, literature appreciation, listening comprehension, and testing. The computer offered EFL teachers the opportunity to make better use of time and expertise to teach these language skills efficiently. However, such a new technology probably brings EFL educators inspiration but presented a big challenge on technical acquisition and practical application in instruction (Chang, 2003; Huang, 2002; Hubbard & Levy, 2006). PBL enhanced CALL for overlapped features between the two. The researcher

briefly introduced the development of CALL and its eight conditions to concern in CALL environment so that we could understand why both learning had the potential in integrative instruction.

2.5.1 Brief Introduction of the Development of CALL

CALL has been developed for more than 30 years. Warschauer (1996) divided its development into three stages: behavioristic CALL, communicative CALL, and integrative CALL. The stages of CALL development closely corresponded with the development of language teaching methods and approaches seen in the following:

1. Behavioristic CALL: beginning of the 1970s

This stage corresponds to Audio-lingual Approach for EFL/ESL learning, where television or computer program with drill-and-practice software served to exercise the learning of discrete language skills. The interaction was an individual and isolated activity of a learner with the learning material, text, television or the computer program.

2. Communicative CALL: beginning of the 1980s

This stage corresponds to Communicative Approach for EFL/ESL learning, where computers had been improved to serve for groups of two to three learners, and the communicative function of language learning was taken into account in the learning materials. The activity was designed for social interaction.

3. Integrative CALL: beginning in the 1990s.

This stage corresponds to the development of the Internet and multimedia, where telecommunication activities through different types of applications, such as email, were involved with integrative language learning skills and collaborative activity, and went on to establish a rapport between the message sender and receiver, and the context of authentic situation.

Since behavioristic CALL regarded repeated practice-drill activities as the primary language learning elements while Communicative CALL flaunted “interactive” communicative activities with the computer, there lacked student-centered or student-driven learning which was pivotal to language learning. In 1990, Kenning and Kenning argued that CALL itself contributed “marginal” elements of language learning instead of the core requirements of language education (Kenning & Kenning, 1990, p. 90). “Indeed, without careful consideration and crafting, machines and software tend to be used poorly or not at all” (Chiquito et al., 1997, p.48).

The reflection led to integrative CALL where computers were generally used with other media tools, “serving the creation of an enriched workplace for accessing resources and using language constructively” (Barson & Debski, 1996, p. 52). Research in various classrooms and institutes has shown evidence that computers had the most teaching and learning efficiency when they were one of the components of a new teaching method instead of being the center of the focus.

During the 1990s the Internet use became widespread and has now become an indispensable part of our daily lives. Learning on the Net provided an alternative method of language learning. It allowed learners to connect with other people, share in the pursuit of a common learning goal, and share interests and experiences in an interactive way (Oxford, 1990). Synchronous communication tools, such as *MSN Instant Messenger* and on-line chat rooms, and asynchronous ones, such as email, have expanded the learning fields outside classrooms and provided learning opportunities to master the target language with authentic materials or foreigners. Email, especially, has become a major method of communication and has the potential to replace the telephone and even face-to-face communication around the world (Warschauer & Meskill, 2000). Now, Weblog/Blog offers an even easier way

for a user to create their online writing journal or discussion forums. Students can use their blogs to keep an online journal, submit their coursework, create portfolios, or discuss or respond on the comment area with the writers and other readers. More and more educators applied the user-friendly appliance into the classroom for instruction, language education or class management (Campbell, 2003). Weblog with videos, so called Vlog, also appeals to educators to apply in their classrooms. With these applications, communicating with foreigners or completing tasks that required little computing literacy potentially supported EFL/ESL worldwide (Campbell, 2003). Including Internet-based or Web-based activities as part of the overall class curriculum has contributed more to improving the holistic language ability. Therefore, several conditions must be met in a CALL environment for designing telecommunication activities that fosters holistic learning.

2.5.2 Eight Conditions to Concern for the CALL Environment

Researchers engaged in CALL environment or pedagogy addressed what it was required to enhance integrative language abilities through IT. Egbert, Chao and Hanson-Smith (1999) concluded the following eight conditions optimal for the CALL environment:

1. Learners have opportunities to interact and negotiate meaning.
2. Learners interact in the target language with an authentic audience.
3. Learners are involved in authentic tasks.
4. Learners are exposed to and encouraged to produce varied and creative language.
5. Learners have enough time and feedback.
6. Learners are guided to attend mindfully to the learning process.
7. Learners work in an atmosphere with an ideal stress/anxiety level.

8. Learner autonomy is supported.

(Cited in Egbert, Chao, & Hanson-Smith, 1999, pp. 3-6)

These eight conditions overlapped with the features of PBL, and also corresponded to the current trends in language learning. Moreover, the conditions also met Grade 1-9 Curriculum Guidelines. Therefore, PBL with IT or CALL for telecommunication activities had pedagogical implications in the curriculum reform in Taiwan. Projects designed using multimedia, such as the famous *WebQuest* hosted by the Educational Technology Department at San Diego State University or *The Challenge 2000 Multimedia Project* by San Mateo County Office of Education (see Appendix A), have been well constructed and organized, and appealed to innovative teachers of different subjects, including EFL/ESL learning, worldwide (Chao, 2006).

When students were engaged in substantial projects, they gained experiences from inquiry activities in real life and the virtual situation through the Internet with telecommunication activities so as to develop or fulfill their learning goals. They could also confront the real problems to solve, take the tasks or challenge or create their own artifacts as the assignment. Project work on the Internet led to more complicated products, such as an oral presentation or an on-line publication with texts, video or audio media, and graphics. Email exchanges attached with the features of media usually accompanied project learning or topic research for an authentic cross-cultural learning experience (Warschauer, 1995; Warschauer & Meskill, 2000).

There was rich literature found on PBL in other academic subjects, such as *Taiwan Schoolnet* (Lin, 2004; Shyu, 2002). However, very little literature was found on well-designed EFL project-based instruction in Taiwan. On the other hand, still other teachers looked at the negative side of the instruction. Time-consuming and laborious process has discouraged the teachers (Chu, 2004; Hu, 2003). It was also granted to be another burden that teachers had to make more efforts to push students

to do the projects, especially lower-leveled learners (Hu, 2003). Some teachers failed because they were unaware of the theory and did not provide sufficient scaffolds of the instruction (Chao, 2006; Hsieh, 2003). EFL teachers in Taiwan needs more concern on the framework of elaborating PBL with IT for EFL instruction in the classroom (Chao, 2006; Tzeng, 2002). It was the researcher's motivation and objective to find out the obstacles encountered to carry out PBL with IT, multimedia or telecommunication activities for EFL instruction, especially in the junior high school.

2.6 Gap in the Literature

EFL teaching is much more complicated than ESL because the former is not in the target language environment. A possible solution to meet EFL teaching needs is through implementing PBL through the Internet, which has become increasingly popular over the years. First, very little research is found directly investigating the role of PBL through IT in language learning. Most of the studies on PBL are conducted in other academic subjects. Hence, more research on this topic should be conducted in an EFL context. Next, although plenty of literature showed the advantages of PBL through IT, a gap is found between its perceived merits and the actual results of applying it in Taiwan's educational context. Even though there are a few cases conducted on language themed PBL through IT in Taiwan, they concluded with unsatisfactory results. Therefore, the researcher is motivated to find out the challenges encountered in the project implement, and follow up on the overall procedure. The researcher aimed to seek answers from conducting qualitative study on two practitioners and their students, and hoped to offer practical solutions and suggestions to bridge the gap between theory and practice.