THE DEVELOPMENT OF AN E-LEARNING COURSE INCORPORATING

SELF-REGULATED LEARNING PROCEDURES INTO A PSI-BASED COURSE

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(ABSTRACT)

This developmental research adopted an adapted Personalized System of Instruction (PSI) structure to design an e-learning course module and a learning procedure, and embedded a self-regulated learning procedure into the PSI course. A set of self-regulated learning tools were developed and applied in this process. Through this PSI-based course, students learned a comparative culture study topic and learned to develop their self-regulated learning skills.

This research also conducted Formative Evaluation. Suggestions from expert review and small group evaluation were used to design and revise this module and learning procedure. Evaluation outcomes from expert review and small group evaluation confirmed that this SRL embedded PSI framework was applicable for this e-learning environment. Implications for future use in both academic and practical areas were discussed.

Keywords: eLearning, PSI, Self-regulated learning

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Glossary

Learning: Jonassen (1991) indicates that learning is about what learners know and how they come to acquire the knowledge. He identifies 3 stages of learning: introductory, advanced and expert. Different theoretical constructs have respective explanations about learning. This dissertation involves two of them: *Behaviorism* supports that learning is viewed as observable performance. It focuses on relationship between stimulus and response, how association between stimulus and response is made, strengthened and maintained. Response followed by reinforcement is more likely occurred again in the future. Learner reacts to environment and takes an active role in learning process. *Constructivism* maintains that learning is a learner to create meaning from personal experiences. Mind filters input from the world to produce its own unique reality. Learners build personal interpretations of the world based on individual experiences and interactions. The context in which learning occurs is a critical part of the process. (Ertmer & Newby, 1993).

Behaviorism: This construct concerns about both learners and an environment in a learning process. The most critical factor is the arrangement of stimuli and consequences within the environment. In Behaviorism, "forgetting" occurs when learners have not responded to stimuli over time. Learning happens and knowledge is transferred through the process of generalization. In instructional design practice, Behaviorism emphasizes observable and measurable outcomes such as behavioral objectives, task analysis, and criterion referenced testing; using pre-assessment to conduct learner analysis; mastering early steps before progressing to more complex levels, and applying reinforcement such as tangible rewards and informative feedback.

Behaviorists use cues, shaping and practice to ensure a strong stimuli and response connection (Ertmer & Newby, 1993).

Constructivism: This construct emphasizes a learner's creating knowledge though personal experiences. The major interaction between a learner and an environment is what creates knowledge. Current situations are interpreted based on an entire history of previous interactions occurred in a real context. In Constructivism, "memory" is always "under construction" as a cumulative history of interactions; it is not a context-independent process. Constructivist approaches work best as learners acquire more knowledge and they therefore gain the conceptual power to deal with complex and ill-structured domains. In instructional design practice, constructivism emphasizes these areas such as the identification of contexts in which skills will be learned and subsequently applied, learner control, capability to manipulate information, learners' needs for information to be presented in a variety of ways, assessment focusing on transfer of knowledge and skills (Ertmer & Newby, 1993).

PSI: Personalized System of Instruction, also known as the Keller Plan, designed by Fred Keller. It includes five basic features: 1) the go-at-your-own pace feature; 2) the unit-perfection requirement for advancement; 3) the use of lectures and demonstrations as vehicles of motivation; 4) the related stress upon the written word in teacher-student communication; and 5) the use of proctors for feedback (Keller, 1968). PSI has proven extremely effective in producing significant improvement in students' achievement (Burton, Moore, & Magliaro, 1996; Keller, 1968, 1974a).

SRL: Self-regulated learning, is a self-directive of learners' transforming their mental abilities into academic skills, by which learners control their thinking, take some purposed actions or strategies to learn, and motivate themselves. The major features of this process are learners'

self-observation, self-evaluation and self-reaction (Zimmerman, 1990, 2002). Researchers (e.g. Schunk, 1984, 1986, 1988; Schunk & Zimmerman, 1994, 1998; Winne, 1995; Zimmerman, 1989b; Zimmerman & Schunk, 2001) summarize major characteristics of self-regulated students including: (1) they have clear recognition on their strengths and weakness; (2) they can proactively select and apply metacognitive and motivational strategies to improve their go-oriented abilities; (3) they are able to apply volitional strategies to concentrate on a task; and (4) they can select and even create advantageous learning environments for themselves and know how to appropriately seek help from peers and teachers when necessary. Self-regulated learners proactively and initiatively engage in their learning activities and are self-motivated and self-directive to achieve desired goals.

Distance Learning: A widely accepted definition was proposed by Simonson, Smaldino, Albright, and Zvacek (2000, p.7): distance learning is "institution-based, formal education where the learning group is separated geographically, and where interactive telecommunications systems are used to connect learners, resources, and instructors". Chute (2003, p.298) defined distance learning as both a technology system and a process that connects learners with distributed learning resources, and he believed that a complete distance learning system must integrate planning, delivery, and management of learning by using information technologies and telecommunication services. Resources, technologies, and distance learners are the key features in a complete distance learning concept.

E-Learning: This concept is connected with distance learning, however, is often defined more narrowly. E-learning is inclusive and synonymous to all computer-related applications, tools and processes (Necat, 2007); it therefore is more related to "technologies" or "resources" themselves. Another researcher defined e-learning as a strategy for connecting learners with distributed

knowledge resources and believed that "the integration of distance learning and knowledge management is e-learning" (Chute, 2003, p.297). Based on these definitions, relevant theoretical and empirical research and their application of e-learning should be one part of the distance learning field.

Computer-based Instruction: Widely called CBI, refers to an instructional computer program, also known as courseware. It is a concept overlapping with a number of names as computer-assisted instruction (CAI), computer-based education (CBE), or instructional applications of computers (IAC) etc (Alessi, et al., 1991, p.6). CBI could be incorporated into an e-learning system as one part/stage/feature of this e-learning product, or it could be a separate learning product or learning strategy. CBI is experiencing a shift from the courseware design to involving more factors regarding hypermedia, open-ended learning environments and e-learning. More than "learning with computer" (Alessie, et al., 1991, p.3), contemporary CBI research focuses on seeking diverse ways to take best use of computer's advantage to enhance learning. Traditionally, texts and still pictures are the major body of CBI; today, multimedia technologies and a variety of new learning approaches derived from constructivist theories are playing an increasing crucial role in CBI.

Web-Based Instruction: Also called WBI, using the Web as a medium to deliver instruction to learners remotely. It often involves hypermedia and applies wide resources and tools of the Internet to support learning, such as synchronous/asynchronous communication tools, remote access tools, search engines to access multiple databases, script programming language, and authoring programs (Khan, 1998; Ritchie & Hoffman, 1997). In a WBI, online resources can be accessed unlimitedly; learners are given more learner-control over their learning processes on how to learn, deciding their learning sequences, and individually using broad resources.

Online Learning: A quite broad term. There are a lot of terms used for online learning, such as e-learning, virtual learning, computer-based learning, web-based learning, distance learning, distributed learning, and so on (Ally, 2008). All these terms are widely used as interchangeable concepts sometimes; however, they still have subtly different focuses. Online learning is more related to the instructional contents delivered on a computer, and these contents could be on the Internet, or other media, such as a courseware developed by authoring tools, a virtual lab, or just simply installed on a computer hard disk (Herrington, Oliver, & Reeves, 2003).

Learner-Centered Instruction: This is an approach placing the emphasis on the person who is doing the learning. Learner-centered is an instructional strategy not a specific method. There are many different instructional methods can use this approach. Five areas of instructional practice need to be changed to achieve learner-centered instruction, they are: 1)The functions of the content: building a strong knowledge foundation and developing learning skills and learner self-awareness; 2) The roles of the instructor: focus on student learning. Instructors are facilitative rather than didactic; 3) The responsibility for learning: shifts from the instructor to the students. The instructor creates learning environments that motivate students to take responsibility for their own learning; 4) The processes and purposes of assessment: shift from only assigning grades to involving more constructive feedback to improve learning. Assessment is one part of the learning process; and 5) The balance of power: the instructor shares some decisions about the course with the students. The instructor and the students collaborate on course policies and procedures (Weimer, 2002).

Novice Learner: In this dissertation, "novice learner" is considered as a learner who is new to a field, activity, or a procedure. Therefore, at the beginning stage of the learning procedure

designed in this e-learning environment, novice learners are asked to follow a regulated learning procedure and an instructor's guidance.

Experienced Learner: In this dissertation, "experienced learner" is defined as a learner who has had some knowledge and experiences of the learning procedure. In this learning module in the dissertation, an experienced learner has to have taken the first stage of the course (total 3 stages at least) under an instructor's supervision, and then continue their learning with gradually decreasing support from an instructor.

Expert Learner: This word was not used in this designed module. A novice who only takes some dozens of hours of the e-learning course was not considered as an expert learner. However, it is relevant to the other two words: novice learner and experienced learner. They were used in this dissertation, and this research's hope was to develop novice learners' self-regulated learning skills and eventually help them become expert learners. Bransford, Brown, and Cocking (1999) define "expert learner" as people who have developed particular ways to think and reason effectively. They identified key characteristics of experts' knowledge and their potential implications in learning: 1) Experts notice features and meaningful patterns of information that are not noticed by novices; 2) Experts have acquired a great deal of content knowledge that is organized, and their organization of information reflects a deep understanding of the subject matter; 3) Experts' knowledge cannot be reduced to sets of isolated facts or propositions but, instead, reflects contexts of applicability, i.e., it is "conditionalized;" 4) Experts are able to retrieve important aspects of their knowledge with little attentional effort; 5) Though experts know their disciplines thoroughly, this does not guarantee that they are able to instruct others about the topic; and 6) Experts have varying levels of flexibility in their approaches to new situations (Bransford, et. al., 1999, chapter 2, p.4). Other than novice learner and experienced

learner, an expert learner is one who has a high degree of proficiency in skill, experiences and knowledge in a particular subject and a procedure. As Bransford, et. al. indicate, an expert learner is proud of his/her achievements and also realizes that there is still much more to learn and improve. That is what this project expected to reach: students will continue developing their self-regulated skills with the knowledge learned from this course and eventually become self-regulated learners through more practice.

CHAPTER ONE: Introduction

The Research Problem

Research on the Personalized System of Instruction (PSI, also known as the Keller Plan) designed by Fred Keller has proven that this system, PSI, including pre-specified objectives and self-paced modules, can be extremely effective in producing significant improvement in students' achievement (Burton, Moore, & Magliaro, 1996; Keller, 1968, 1974a).

Sherman (1992) summarizes formal characteristics of the PSI: mastery, specified objectives, self-pacing, small-step sequenced materials, repeated testing, immediate feedback, credit for success rather than penalty for errors, proctors, and lectures for motivation. On the other hand, along with a record of the pace of students' learning, for researchers, the PSI leaves behind large amount of data related to students' learning processes. Therefore, the PSI is also viewed as a good research tool (Sherman, 1992).

Although the PSI method has been challenged since the 1980s, recent research findings and new technologies used in instructional design are creating new opportunities for the PSI; possibly making it an effective instructional method in more settings, including distance education (e.g. Chase, 2006; Ironsmith & Eppler, 2007; Pear & Crone-Todd, 1999). PSI is regarded as an effectively instructional design framework in distance education. This dissertation applied a PSI method to structure an e-learning product and to study the implementation of that application.

Studies Addressing the Problem

A large number of studies confirm that the PSI shares many features with some new technologies, such as computer-based and/or web-based instruction, and offer support for the

notion that the PSI can apply these new technologies effectively in distance education. Some of

the studies focused on the PSI's component analysis and investigated effectively applying and

adapting the PSI features to meet various learning needs in computer-based or web-based

learning settings (Brothen & Wambach, 1998; Chase & Houmanfar, 2009; Worland, 1998).

Some researchers have applied the PSI's self-paced feature to improve learners' self-efficacy and

have constructed learning environments to encourage learners to play an active role in their own

learning (Brothen & Wambach, 2000).

Deficiencies in the Studies

While recent studies have applied the PSI methodologies in different instructional settings,

most of them have failed to explore the PSI's features in a constructivist learning environment.

Even though the two constructs apparently have foci and features in common, the studies pay

little attention to the possible combination of the PSI method and constructivist perspectives.

Especially with the new technologies recently used in instructional design, the combination

obviously is becoming feasible.

A highly structured PSI classroom organizes instructional materials by individual units. In a

constructivist learning environment, learners can control their own lesson pace and sequence,

and further, adjust their control on lesson pace and sequence based on effective feedback

(Bauersfeld, 1995; Rhodes & Bellamy, 1999). Such constructivist perspectives provide further

theoretical support to the application of Keller's model in practical settings. They both

concentrate on a learner-centered learning environment.

Significance of the Study for Audiences

The PSI's emergence and development originates from a few behaviorists' disagreement with 1950s- 60s instructional methods (Keller, 1968). Although the construct of self-regulated learning (SRL) predates constructivist pedagogy, it is developed and has been greatly aided by the rise of the constructivist orientations. On the surface it would appear that the two constructs do not fit with each other naturally. This research, however, explored the possibility of combining the advantages of the two frameworks (PSI and SRL), and finally applied this PSI structured framework to develop SRL skills.

The purpose of developmental research, also called "design and development research", is to test theory, to validate practice, and to empirically establish new procedures, techniques, and tools based on a methodical analysis of specific cases. It seeks to create usable knowledge grounded in data systematically derived from practice. Major methods and strategies applied in developmental research include qualitative, quantitative, and mixed-method approaches (Richey & Klein, 2008, p.748).

According to Richey and Klein (2007, p.7-13), there are two large categories of research: product and tool research and model research. The two types of research have different foci. Research on "product and tool design and development" is conducted during the design and development of a product or tool. Research on "design and development models" pertains to studies of the development, validation, and use of design and development models.

In this product and tool design and development study, the goal was to design a learning procedure for developing novice learners' self-regulative skills via a PSI-based learning product based on an American perspective of Chinese history. This product could be used in a specific

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cultural setting and is developed to depict this learning procedure. This dissertation depicts the attempt to perform instructional design, development, and evaluation activities, as well as studying the process at the same time. This is one of the two basic forms of developmental research described by Richey, Klein, and Nelson (2004), and will be illustrated in the following sections.

In addition to this developmental research study framework, two theoretical orientations also support this study: Keller's (1968) PSI and Zimmerman's (1989a) Social Cognitive Model.

Purpose of this Study

The purpose of this developmental research study is to develop an e-learning product that can be used in a specific cultural setting. The design of this distance learning product was based on the two theoretical orientations of self-regulation theory in the form of Zimmerman's (1989a) Social Cognitive Model and Keller's (1968) PSI, particularly focusing on their application in distance education. It attempted to contribute to the field of IDT through using the PSI to structure this course and then embedding a set of procedures developing self-regulatory skills into this model for novice learners. The "self-paced" feature was a core function connecting the two theoretical frameworks.

Therefore, the overall research hypothesis is: on the basis of some similar understanding of learning processes between the PSI and SRL, there is value in embedding a self-regulated learning procedure into a PSI course. This hypothesis suggests two questions:

1. Does this designed project follow PSI principles?

2. Is it possible to combine a SRL procedure into a PSI-based course?

First, a PSI model for structuring this distance course was adapted; second, in addition to the learning objectives on this course subject (the comparative culture study), novice learners' self-regulative skills were targeted through this PSI-based course; some tools designed based on self-regulatory process were applied to develop this learning procedure. This research expected to connect the recent research findings on the PSI and SRL, and to apply them to design the comparison study course.

Several academic and non-academic books by Dr. John Fairbank, including "The United States and China," and "China: A New History," became major resources for the course subject matter.

There are six major components to this dissertation:

1. Introduction to the Developmental Research (in Chapter Two).

2. Introduction to the PSI's theoretical background, research findings, and application of this model including the theories supporting applying PSI online (in Chapter Two).

3. Introduction to the major theoretical development of self-regulation (in Chapter Two).

4. Specific design tools based on PSI and self-regulation theory and practice (in Chapter Three).

5. The product review and analysis based expert review's feedback on procedure of Developmental Research, on basic framework of PSI, and on major applied principles of Self-Regulated Learning through Proof of Concept Evaluation. The entire evaluation includes Formative Evaluation and Small Group Evaluation (in Chapter Four).

6. Discussion (in Chapter Five).

CHAPTER TWO: The Theoretical Background

Developmental Research

A review of developmental research will include: its history and definition, its challenges and criticisms, and its application in practice. The specific procedure of developmental research and the procedure used in this dissertation will be introduced in the "Methodology" section.

History and Definition of Developmental Research

Developmental research stems from scholars' efforts of seeking useful solutions for a variety of design and development problems in education. When they face a number of uncertainties in complex tasks and dynamic contexts, they often find that traditional methods, focusing on descriptive knowledge, cannot provide effective help. Worldwide educational revolutions including both large-scale policies and small-scale system components become another drive for developmental research. In these revolutionary processes, diverse needs, ill-specified problems, unpredictable effectiveness of interventions, and a broad variety of contexts require better theoretical articulation, more empirical evidence, and wider application in development practices. Further, researchers have had a long-standing desire to enhance the relevance of educational research. The interactions between research and practice are effective channels for researchers to create more usable knowledge and enhance design principles (van den Akker, 1999).

Richey (1994) emphasizes the fact that developmental research primarily emerges with the developing process of a specialized domain in educational research, the instructional technology (IT) field. This is a convergence of media research and instructional psychology.

Developmental research is founded on scholars' efforts to strengthen the fundamental knowledge base of the instructional design and technology (IDT) field (Richey & Klein, 2007).

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According to Reiser (2001a, 2001b), there are five categories of activities and two core practices in IT or IDT. First, IDT is a process encompassing analysis, design, development, implementation and evaluation. Second, it employs two overlapping practices: instructional media for instructional purpose and systematic instructional design procedures, to solve instructional problems. IDT is a field which demands a blend of theory and practice. Richey (1994, p.714) originally defines developmental research as "systematic studies of designing, developing and evaluating instructional programs, processes and products that must meet criteria of internal consistency and effectiveness." She distinctly differentiates between "performing a process" and "studying components of a process." She further identifies the way developmental research varies from case studies, evaluation reports, retrospective analysis, or typical experimental research. Developmental research not only addresses formative evaluation, but also summative and confirmative evaluation. From this comprehensive description, it can be found that developmental research emerges and develops in order to solve problems in the field of instructional technology research. As a result, the history of developmental research parallels the history and growth of instructional technology. They share similar processes and methods for solving the same problems.

In the history of IDT, the development of media and design procedures is an important part (Reiser, 2002). Richey (2004) claims that the developmental research emerged and developed under the background of instructional systems design movement starting in 1960s, upon which research focus shifted from the media to the process of systematic product design, development, and evaluation. For example, in 1960s, under federal financial support, research-based product and program development had become firmly established as part of the scientific movement in education (Richey, 1994). In this process, scholars started using empirical measurement and

experimentation to explain product effectiveness. These efforts changed the development of product to research with empirical results and constructed new theory for future problems (Wittrock, 1967), and formed embryo of developmental research.

<center>Challenges and Criticisms of the Developmental Research Method</center>

Since its birth, the developmental research method has found advocates and critics, especially in regard to its empirical findings. Developmental research is theory-driven design research. Researchers design new tools based on theory, and then test and improve these tools through empirical work. Finally, they provide basic understanding of theory and build a new theory framework. The tools, educational interventions and research findings generated in these methods aimed at creating usable knowledge are tested in empirical work and therefore are objective and valid. However, the qualities of tools and interventions, comparing to findings in controlled labs or experimentations, are under question. Some researchers doubt whether research findings and recommendations are reliable since the entire process of developmental research involves a variety of data sources but eventually connects with certain intended or unintended outcomes. The complex whole, arising in such compromised settings may not fully consider all possible factors (Barab & Kirshner, 2001). Researchers who advocate developmental research argue that dealing with many interrelated elements at the same time strengthens educational research in complex and dynamic contexts, especially during a long trajectory of research. In a developmental research setting, lack of rigor and control in methodology promotes reaction to unforeseen events, influences or forces. The researchers are also susceptible to changes in external policies or organizational conditions (van den Akker, 1999).

Another major challenge for researchers to sustain close collaborations with practitioners over a long time. Many researchers face tension in the division of roles between developers and

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researchers. Van den Akker (1999) describes the situation as controversy between "subjective and imaginative involvement" and "objective and critical distance" (p.11). But negotiation and compromise are not necessarily negative. Consider the founders of the United States two hundred years ago. They fought fiercely for their own state's benefits throughout the Federal Convention between big states and small states, between southern states and northern states, and between Free states and Slave states. Finally a balance was found and history has proven its value. Similarly, van den Akker (1999) believes that controversy is a productive force that contributes to balanced solutions. He further suggests that, in a developmental research, practitioners' perspectives could dominate the early stages and then shift to a stronger voice of researchers at the later stages.

Applying research findings in appropriate settings is another key concern for researchers who intend to contribute usable knowledge through their research. Developmental researchers develop their claims and arguments on the basis of a real world problem; their studies therefore have relevant conditions in complex educational settings. Acquisition of such knowledge should be accompanied by strict adherence to carefully developed methodologies and rules. When van den Akker (1999) addresses this problem for developmental research, he recommends that detailed description of the process-in-context should be provided to other researchers and practitioners to apply and provide generalization of the findings. A clear theoretical articulation in specific implementation context helps others better estimate in what respects and to what extent transfer from the reported situation to their own is plausible.

Application of Developmental Research in Practice

There are numerous projects employing the research on product and tool design and development. Common cases include needs assessment, formative and summative evaluations

conducted for existing or developing educational programs etc. For example, O'Quin, Kinsey and Beery's (1987) evaluation of a microcomputer training workshop for college personnel was conducted in a specific context and offered improvement suggestions for this workshop. This is a developmental research project focusing on product use. Hirumi, Savenye, and Allen (1994) presented a product or program development example. In an interactive videodisc museum exhibit report, they provide detail analysis, design, development, implementation and evaluation on this program. Research on design and development models, dealing with model development, model use, and model validation - especially focusing on models and processes themselves rather than their demonstration - is identified as a separate method with respect to "research on model" defined by van den Akker, et al (2008). Developing and summarizing work regarding ADDIE models is one sample of model development (Gustafson & Branch, 2002). Richey's (2005) two models of instructional design, "conceptual model" and "procedural model", is another example. The issues relating to research on the use of models, including the gap between how experts use models and how novices use models and so on, are one major studying aspect in use of model (Rowland, 1992). Richey (2005) recommends five approaches to validate a model (internal procedures of expert review, usability documentation, component investigation, and external procedural of field evaluation and controlled testing). An instructional design model developed by Tracey and Richey (2007) that incorporates the theory and practice of multiple intelligences is also a typical model development project (or type 2 study of developmental research). Plass and Salisbury (2002) described and evaluated a design model for a Web-based knowledge management system. This research applies traditional IDT models to design non-instructional solutions and summarizes generic knowledge for related settings. All these efforts try to keep

educational research from isolating studies and construct extensive collaborations between researchers, practitioners, designers and policymakers.

The Developmental Research method is particularly effective and efficient in Technology Enhanced Learning Environments (TELEs). Richey, et al. (2004) point out that computer technologies have changed our society and learning environments; today more and more training and educational programs are conducted via computers. The development of computer-based tools is becoming a trend in instructional technology field. New research methods, intended to create usable knowledge, are playing a significant role in the research and design of technology-enhanced learning environments.

Technology enhanced learning environments (TELEs) are technology-based learning and instructional systems, using computer, networks, remote database and video applications etc to stimulate classroom activities by prompting high levels of interaction among students and teachers, and by involving students in simulated activities or data-gathering. In addition to teachers' facilitation, students learning in technology enhanced learning environments can acquire help from various learning support tools and rich technological resources (Shapiro & Roskos, 1995).

Wang and Hannafin (2005) identify several aspects of design-based research and developmental research consisting with TELEs design theories, such as iterative design process, and collaboration with participants, and highlight three implications of the research for TELEs, including encouraging continuous synergy, refining TELE theory, and encouraging socially responsible and responsive inquiry and practice. These policies offer direct implications for new research methods in TELEs.

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According to Wang, et al (2005), the design of TELEs has faced the problem of lacking clearly defined and enacted theoretical frameworks applicable to practice for a long time. This is not a new criticism for educational research. In the instructional technology field, design is a core concern. Goel and Pirolli (1988, p.7) identify a few features that explain why design work often encounters ill-defined and non-specific problems, such as the initial uncertainty of the problem statement, limited or delayed feedback from the naturalistic contexts during problem-solving activities, "no right or wrong answers, only better and worse ones" and so on. Wang et al believe that research methods assuming synergy between practice and research in everyday settings are a good solution to extend both grounded design practices in general and TELE design theories in particular, and conduct intertwined processes of designing learning environments and developing learning theories. Synergy makes design become evidence-based and efficiently react to any tangible change in TELEs. Ill-defined and poorly-specific problems are no longer an obstacle of researchers and designers when they work with design-based research or developmental research.

Wang, et al (2005) further claim that design-based research and developmental research provide effective channels for researchers to refine TELE theories. TELE researchers look for three types of theories identified by Edelson (2002): domain theories, design frameworks, and design methodologies. Context-specific knowledge regarding product or program effectiveness, impact, design procedures, etc. can definitely satisfy TELE researchers' pursuits of domain theories; likewise, generic findings and conclusions that design researchers seek and inform to broader contexts help TELE researchers shape and modify design frameworks and methodologies. These new or changed theories are believed more reliable than what are conducted through traditional experimental studies in manipulated labs, because they are

developed and tested in naturalistic contexts. Furthermore, more design researchers commit to defining the boundaries of applicable contexts of generic findings as one part their research conclusions. Design researchers' efforts are contributing to building a better and flexible TELE research environment.

The opinion of Wang et al (2005) with respect to social responsibilities in TELEs is not a new argument. Reeves (2000) discussed social responsibilities in educational technology and identified three major problems in research, including lack of building applied models, poor research quality, and failure in research syntheses to provide guidance. He recommended that researchers should have intensive collaborations with practitioners, and that theory research should address real world problem with social responsibilities. He emphasized solutions of practical problems, and the development of design principles to inform future decisions under theoretical framework and practical test. His criticism reflects an echo to the blooming design research trend among responsible scholars, who contend that theories should be generated to influence practice, and implies that design research has become a protagonist of educational research in our era. With more and more advanced technologies being applied in the design of TELEs, design research closely bridges researchers and practitioners to react to educational reforms, to fill the gap between technical potentials and demands of TELEs, to address local problem as well as global principles. Conducted in naturalistic contexts and emphasizing extensive and intensive collaboration between researchers and practitioners, design research actively encourages socially responsible and responsive inquiry and practice.

Developmental research also greatly improves the tangible design work of TELEs both for designer and researchers through advancing knowledge-based design and offering more design tools and frameworks.

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Traditionally, the content acquisition mainly depends on task analysis and information processing analysis to describe the nature of the learning tasks and to identify and sequence the content of the instruction. Recent research focusing on the feasibility of creating and maintaining reusable, scalable, and distributed content is providing new opportunities for content acquisition, management and delivery (Richey, et al., 2004). For example, Zielinski (2000) describes learning objects and likens them to "software help screens". His research concerns the way learning objects can go wrong after they have been stored in a database of reusable information chunks. He identifies four major categories of misuse or misunderstanding for future research on use and reuse of learning objects to support performance. Merrill (1999) departs from his work of Component Display Theory to refine the new Instructional Transaction Theory in a way that provides more precise directions on making automated instructional design a possibility. These research studies are not to test a hypothesis in a manipulated venue; rather they are directed toward real-world problems and the creation of usable tools and techniques for a broader context.

New research methods are providing additional insight into instructional design and are producing effective tools and theory frameworks for instructional designers.Merrill and Thompson's (1999) IDXelerator is a learning-oriented instructional development tool, which assumes that different instructional goals require different types of instructional presentation and practice. It provides four built-in lessons, a text module and a slide-show function. These plug-in components can be added to the "authoring menu" and are compatible with many original features. This is a typical mode of research in developmental research. Researchers produce and test their instructional tools, demonstrating the design features intended to change future design procedures. Wild's (2000) research provides a hypermedia performance support tool, the Lesson Planning System (LPS), to aid novice teacher-education students in learning and performing the

complex cognitive task of lesson planning. In addition to investigating the effectiveness of the tool, he also discusses the principles applied in the design and development of the system for future design of other similar systems across a wide range. In this research, the researchers' efforts to reduce the possible negative factors in design-based research or developmental research are clearly seen, as the specific context and application conditions are carefully defined.

On the basis of the analysis above, we contend that the opinion of Wang, et al. (2005), that design research and TELE designs are actually reciprocal and interdependent, is correct. Design research can exert its effect in TELEs to a greater degree. Conversely, new theories, models, interventions and procedures regarding design of TELEs provide additional sources to the development of design research.

When this research method was newly constructed, Richey (1994) forecasted a promising future of developmental research on model construction and theorizing in the IDT field. She stated that because she and her colleague have observed and engaged in studying and employing developmental research for decades, they have developed an overview of trends for fruitful developmental research. First, they believe that research on non-instructional products and tools will expand the definition of developmental research. Performance improvement will become a crucial concern for researchers. Second, research on media and technologies, especially on computer-based instruction including distance learning products and web-based tools, will increase. Third, cognitive science and constructivism will further influence model and process development. Fourth, specific designers and practitioners' characteristics shown in the use of models will attract more researchers' attention (Richey, et al., 2008).

Personalized System of Instruction

The Rise and Fall of Keller's Personalized System of Instruction

In the 1960', Keller and his colleagues (including Sherman, Azzi, Bori, etc.), found that they were dissatisfied with conventional instructional methods. Being well-trained in the behavioral learning theories of the day, they sought to create a system that rewarded students more than it penalized them, promoted mastery of the learning materials and provided more interpersonal communication within the classroom. This effort finally resulted in the establishment of the Personalized System of Instruction (Keller, 1968). It is also called the "Keller Plan" in honor of Keller's significant contribution.

Since Keller (1968) presented his "Goodbye, Teacher…" at various professional conferences, researchers and practitioners' interest in the Personalized System of Instruction (PSI) had dramatically increased. This method was fueled by a good many relevant studies and supportive publications which were backed by the financial support of many research grants. A large number of studies showed that, compared to traditional lecture methods or other appropriate controls using the same reading assignments, students in PSI courses demonstrate better learning performance (Alba & Pennypacker, 1972; Austin & Gilbert, 1973; McMichael & Corey, 1969; Sheppard & MacDermot, 1970). In 1973, the popularity of PSI reached its peak: the Center for Personalized Instruction was established at Georgetown University, and published the PSI Newsletter. The Center also published the Journal of Personalized Instruction which served as an information clearing house, offered workshops on PSI course design, and sponsored national conferences. By 1979 there were close to 3,000 relevant publications (Sherman, 1992).

Some reviews were published in the 1970s, which widely investigated the PSI research and its implementation and found that the PSI method was much superior to traditional lectures. For

example, Taveggia (1976) analyzed the final examination performance of fourteen students and concluded that PSI students had a better performance than those under traditional methods. Kulik (1976) compared the PSI to other methods across a wide range of disciplines including chemistry, economics, history, mathematics, physics, psychology, etc. He found that, in these multiple disciplines, students under PSI methods produced more positive results not only on final examination but also on the students' attitude. Kulik, Kulik, and Cohen's (1979) study confirmed that PSI-based courses were more effective in terms of students' learning performance (despite the aptitude variable), self-satisfaction related to their own learning, and the amount of time students spent studying.

By 1980s, the PSI model had been applied as a "self-examining and self-modifying procedure" (Sherman, 1992, p.60) in almost all levels of education and a variety of disciplines. Kulik, Kulik, and Cohen (1980) concluded that PSI courses had the strongest effect on student achievement. Many contemporary PSI studies were conducted to determine the most efficient ways to train proctors, reduce student procrastination, and determine which elements of PSI were essential for the system to function effectively (Eyre, 2007).

Unfortunately, after the 1980s, PSI had no longer continued the popularity which had been characterized by widespread implementation, proliferating research, and improving methodology – research had greatly declined. By 2006, the number of PSI studies within the recent decades was fewer than 50 (Eyre, 2007; Sherman, 1992).

Sherman (1982a, 1992) and Eyre (2007) summarized some factors contributing to the downfall of PSI. First, some first-line practitioners did not advocate the implementation of PSI in their instructional practice. On one hand, they thought that the independence of PSI threatened

teachers' profession, even though Keller insisted that "the role of the teacher is not lessened under PSI; it has only been given a different form" (Keller, 1982, p.56). They therefore were reluctant to apply PSI in a wider scope. Some teachers might prefer Computer-Based-Instruction (CBI). Since the former was viewed to be less threatening and seen as a supplement; teachers could apply CBI to design some separate exercises and still play the indispensable instructor role themselves. On the other hand, some teachers, who tended to control course content or learning objectives to a higher degree, might not have advocated PSI either (Keller, 1982). Given the fact that the PSI method required more time and effort on the preparation stage, some others might have felt reluctant to apply PSI in their course too (Green, 1982).

Second, even among the community of those teaching PSI courses and encouraging its further development, defining PSI or establishing what constituted a "true" PSI course became a problem. Keller and Sherman (1974, p.78) used this word "SLI" (Something Like It) to refer to the variations of PSI that did not actually include all the designed components. Some courses claimed to be PSI, but they obviously altered certain variables, omitted some components of PSI or the major characteristic of PSI – self-pace. This disagreement made it difficult to assess PSI's effectiveness. Researchers wondered what caused ineffectiveness in these courses: the improper application of PSI or the function of PSI itself? As one of the major advocates and researchers of PSI, Sherman had to confront this dilemma too. He later noted that a rigid definition might limit the PSI audiences, but a broad definition would make PSI so inclusive as to be meaningless (Sherman, 1992). When the Georgetown Center for Personalized Instruction tried to define PSI strictly, they realized, as Sherman had warned, that a rigid definition would lead to the loss of the method's vitality. This rift has existed in PSI research and impacted its development since very beginning.

Third, more objections came from the PSI practitioners. Some of them found that   in addition to developing course materials, training and supervising proctors who could be students previously taking the course, or currently enrolling in the course but mastering a given unit of study, was quite time-consuming and arduous. The general inertia of lecture-based teaching drove them to go back to traditional methods. In a typical PSI course, an instructor's function includes: a) arranging and reviewing unit materials and corresponding study questions in written type; b) designing and revising unit quizzes; and c) overseeing course management tasks including training proctors, preparing and giving weekly lectures, and occasionally arbitrating students' questions about a proctor's grading (Buskist, Cush, & DeGrandpre, 1991, p.220). Obviously, teachers were reluctant to convert their role from a traditional "teacher" or "performer" in front of students to a "course manager" behind students although the latter might alleviate the threat from PSI to their career.

Fourth, educators, researchers and scholars often felt reluctant about commercial promotion. That led the Georgetown Center for Personalized Instruction, which had become self-supporting, to gradually run out of funding. Fewer and fewer funding initiatives supported new research and publications. The number of research articles had dramatically declined. Information about PSI was increasingly difficult to find.

In addition, some weakness from PSI itself may impact its further development. Some researchers, including Keller himself, considered that PSI might not be suitable for those courses that aim at providing students with unique experiences or interactions rather than mastery of course content (Green, 1982; Keller, 1982; Price, 1999).

The New Opportunity for PSI Today

When the PSI method confronted these criticisms and issues, and gradually faded out of instructional design, the computer had actually been creating new opportunities for PSI. Since the 1980s, the dawn of the Internet age has been providing channels and spaces for researchers. New development of PSI started in the 1990s. The features of computers and other new technologies are being combined into PSI procedures enlarging PSI's applied scope effectively.

Jay and George (2002) studied the effect of three types of computer feedback to quizzes in a course based on the PSI method, (a) end-of-test, (b) item-by-item with the option to skip questions during the test, and (c) item-by-item without the option to skip questions during the test. The results indicated that item-by-item, with the option to skip questions, is an effective method to motivate students without sacrificing learning performance. Brothen and Wambach (2003) reported the way that the University of Minnesota applied WebCT to conduct PSI-based psychology and human development courses. They also developed computer-based quizzes to deliver feedback quickly in networked computer classrooms. Computer-Aided PSI courses and PSI-based programs are becoming important trends in current PSI research and implementation. Eyre (2007) discussed two cases on how application of computer and new technologies, particularly Internet, increased the flexibilities of PSI courses. Some new distance education platforms (such as Blackboard and WebCT mentioned above) share similar features with PSI and make PSI courses more efficient and economical. PSI may play a major innovative role in many distance or online education courses in the near future.

The Structured Design Tool: PSI

In his seminal research (Keller, 1968, p.83), Keller described five components of PSI distinguishing this method from conventional teaching procedures, including:

1) The go-at-your-own pace feature

This feature permits a student to move through the course at a speed based on his/her own ability and other conditions. A student can decide his/her learning pace and speed throughout the entire learning process possibly including many learning units. He/She does not have to be held back by other students or forced to go ahead until he/she is ready.

2) The unit-perfection requirement for advancement

The "unit-perfection requirement for advancement" feature is designed to stop students from learning new materials before they demonstrated that they have completely understood and mastered the preceding learning contents.

3) The use of lectures and demonstrations as vehicles of motivation

One of the major pioneers of Behaviorism, Skinner (1938) promoted a shift in educational practices from that of aversive control (such as punishment) to the practice of reinforcement. Aligning with Skinner, Keller (1968) thinks that many contemporary educators improperly apply aversive contingencies to manage students' performance and behavior. Keller believes that aversive contingencies in whatever form do not work as well as reinforcement. With the belief that aversive contingencies are ineffective, Skinner used lectures and special demonstrations to motivate students through a positive reward structure, and emphasized that the vehicles of motivation are not sources of critical information. The PSI method is an application of reinforcement theory. When a student has shown his mastery of a certain unit, a special lecture, a demonstration, or a field trip will be applied to offer positive reinforcement to him/her.

4) The related stress upon the written word in teacher-student communication

The written word is the primary communication means in PSI instruction, including the instructors' feedback to students. Keller was interested in programmed instruction. He originally designed this feature in order to standardize the instructors' work in a PSI course, such as dealing with matters of course logistics, the interpretation of training manuals, the construction of lesson plans and guides, and the evaluation of student progress; but more importantly, this feature closely supports the self-paced component. Students have no limitation on accessing the written materials, therefore they can learn at their own pace rather than following instructors or peers. The connection between this design feature and distance and online education characteristics can be identified clearly. This feature leaves room for future application and development of PSI in new fields after a new technology age arrives.

5) The use of proctors for feedback

Proctors are screened, trained and supervised by instructors in PSI courses. They often are students who have taken this course or demonstrated a necessary level of mastery of certain unit. This feature permits repeated testing, immediate scoring, and direct tutoring. Both verbal and written communications could be provided to student through social functioning.

Research, Criticisms, and Reflection on the Five Components of PSI

Pacing and Procrastination

Of the five PSI components, self-pacing could be the most controversial feature. Some students tend to finish the course at the suggested schedule and before the official deadline, while others may finish very close to that deadline, or not finish at all. The procrastination issue, arising with the self-pacing of PSI, has been cited as a problem by researchers and practitioners from the very beginning (Bufford, 1976; Hess, 1971; Keller, 1968; Sherman, 1972; Szydlik,

1974). Keller (1968) himself realized that procrastination could be an issue when he attempted to apply PSI at the early stage: students may meet all the course requirements in less than required time, but they also may not complete the job within that time.

In researchers' efforts to decrease procrastination, setting instructor deadlines with pacing contingencies became one reasonable strategy. Semb, Conyers, Spencer, and Sosa (1975) conducted an experiment to study the effect of different pacing contingencies. They provided a suggested learning pace to four groups of students with four kinds of pacing contingencies on course withdrawals, the timing of learner quiz-taking throughout the course, performance on exams, and learner evaluations. If students do not reach the suggested deadline, the four groups will receive "no benefits or punishment," "punishment," "reward 1," and "reward 2." All groups of students will receive an "incomplete" if they do not finish the course by the end of this semester, they can finish the course later without any penalty, and drop the course at any time during this semester. The study data indicated that an instructor deadline with penalty is a feasible method for decreasing withdrawals and incompletes. Appropriate punishment and reward can also deal with procrastination effectively. Some other researchers' studies also support this finding (Bufford, 1976; Miller, Weaver, & Semb, 1974; Reiser, 1984; Ross & McBean, 1995).

In addition to instructor deadlines, some researchers allow students to set deadlines for themselves supplementing instructor deadlines. Roberts, Fulton, and Semb (1988), in a self-pace psychology course, designed the two deadline features for students. They evaluated two experimental procedures: one is requiring students to respond to a quiz question assessing compliance with their self-set schedules, the other one requiring students to meet a deadline that they had set for themselves. They finally concluded that the features and procedures enhanced

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pacing rate and schedule compliance. The effectiveness of self-imposed-deadlines is supported by more studies (Lloyd & Zylla, 1981; Roberts & Semb, 1989). When students cannot meet the instructor-deadline, they can discuss with the instructor to set a new deadline. This strategy is proven effective too (Lamwers & Jazwinski, 1989).

However, this comes back to the traditional rift with regard to "what constitutes a 'true' PSI course". Self-pacing is closely connected with learner control. Early learner control researchers had obvious disagreement on research findings of "performance" and "time-on-task". A major issue is indicated in relevant studies: some researchers find that less time generally leads to poor performance or distraction. Self-paced students sometimes skip important instructional events when they are free to navigate the instructional process – that partly explains why they use less time and gain poorer performance (Belland, Taylor, Canelos, Dwyer, & Baker, 1985; Lepper, 1985; Tennyson, 1980).

Some research findings in learner control might shed light on this problem. Romiszowski (1986) identifies four levels of instructional control contents, including curricula, units, lessons, and various learning activities within lessons. He recommends designers focus the last level on how to provide learner control over these micro-instructional events. Some studies suggest the list of learning activities or events in a learner-controlled instruction e.g. learning sequence, the quantity of exercise, the difficulty of practices, and modes of layout (Laurillard, 1987; Steinberg, 1984). Milheim and Martin (1991) identify three types of variables in terms of learner control: control of pacing, control of content, and control of sequence. All of these discussions are within the individual learning activities range. PSI course designers may combine this factor into the learning process when applying the self-pace feature.

Individual learner characteristics is another important variable for locus of control in a distance learning setting (Friend & Cole, 1990; Hannafin & Sullivan, 1996; Lockee, Burton, & Cross, 1999; Williams, 1993). In researchers' efforts to decrease procrastination, instructor deadlines were regarded as an effective method. The degree of this external control (setting instructor deadlines) should be determined by assessing individual differences. An I-E scale (Rotter, 1966) or an adapted I-E scale could be applied in a PSI course to involve the individual difference variable into the self-pace process.

Finally, the discussion on the nature of learning tasks could be a valuable tool to combat procrastination. Ross and Morrison (1989) claim that learners should not be given control of instructional events which can alter the supportive contents of the lesson. Hannafin (1984) states that not all learning tasks can best benefit from learner control. Procedural tasks and verbatim learning are more suitable for applying program control. Shyu and Brown's (1995) conclusion, however, contradicts Hannafin's. Through conducting a series of experiment focusing on procedural knowledge, they found that learner control resulted in higher performance of learning procedural knowledge, particularly benefiting those learners with greater ability or higher prior knowledge. The structure of learning tasks receives attention. Spiro, Vispoel, Schmitz, Samarapungavan, and Boerger (1987) claim that ill-structured domains, such as literature, need more nonlinear cognitive processing. Their theory helps explain why learner control strategy can receive better results with some learning tasks, but act poorly with others.

PSI course designers may first identify learning tasks and then determine how to apply the self-pace feature to different tasks.

The Unit-Perfection for Advancement and Mastery Criteria

In the early stages of Keller's experimentation on his PSI model, he did not constrain his students to traditional semester systems. However, the fact that incompletes became a major issue cannot be neglected in PSI courses (Eyre, 2007). Many studies therefore focus on the relationship between broken-down units and performance, as well as what appropriate mastery criteria should be in PSI courses, such as the impact of the size of a unit (O'Neill, Johnston, Walters, & Rashed, 1975), the effect of the number of units and quizzes (Born, 1975), students' performance between the unit-perfection and traditional lecture method (Goldwater & Acker, 1975).

Weisman and Shapiro (1973) conducted a study on the effect of unit structure of PSI. They invited one third volunteers of a class from a traditional lecture course, and the other two thirds was regarded as a control group. They applied achievement of defined levels of mastery to replace the traditional focus on fixed-time constraints. The content of a biochemistry course in the first year medical class was divided into 14 units of study. Guidance was provided in each unit explaining the primary points and directing students to refer to other supplemental materials or materials supporting different views. The guidance for the unit also contained questions about the materials given in order to assist students to evaluate their knowledge. Students were allowed to progress through every unit at their own pace based on their abilities. They were tested on each unit as many times as needed with no penalty for failure. The application of this "unit-perfection required for advancement" feature asked students to demonstrate their mastery of a unit before they move on to the next unit. An instructor deadline was added: student were required to complete all 14 units and then take a standardized national test as a final examination for credit within the 18-week semester; those people who finished the 14 units within 12 weeks

were exempted from the final examination. The student achievement and evaluations indicated that the PSI students received better grades and demonstrated more efficient use of their time.

Since its birth, PSI has been widely applied in higher education. Therefore, the institutional regulations and course withdrawals become problems that PSI researchers and proponents need to study. Recent researchers have tried to adapt unit-perfection for the advancement of PSI to fit into traditional semester systems.

Brothen and Wambach (2001) used 26 computerized, multiple-choice chapter quizzes to help psychology students master their course textbook. Differing from traditional PSI, -practitioners applying a unit quiz feature to help students learn course material (through repeatedly taking unit quizzes), researchers used a "prepare–gather feedback–restudy" strategy (p.292), and the result was successful. Unit quizzes were designed as a channel for helping students to pass exams. The computerized unit exams were closed-book, one-hour, multiple-choice exams covering six or seven chapters. Students could take each exam only once. They saw their scores (but no feedback for wrong answers) when they finished with each exam. At the beginning of the course, it was emphasized to students that the best way to approach quizzes was to use them for feedback on the effectiveness of their studying and to complete them before the respective unit exams. Students recognized that the best way to use the quizzes was to study each chapter thoroughly, take the quiz without looking at their books, write down the feedback, restudy, and then try again. However, they could look for answers in their books and complete the quizzes at any time during the term. The research results indicated that spending more time taking quizzes and taking them more times did not necessarily lead to good exam performance. Repeatedly taking quizzes cannot really help students master the learning materials. However, the quiz feature was an effective strategy when students learned for the future studying

needs under proctored conditions. When students knew that they could re-take quiz as many times as they wanted and receive answer feedback, the performance results were not positive; however, when quizzes became a learning strategy helping them pass real exams or learn for future needs, the "quiz-to-learn" (p.294) turned out to be a very effective strategy.

Some other studies regarding the similar problem on the effect of applying unit quizzes supported Brothen and Wambach's (2001) finding. For example, Eyre, Parks, and Crone-Todd (2006) suggested that simply having repeated contact with the material, particularly allowing re-taking quizzes serving mastering learning materials, was not sufficient for mastery. Perhaps limiting the number of attempts or using a fixed interval schedule with a limited hold for test attempts may increase more appropriate study behaviors. Another study of Brothen and Wambach's (2004) concluded that time limits were associated with better learning and exam performance because they reduced the opportunity to look up answers in lieu of learning the material. In a computer-assisted course on human development, they found that students spent less time on quizzes and performed better on exams when they had time limits on their quizzes.

In addition to the numbers and types of quizzes in the PSI method, appropriate contexts and mastery criteria for PSI quizzes are studied. Aiming at the criticisms of PSI's "teaching to the test" (Miller, 2001; Popham, 2001), Wadkins and Wozniak (2004) argued that in some particular courses, such as terminology-intensive and covering clearly-defined knowledge sets, "teaching to the tests" was appropriate, these tests could be designed to include the materials instructors expect students to master. Therefore, the repeatedly taking quiz feature of PSI was an effective strategy for these learning contents. Fox (2004) suggested defining "mastery criteria" based on unit instructional objectives, and therefore PSI researchers and course designers may apply Mager's (1997) instructional objectives guidance to set mastery criteria.

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However, just like Eyre (2007) indicated, all these research and these implications, including limiting the number of attempts, re-defining quizzes, identifying appropriate contexts for repeatedly taking quizzes would essentially violate Keller's course parameters with regard to mastery and it would also affect student self-pacing within the course.

The use of lectures and special demonstrations as motivators

In Keller's (1968) original design, the feature of using lectures and special demonstrations as motivators was used to provide positive reinforcement to students. Attendance is not required and subsequent quizzes or tests will not include material from it. Keller believes that the role of today's teacher has been primarily that of a talker rather than a facilitator of learning (Keller, 1968). Kelly expected lectures and special demonstrations could inspire students to study further and finally improve their learning performance.

Many studies found that, given the fact that attendance to lectures or other special demonstrations did not affect the learning performance, the attendance to these events was quite low, this feature therefore did not work well to motivate students, or the direct application of this feature failed to improve performance (Born & Herbert, 1974; Brothen & Wambach, 1998; Buskist, Cush, & DeGrandpre, 1991; Calhoun, 1976; Hornby & Anderson, 1995; Lloyd, Garlington, Lowry, Burgess, Euler, & Knowlton, 1972). In his own research and implementation process, Keller himself soon realized that the lectures and special demonstrations are not effective reinforces (Keller, 1990). Lectures may have to go back to their traditional function of clarifying learning problems, synthesizing textual information, and answering student queries.

Since theory and research on PSI have characterized that the lectures and special demonstrations as motivational devices have minimal effects on student learning, more

researchers started to focus on defining effective motivators. These studies are partly overlapped with exploration in other components of PSI, and will be discussed in the following sections.

The Written Communication between Teachers and Students

Stress upon written teacher-student communication is a primary component of PSI. This feature is mainly applied in the unit introduction placed at the beginning of each unit, which often includes introduction to the unit material, unit objectives, and suggestion on how to study the material, and then study questions provided. Sometimes, only introduction and study questions are included into the unit introduction (Buskist, et al., 1991; Calhoun, 1978; Keller, 1968). Calhoun (1978) found that a complete unit introduction can effectively help students understand, decrease procrastination, and have a better learning performance.

In addition to the unit introduction, texts are another major type of applying written communication to deliver important learning information to students. Teachers are responsible for preparing text and other reference or supplemental materials in written type. All the quiz questions come from the text materials. It is critical for students to distinguish important information from unimportant materials, and reading skill becomes a primary requirement for students in PSI courses (Buskist, et al., 1991; Keller, 1968).

The emphasis on written communication requires students to devote much of their study time to reading text materials provided by the instructor. Students must actively read, study, and respond in writing to questions over textual materials, rather than simply passively responding to instructors in traditional lectures. The instructor's major responsibility is to arrange academic contingencies so that quizzes can evoke appropriate academic behavior.

The Use of Peer Proctor and Verbal Interaction between Proctors and Students

Keller originally defined a proctor as "an undergraduate who has been chosen for his mastery of the course content and orientation, for his maturity of judgment, for his understanding of the special problems that confront the student as a beginner and for his willingness to assist" (Keller, 1968, p.81). Later, he identified two types of responsibilities for the undergraduate proctor, including "study hall proctor" (Keller & Sherman, 1974, p.17), which means discussing unit materials and answering questions regarding quizzes before students take quizzes; and "grading proctor" (p.17), which means scoring quizzes with relevant work.

The major function of proctors is to offer repeated testing and immediate scoring of quizzes. They need to provide immediate feedback on unit quizzes, answer students' questions, discuss and explain unit materials with students, and reinforce students for processing through the course, they may also need to meet with other proctors and the course instructor discussing any problems that have arisen and make plans for the next week's activities (Buskist, et al., 1991; Keller, 1968, 1974a).

Keller (1974b) especially emphasized the importance of student proctors in PSI courses and maintained that it is the central feature in the PSI system. These proctors recently had taken the course or demonstrated their mastery of a certain unit, therefore they had a better understanding of the special problems that beginning students might have. According to Keller, they were able to provide more individualized and considerate coaching to students than instructors and helped beginning learners maintain their "dignity and self-esteem" (p.152).

Early in the popular stage of PSI, some researchers had found that immediate feedback on student performance is one of the most significant variables responsible for the effectiveness of

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PSI (Balcazar, Hopkins, & Suarez, 1985; Kulhavy, 1977; Kulik, et al. 1980). Chase and Houmanfar (2009) later confirmed that elaborate feedback was particularly effective to improve students' performance on the most difficult questions.

Fernald, Chiseri, Lawson, Scroggs, and Riddell's (1975) study found that a high amount of contact with a proctor, coupled with the application of the self-pace feature, were effective motivators to enhance students' learning. Taveggia (1976) is also one of early researchers who noticed that these components of PSI contributed greatly to its effectiveness. He thought that the use of the proctor feature made it possible to monitor the progress of each student through the entire course, and therefore the lower ability students may be identified easily and be offered extra assistance and encouragement. His research findings confirmed that the combination of self-pace, sequential unit mastery, and the use of proctors can effectively encourage students to "work harder" (p.1031) and therefore greater improve their subject matter mastery over conventional courses. On the other hand, Taveggia's conclusion, that lower ability students tend to drop PSI courses, therefore PSI courses are mainly completed by higher ability students, explains why PSI students have a better performance, was not supported by other researchers' studies (e.g. Johnson, Zlotlow, Berger, & Croft, 1975; Kulik, et al., 1979).

Some researchers insisted that student proctor could threaten course integrity seriously. Caldwell, Bissonnettee, Klishis, Ripley, Farudi, Hochstetter, and Radiker's (1978) research indicated that no evidence supported that the application of student proctors improved learning performance (such as reducing the number of quizzes taken). The reason that some other studies had contradictory findings was because the quizzes in those studies included approximations to the quiz answers, therefore students had chances to defend their answers and shaped student proctors to accept their approximations to the correct response. When researchers completely

used multiple choices with only correct response in quizzes, students no longer had the chance to shape proctors' behavior, the obvious performance difference between PSI with the student proctor feature and traditional methods would not exist.

Caldwell (1985) further argued that, in a typical PSI course in which no final exam was given, a good quiz score graded by proctors was regarded as a significant part of learning, therefore both proctors and students might tend to shape this "cheating" behavior (p.11).

At the same time, some other studies questioned the effectiveness of proctors. For example, Farmer, Lachter, Blaustein, and Cole (1972) conducted their research on the amount of proctoring in a typical PSI course; on one hand, they agreed that no proctoring may lead to low performance; on the other hand, they doubted whether the more proctoring the students would receive, the higher performance they would attain. Robin and Heselton's (1977) study on proctors' feedback supported this opinion. They found that the *amount* of proctor feedback had no influence on student learning performance.

Although controversial, the presence of proctor feedback has still been regarded as a primary feature in PSI components and some researchers increasingly concentrate their interests on the motivation function of proctor feedback for either student proctors themselves or other students, or both, in PSI courses. Jacobs and Gedeon's (1982) study indicated that student proctors who were "social with students" – that is they had more communications between the proctor and students, was an important motivator to help students adapt to various instructional settings. While some other studies found that, student proctors greatly benefited from their proctor experiences in their later course, other students tended to ask questions from proctors more than from instructors; therefore, the application of student proctors was an effective motivator for

students to learn more, and this also could improve proctors concentration (Cohen, Kulik, & Kulik, 1982; Hedin, 1987; Semb & Ellis, 1994; Silberman, 1978). Wittig's (1974) research claimed that the individualized coaching and personal contact provided by proctors effectively could reduce students' fears and failure, consequently motivating learning.

As the founders of PSI method, Keller and Sherman (1974, p.19) advocated that introducing computers into PSI, proctor feedback could be adapted and become a powerful tool. Under computer and new technology environments, proctor feedback will not necessary be conducted by humans, it still shares similar characteristics of human proctor feedback defined by Keller.

Self-Regulated Learning

The Major Theoretical Development of Self-Regulation

Two root theories of Self-Regulation: Metacognition and Self-Efficacy.

According to Flavell (1976, p. 232), Metacognition refers to one's knowledge concerning one's own cognitive processes or anything related to them, e.g., the learning-relevant properties of information or data. This process involves monitoring and regulation of cognitive processes (Flavell, 1979, 1987). Metacognition strategy is an important concept in Metacognition theory. Differing from cognitive strategy (which often refers to reaching a certain goal), Metacognition strategy means that an individual takes action to make assure that he or she reaches the goal. Researchers rely on this when investigating people's ability to control their cognitive processes – self-regulation.

Brown's (1978, 1987) research supports Flavell's theory. Her discussion on regulation of cognition reveals that people's thinking and learning process includes planning and monitoring activities, checking the outcome of those activities. They are relatively unstable and task or

situation dependent. Metacognition strategy (or ability) is divided into sub-processes. Researchers believe that effective instruction can impact these sub-processes and finally improve learners' thinking and learning.

The other theoretical foundation of self-regulation, the shaping of self-efficacy is impacted by a psychological term, Locus of Control, and Social Learning Theory. Rotter (1954, 1966, 1990) finds that people's potential behavior is a complex function influenced by subjective factors and situational factors (expectancy and reinforcement value), and that different people interpret and react differently to the same situation. Some people's general locus of control is internal, but they might react externally in particular situations.

Bandura challenges Rotter's internal-external distinction as well as Rotter's assumption that an internal locus is a personal characteristic. He (Bandura, 1986, 1997) defines self-efficacy as the belief in one's capabilities to achieve a goal or to produce an effect. Self-Efficacy theory challenges and develops Rotter's Social Learning Theory, and goes farther. It places more emphasis on the effect on learning outcomes produced by internal factors, such as self-organizing, proactivity, self-reflection, and self-regulation of thought and action. In contrast is the emphasis on which is the focus of the locus of control, what is the individuals' reaction to social environment or inner cognitive-affective forces. Students with high self-efficacy are more likely to challenge themselves with difficult tasks and be intrinsically motivated. Students with low self-efficacy believe they cannot be successful and thus are less likely to make a concerted, extended effort and may consider challenging tasks as threats that are to be avoided. Thus, students with poor self-efficacy have low aspirations which may result in disappointing academic performances becoming part of a self-fulfilling feedback cycle (Bandura, 1997).

Bandura's theory of self-efficacy is expanded through his research on efficacy and outcome expectation, the latter indicates that beliefs in the personal determination of outcomes create a sense of efficacy and power. This means that, for any given instance, behavior can be predicted best by considering both self-efficacy and outcome beliefs, such that, different patterns of self-efficacy and outcome beliefs are likely to produce different psychological effects (Bandura, 1986). Bandura (1989) further investigated the way that individuals' expectations shape the goals they set for themselves. If individuals believe they have control over future events, then they will attempt to exert that control in order to achieve a positive outcome. It does not matter whether an outcome is, or is not, attainable, it is *the perception* of control that determines whether one will try to attain it.

Bandura (1977a, 1994) identifies four sources of gaining or strengthening self-efficacy: mastery experiences (performance accomplishments), vicarious experiences provided by social models, social persuasion, and the reduction of people's stress reactions by altering their negative emotional states (physiological states).

Other researchers have applied instructional strategies designed to enhance self-efficacy: establishing specific and short-term goals, comparing student performance to the goals set for that student not comparing against peers, and using moderately difficult tasks, giving focused and frequent feedback (Bandura, 1994, 1997; Fencl & Scheel, 2005; Margolis & McCabe, 2006; Schunk & Pajares, 2002).

The most positive aspect of Bandura's self-efficacy theory is that people can develop their own self-efficacy through families, peers, school, transitional experiences of adolescence, and self-reappraisals in adulthood. The reappraisals can last lifelong. People always have

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opportunities to strengthen their self-efficacy and to re-shape their lives. Bandura's research provides an exceptional insight into people's self-regulation and self-motivation of their learning.

The self-regulation construct is being shaped by the work based on two theories: Metacognition and Self-Efficacy. Both Metacognition and Self-Efficacy theorists support the arguments that individuals can always learn how to better regulate their cognitive activities through effective instruction. Active, positive and sociable individuals tend to take an optimistic view of their personal capabilities. People can develop their own self-efficacy through some well-designed pedagogies. These points of view shed new light on how people motivate themselves and take actions accordingly.

Bandura (1986) emphasizes the relationship between human personality and behavior. Human personality drives people to control their own behavior and this process is self-regulation. There are three steps included in self-regulation: self-observation, judgment and self-response. The three steps are related to "self-concept": If one person finds that he can meet the standard he sets for himself for years, he will have a pleasant self-concept. If, on the other hand, he finds that he forever fails to meet his standards and therefore punishes himself (no matter what punishment, obvious or covert), he will have a poor self-concept.

Bandura believes that punishment in whatever form does not work as well as reinforcement in changing people's behaviors. His belief that self-punishment is ineffective, is based on what he sees as three negative effects from excessive self-punishment: compensation, inactivity and escape. They all may lead to unhealthy personalities. Accordingly, Bandura recommends three steps of self-regulation to deal with poor self-concept: when self-observing, try to really understand own behavior; when self-judging and setting standards for ourselves, try to have a

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reasonable bar; when self-responding, always use self-reward instead of self-punishment –

success is enjoyable; but lessons can always be obtained from failure. Some basic

Self-Regulation tools are designed based on this belief.

Beginning in the middle of the 1980s, more and more researchers (Boekaerts, Pintrich, &

Zeidner, 2000; Corno, 2001; Schunk, 1984, 1986, 1988; Schunk & Zimmerman, 1994, 1998;

Winne, 1995; Zimmerman, 1989b; Zimmerman & Schunk, 2001) became involved in the field of

self-regulation and began identifying the major characteristics of self-regulated students,

including: (1) they have clear recognition on their strengths and weakness; (2) they can

proactively select and apply metacognitive and motivational strategies to improve their

go-oriented abilities; (3) they are able to apply volitional strategies to concentrate on a task; and

(4) they can select and even create advantageous learning environments for themselves and know

how to appropriately seek help from peers and teachers when necessary. Self-regulated learners

proactively and initiatively engage in their learning activities and are self-motivated and

self-directive to achieve desired goals. Accordingly, Pintrich, and Schunk (2002) believe that a

self-regulated learner often displays a higher sense of self-efficacy.

Founded on these research findings, researchers (Bulter & Winne, 1995, Zimmerman, 1990,

2002) define self-regulated learning as a self-directive of learners' transforming their mental

abilities into academic skills, by which learners control their thinking, take some purposed

actions or strategies to learn, and motivate themselves. The major features of this process are

learners' self-observation, self-evaluation and self-reaction.

Major Instruments of Self-Regulated Learning

Based on the understanding of the Self-Regulated Learning process and the major characteristics of self-regulated learners, more applicable instruments have been developed and applied to instructional design.

With the growth in theoretical paradigms and methodologies, many self-regulated instruments and models were developed by researchers from different theoretical backgrounds. Self-regulated learning became a metacognitive, motivational, and behavioral construct. The Model of Adaptable Learning (Boekaerts, 1992, 1996; Boekaerts & Niemivirta, 2000) concentrates on appraisals and learning goals; the Process-oriented Model of Metacognition (Borkowski, Chan, Muthukrishna, 2000) studies strategy generalization. The Four-stage Model (Winne & Hadwin, 1998) describes self-regulated learning as a four-stage event, including task definition, goal setting and planning, enacting strategies planned, and metacognitively adapting studying techniques for the future needs.

Based on Bandura's (1977b, 1986) research on socio-cognitive theory and self-regulatory mechanisms, Zimmerman (1989a, 1990, 1996, 1998, 2000) develops an important model of studying and applying self-regulated learning in empirical work, the Social Cognitive Model. The model includes three determinants: covert self-regulation (monitoring and adjusting cognitive and affective states), behavioral self-regulation (self-observing and strategically adjusting performance processes), and environmental self-regulation (observing and adjusting environmental conditions or outcomes). This cyclical model based on strategy use and feedback loops (1989a) was augmented with a cyclical model that detailed self-regulatory processes and motivational beliefs that occurred in three phases: forethought phase, performance phase and self-reflection phase. Zimmerman also developed a model to guide instructional interventions for

developing self-regulatory skills through four sequential levels: modeling level, imitative level, self-control level, and self-regulation level. Zimmerman and his colleagues developed numerous methods for assessing self-regulated learning ranging from a structured interview, various Likert scales, experimental methods, and most recently, microanalytic methods.Tthe structured interview schedule (SRLIS)" (Zimmerman & Martinez-Pons, 1988, 1990) was used to evaluate students' self-regulated learning strategies and perceptions of self-efficacy. From the teacher's standpoint, they design a teacher scale to measure if students use the strategies identified in SRLIS.

Pintrich's (1999, 2000) General Framework for self-regulated learning is based on the socio-cognitive perspective of learning (Bandura, 2001), which views self-regulation as an interaction of personal processes, behavioral processes and contextual processes. This framework is to study the role of these processes in self-regulated learning. In this framework, self-regulated learning is divided into four phases: planning, monitoring, control and evaluation/reflection. Pintrich does not think that the four phases are linearly structured; on the contrary, they might occur simultaneously and interact in different processes. Pintrich emphasizes his view that self-regulated learners can take advantage of some strategies to change their learning context. As a major researcher of self-regulated learning, Pintrich and his collaborators (Garcia & Pintrich, 1996; Pintrich & De Groot, 1990, Pintrich, Smith, Garcia, & Mckeachie, 1993) worked together to develop "motivated strategies for learning questionnaire (MSLQ)", a self-report questionnaire, to test motivational beliefs (including self-efficacy) and learning strategies, and study its implications.

In addition to these models focusing on process study, more practical tools were developed and applied in empirical work to measure self-regulated learning. Besides MSLQ (Pintrich et al.,

1990, 1993) introduced above, "learning and study strategy inventory (LASSI)" becomes one of the widely used self-report questionnaire to measure learning strategies (Weinstein, Schulte, & Palmer, 1987). Other self-report questionnaire tools including "components of self-regulated learning (CSRL)" developed by Niemivirta (1996, 1998) was designed to measure motivational and cognitive components regarding goal setting, belief control and cognitive strategies. As well as these application tools, some methods are developed and provided to first line educators and practitioners to teach processes and strategies of self-regulated learning. Methods are developed for training self-regulated learners in skills such as, time management, text comprehension and summarization, note-taking, and writing skills (Schunk & Zimmerman, 1998; Zimmerman, Bonner, & Kovach, 1996).

The actual strategies derived from self-regulated learning theory are studied too. Researchers suggest modeling the self-regulated learning's processes of planning, control and reflection so that the student can observe and imitate (Graham, Harris, & Troia, 1998; Schunk, & Zimmerman, 2003). Butler and Winne (1995) synthesize a model of self-regulation and indicate that feedback should be tightly integrated with self-regulation since feedback is an important mediation to offer an account of how knowledge is constructed in the process of learning.

Vygotsky's (1978) ZPD argues that learner control is not simply giving learners more freedom to choose: learners' self-regulation has to be under assistance from capable peer or adult, in a social context. This idea becomes a primary concern in many teaching self-regulated learning models and strategies. Social support from teachers and peers is eliminated over time based on students' self-regulated competency. This is a scaffolding process to be done gradually. Other important factors emphasized in these models and strategies involve creating supportive learning environments for students so that they favor the use of cognitive strategies, and provide

enough practice to improve students' abilities on planning, monitoring and self-evaluating (Graham et al., 1998).

Most of these instruments developed in the 80s-90s are classified into aptitude measures of self-regulation (Winne & Perry, 2000). Recently, researchers' interests have focused on creating and applying more practical tools and methods to develop online measures of self-regulatory processes in authentic contexts.

Richey and her colleagues (2004) identified think-aloud as one major research design method in developmental research. It is a protocol designed to observe participants' immediate reactions when they are in a process of task completion. Participants are asked to say whatever they are looking at, thinking, doing, and feeling during their working on this task so that observers can record and explore the internal factors influencing students to complete a learning task. This protocol was originally refined and applied in the educational field by Ericsson and Simon (1980, 1987, 1993); Pressley and Afflerbach (1995) used it in reading instruction; Azevedo and his colleagues (Azevedo & Cromley, 2004; Azevedo, Cromley, & Siebert, 2004) further developed the tool to measure students' self-regulated learning processes in a hypermedia learning setting.

Winne and his colleagues (Winne, et al., 2006) developed a program called "gStudy" providing a virtual classroom in an online setting. Students can complete various classroom activities and seek social support, including making notes, constructing concept maps, collaborating with peers. A log analyzer is designed to record the traces of students' cognitive strategies and helps measure the best strategies in their self-regulatory processes. In the computer-assisted environment, more data regarding learners' strategies, self-concept, and their

learning status can be tracked and investigated; researchers are able to better measure learners' self-regulatory processes.

Zimmerman (2008) has examined the recent research wave in the area and argued that these online measures of self-regulatory processes help address some major emergent questions in self-regulated learning construct. For example, "Structured Diary Measures" (Schmitz & Wiese, 2006; Stoeger & Ziegler, 2007) and "Observation and Qualitative Measures" (Perry, Vandekamp, Mercer, & Nordby, 2002) investigate whether teachers can structure and alter their classroom instruction to convey self-regulated learning processes and enhance students' achievements as well as their use of the SRL process; Microanalytic Measures and Cyclical Analyses (Cleary & Zimmerman, 2001; Kitsantas & Zimmerman, 2002) serves to assess students' motivational beliefs and analyze the role of students' motivational feelings and beliefs in initiating and sustaining changes in their self-regulation of learning. All these efforts are aimed to improve students' self-regulated learning and their performance in authentic contexts. Self-regulated learning is more than a flourishing theory, it is really bringing significant influence to practice and changing lives.

Summary of Literature

The PSI method has proven its high performance especially in individualized instruction even though it is challenged. As was discussed above, researchers, including Keller himself, suspect that PSI's greatest values was in providing students with mastery of concrete course contents and might not be suitable for some studies courses or interactions.

Computer, new technologies and theoretical development bring new blood for PSI.

Computer-Based Instruction and the Internet Age

Various terms describe the educational use of computers since 1960s. Alessi and Trollip (1991, p.3) identified one use as that of the computer playing the role of tutor, indicating that this process of "teaching with computer," is viewed as computer-based instruction. Computer-based instruction (CBI) refers to an instructional computer program, also known as coursewares, is a concept overlapping with a number of names such as computer-assisted instruction (CAI), computer-based education (CBE), or instructional applications of computers (IAC) (p.6).

A clearer understanding of CBI progress was acquired within recent decades through Alessi and Trollip's work (1991, p.9-11) who summarized five major types of CBI, including: tutorials, drills, simulations, games and tests. They added three methodologies in 2001 (p.10-12): hypermedia, tools, open-ended learning environments, and web-based learning.

The research on CBI has gone through three major stages (Maddux, 1993). The first stage focuses on whether or not the application of computers can make a positive impact on education; the second stage studies whether or not specific types of applications would benefit education; and the third stage considers how learners interact with other variables within a computer-based instruction environment.

The internet drives us to the fourth stage of CBI: web-based instruction (WBI) supported by the attributes and resources of Internet technologies. Asynchronous and synchronous web-based instruction is becoming a major trend in educational practice today (Greene & Meek, 1998).

Khan (1998, p.64) summarizes two major categories for WBI features. Key features include: interactive, device-distance-time independent, globally accessible, electronic publishing, uniformity worldwide, learner-controlled, multiple expertise, online resources, etc. Additional

features include items such as online support, authentic, environmentally friendly, cost effective, ease of coursework development and maintenance, collaborative learning, and on-line evaluation. WBI, relative to CBI, can be seen to provide more flexibility, self-control, more uniform learning materials, and multiple types of feedback to students. In addition, students can access learning materials at their own convenience. Coupled with a wider and higher degree of interactions available on WBI, a new "leaner-centered" learning style is forming.

In Khan's (1998) summary of WBI features, "multiple expertise" and "online resources" are two characteristics worth noting. The feature of multiple expertise allows WBI courses to take advantage of sources available on the Web that are provided by experts from various fields. Students can access a variety of perspectives (Bannan & Milheim, 1997). Online resources further emphasize written learning materials which allow students' instant and unlimited access to learning contents based on their needs. Differing from traditional textual materials, online resources can be up-to-the minute or archival; instructors can incorporate the most recent information into their learning materials. This feature also allows WBI students and instructors to publish previously authored documents on their own WBI course archives and to make these resources available for worldwide use (Butler, 1997; Khan, 1998).

The Application of Computer and the Internet in PSI Courses

Since its birth, the PSI method naturally shares some features which can be offered by computer-based and web-based instruction, such as the self-paced, structured unit learning materials, and immediate feedback. Like WBI teachers, PSI teachers also play a course manager role more than being traditional instructors who control over the entire learning procedure.

Some recent studies focus on the degree to which new technologies improve various aspects of PSI courses. These studies involve how computers and web-based course management systems (such as Blackboard, WebCT, Moodle, etc.) are used to administer and score examinations and provide certain practice activities, decreasing administrative burdens (Chase & Houmanfar, 2009; Conard, 1997; Crosbie & Kelly, 1993); how application of synchronous or asynchronous communication tools (such as email, instant messenger, and online conferencing) help enhance the efficiency of proctoring and other collaborative activities (Pear & Novak, 1996); how new information generation methods change the dependence on traditional textual learning materials, allowing structured unit learning materials to be delivered in a variety of formats (Hambleton, Foster, & Richardson, 1998).

Among these studies, component analysis, which focuses on investigating which features of PSI are most vital to its success and how they should be implemented, attracted many researchers' attention (Sherman, Ruskin, & Semb, 1982). Through researchers' studies on primary issues in the implementation of PSI, its components, and the application of new technologies in PSI, PSI can be applied in a wider scope.

Researchers in some early PSI component studies had started to analyze and assess which features of PSI were necessary and which were least efficient. For example, the use of lectures and special demonstrations for motivational purposes was proven by many studies to have little effect as reinforcers to improve students' achievement or as motivation to enhance their attitudes (Born & Herbert, 1974; Calhoun, 1976; Lloyd, et al., 1972; Phillips & Semb, 1976). Some later studies also confirmed that this feature does not seem to contribute to the improvement of student learning and can even be counterproductive. Therefore, practitioners need not to include

this feature in their PSI course (Brothen & Wambach, 1998; Buskist, et al., 1991; Hornby & Anderson, 1995; Roberts, et al., 1990).

Furthermore, the involvement of the computer and new technologies with PSI changes the concentration of some features. In order that students can have flexible access to learning materials, Keller (1968) and Sherman (1982b) placed emphasis on the printed materials instead of the instructor's lecture. However, today, structured unit learning materials can be delivered in more ways supported by computer and Internet technologies. These methods, like this component of PSI, also allow students unlimited access to learning materials at their own pace (Fox, 2004; Hambleton, et al., 1998). The computer can better control the maximum number of quiz attempts for the student to achieve mastery and track the progress (Chase, et al., 2009). The designer may consider using praise to reinforce students rather than motivate them by lecture or special demonstration in a computer-mediated PSI course (Worland, 1998). In addition to proctor feedback, computers can provide immediate and extensive feedback effectively (Crosbie & Kelly, 1993).

Because they are emphasized and enhanced by computers and/or internet technologies, some components of PSI work more effectively in computer-based instructions or web-based instructions on improving students' performance and attitude. For example, Pear and Kinsner (1988) designed a computer program based on PSI that has been used for on-campus and off-campus teaching by the University of Manitoba. In this computer-aided personalized system of instruction (CAPSI) program, researchers highlighted the role of proctors in PSI by assigning one student, who had demonstrated his/her mastery of a certain unit, as another student's proctor. The proctor provided immediate feedback and reinforcement. Electronic mail was applied as the major communication tool in the process, and some computer-aided methods were used to

identify proctors, and provide quiz options to students. The results indicated that learners reacted favorably to the teaching method and their completion rate increased greatly compared to the traditional method.

Pear and his colleagues (Pear & Crone-Todd, 1999; Pear & Novak, 1996) further developed this CAPSI program in a web-based instructional environment. Students in four different undergraduate psychology courses were asked to take unit quizzes covering questions randomly selected by computers. Student proctors were responsible for grading the quizzes and providing feedback (if no proctor was identified for this unit, an instructor would do this job remotely). Students' performance and ratings indicated that CAPSI was a viable on-line educational method.

In addition to strengthening certain components of PSI, this research team also tried to modify and fix these components to better serve instructional purposes through applying new technologies. They tried to add a punishment feature by incorporating a "conditional pass" for quizzes in the CAPSI program, and results indicated that students were better motivated (Crone-Todd, Eyre, Hutchens, Jones, & Pear, 2007; Pear & Crone-Todd, 1999).

Many researchers have successfully combined computer and Internet technologies with PSI methods, and, in the process, analyzed PSI components under new conditions. Rae (1993) applied videos (which could be visited repeatedly) and computer features to reduce the number of student proctors needed. In addition to self-pacing, a mid-term exam was added to decrease procrastination. The results indicated that many students who would have otherwise failed this course were able to successfully complete it. Eyre, Parks, and Crone-Todd (2006) found that allowing students to take unlimited unit quizzes attempts in computer-scored multiple-choice

unit quizzes actually cannot really improve the mastery of course materials. Applying computer features to limit the quiz taking attempts was a feasible option for instructors in the PSI courses.

Lecture is also an important subject when researchers conduct component analysis under computer and the internet conditions. Brothen and Wambach's (1998) research confirmed the early PSI researchers' findings on the effectiveness of lectures in a PSI course. They concluded that the attendance to lectures did not contribute much to students' learning in a computer-based instructional environment. Price (1999) used the PSI method to structure his web-based instruction. Adapting to the instructional objectives of this course - locating specific information on the Web using two or more Web search engines, he made two important modifications to the original PSI model: 1) Given the finding that the role of lectures was minimal in a PSI course, lecture attendance was optional in some courses. This element was provided in the course guide including course supplement materials and guidance for the learner; and, 2) immediate feedback on course assignments and exercises was conveyed via emails between students and instructors. Price finally concluded that the PSI method was applicable in web-based instructions when given proper planning and design.

With new technologies, the PSI method still turns out to be a very easily understandable and applicable instructional design tool. A large amount of research and practice has proven it an effective model for improving learning. Combined with the computer and new technologies, these basic features of PSI contribute to quality instruction, such as clear instructional objectives, active and frequent student response, careful sequencing of materials, and immediate feedback (Fox, 2004).

PSI and Distance Education

In Moore and Kearsely's (1996, p.2) overall description of distance education has three key features: distance instructor and learner, distance communication via technologies, and user/learner-centered design. Distance education experiences from correspondence courses around one hundred years ago, to radio and television courses, to live video instruction. Recently, instruction has been based on more new technologies including telephone, video conference, and particularly, the Internet.

Moore (1993) interprets three important concepts in distance learning: dialogue – interaction between instructors and learners; structure – a learning package containing carefully developed and optimized courses; and autonomy – the self-determination of students. Peters (1998) further articulates their implications, especially structure and autonomy, in distance education context.

Therefore, a natural connection can be found between distance education and PSI. With its emphasis on the self-pacing of learners, structured unit learning contents, written texts and supplemental materials, flexibility in relation to distance learners, and especially the recent incorporation of the computer and the internet technologies, PSI is naturally applicable to distance education. As discussed earlier, distance instructors may adapt or adopt some components of PSI by utilizing computers and new technologies to deliver a variety of disciplines and meet different and flexible instructional needs. In Liu's (2003) research, distance educators applied a PSI model to organize learning materials into self-paced units, and provided a comprehensive application example of integrating PSI into distance education.

Grant and Spencer (2003) identified three major features to possibly be applied into distance education, including, 1) PSI's emphasis on the repeated visit to the written word as a medium for

teaching and learning; 2) PSI's considerable flexibility for students concerning the written word, self-pacing, mastery criteria, and the use of proctors; 3) PSI's natural compatibility with computers and the internet technologies for improving instructional effectiveness. Additionally, PSI and distance educational scholars and teachers can conduct a wide range of research through examining the other's literature and teaching practices.

<div align="center">PSI and Constructivist Approaches</div>

Although PSI was originally designed based on behaviorism (Keller & Sherman, 1974), PSI is obviously compatible with other theoretical perspectives regarding learning and instruction.

First, PSI method is a "learner-centered" model. This is consistent with the constructivist approach, especially the self-regulated learning perspective. Self-regulated learning researchers believe that component processes of self-regulation could be acquired through effective training, and students' self-efficacy and self-regulated learning skills can be influenced through special strategies provided; students learn that their efforts can enhance their ability and finally construct the belief that their efforts will influence their performance (Corno & Mandinach, 1983; Schunk, 1990b). PSI is about using different strategies to reinforce students' learning. Based on the insistence on the "learner-centered" concept, researchers may apply PSI's self-paced feature and self-regulated learning model together to design courses and encourage students playing an active role in their own learning.

Second, incorporating computer and the internet technologies, the PSI method can provide a constructivist educational community for both instructors and students, as well as for educational researchers and designers. Web-based PSI courses allow instructors to build up a two-way communication society with multiple resources and strategies.

Some researchers have successfully applied new technologies to connect the PSI method with other theoretical constructs. For example, Brothen and Wambach (2000) developed a PSI-based model for computer-assisted, mastery-oriented pedagogy to teach students and to increase their self-regulating studying behavior, improve their sense of self-efficacy and belief in the importance of acquiring good study habits and skills, and to encourage them to persist until they are successful. The concept of self-regulation, to be connected with self-paced feature of PSI, was applied to structure the course module in this project.

These new technologies and theoretical development provide foundations to further enlarge PSI's application in instructional design practice.

As in the project discussed above, Brothen and Wambach (2000) applied a PSI-based model with mastery-oriented pedagogy to increase students' self-regulating behaviors. They connected the concept of self-regulation with PSI methods by "self-paced" feature. In this dissertation, the hypothesis that combining PSI methods and self-regulated learning procedures is feasible in other pedagogy will be tested first. Combining into this module more features of both constructs, in addition to the self-paced feature, will be discussed further.

CHAPTER THREE: Course Design Methods

The Contexts for a Web-Based PSI Course

Dr. John K. Fairbank, was a leading scholar who created the field of modern Chinese studies in the United States. As a leading advocate of diplomatic recognition of the People's Republic of China, he taught Chinese history and culture at Harvard University for more than forty years, and published a number of both academic and non-academic works on China. Many of his books have reached a wide audience and become one of major factors involved in decision making for the United States for a long time.

The foreword of the fourth edition of "The United States and China," written by Edwin Reischauer, provides a background of this course (Fairbank, 1983, p. xi-xii):

When the first edition of John King Fairbank's The United States and China appeared in 1948, it was greeted with acclaim and soon came to be regarded as a classic. The term "classic" suggests something fixed in time, but that is not the case with this book. Through successive revised editions, it has grown and developed. A second edition in 1958 added the Communist victory and the experience of the first decade of the People's Republic. A third edition in 197 I, taking the analysis forward another decade, proved even more popular than the first edition and reaffirmed the evaluation of this book, not just as a classic, but as a continually up-to-date classic. The same, no doubt, will be true of this fourth edition, enlarged, coming still another decade later.

Revised editions suggest the addition of new material to bring a book up to date and the revision of interpretations as time brings past events into clearer perspective. The author has done both of these, but more significantly he has added a great amount of new information and insights produced by fresh scholarship, not just on recent events, but also on earlier phases of Chinese history, stretching all the way back to the Palaeolithic age. John Fairbank is in a good position to do this, for he, more than anyone else, is responsible for the vigorous development of Chinese studies in the United States and an astonishingly large percentage of the authorities he cites were once his own students, whose research activities he encouraged, supervised, and often saw through to publication. Sumner Wells, in the opening sentence of his Introduction to the first edition of this

book, wrote, "The Harvard University Press can offer the readers of its Foreign Policy Library no more timely or important book than John King Fairbank's The United States and China/' The same can be said today, thirty-five years later. The Chinese people constitute a fifth or more of all mankind; the American people control about a quarter of the world's wealth. The relations between these two great nations, their understanding or misconceptions about each other, their cooperation or friction, will play a large part in determining the future of humanity.

No one has written more clearly or perceptively about China during the past three decades than John Fairbank, and no one has contributed more to American understanding of that country,: its traditions, its tumultuous recent history, and its enigmatic present conditions. The portions of this book carried over from earlier editions still sparkle with insights, expanded and refined by the results of recent scholarship. Anyone interested in China will read or reread these with pleasure and enlightenment. The extensive new sections on recent events, the present conditions in China, and the prospects for Chinese-American relations constitute, in my judgment, the clearest and most judicious brief presentations of these extraordinarily complex and obscure subjects that I have yet seen. John Fairbank has a knack for combining broad perceptions and deep analysis with clarity of expression. That is why this book has been and will long continue to be a classic. (p.xi)

In this e-learning course, I introduced his book, "The United States and China", based on my own perspective. Given my long-term reading and studying of most of books by Dr. Fairbank, I served as my own Subject Matter Expert (SME).

This was a product and tool design and development study. It attempted to design a set of learning procedures to develop and improve novice learners' self-regulative skills via a research type or collaborating course. A learner-centered learning environment, containing multiple communication channels between instructors and learners, was viewed as an ideal framework for this subject. The application of the PSI model served as the foundation for a learner-centered platform. Meanwhile, learners, under instructor/designer's suggestions, took advantage of self-observation, self-judgment and self-response to identify their learning objectives and share

their learning processes in each unit at a self-determined pace in the constructive community of learning. Through the adapted PSI method, the target students were expected to take control of their own learning, develop a sense of self-efficacy, and acquire good reading and study habits and skills. The hope was to establish a reasonable combination of the PSI method and self-regulated theory in this project, such that it becomes a practical method in more learning subjects (pedagogy) and contexts.

Some concerns regarding whether or not a researcher can play dual roles of both researcher and practitioner (developer) efficiently in a developmental research still need to be addressed. Barab and Squire (2004) argue that the dual roles of researchers could generate a dilemma for them. van den Akker (1999, p.11) also describes this situation as controversy between "subjective and imaginative involvement" and "objective and critical distance". However, van den Akker (1999) still believes that the controversy is a productive force contributing to a balanced solution. He further suggests that, in a developmental research, practitioners' perspectives could dominate the early stages and then shift to a stronger voice of researchers at the later stages. That was what this developmental research attempted: after the design was complete, additional objective data was collected from expert review and small group evaluation in order to maintain proper objectivity.

Methodology

Research Procedure of Developmental Research

Developmental research follows a relatively structured route: It begins with defining a research problem and reviewing related literature. Different participants and research methodologies in various functions/phases are required for the two different types of developmental research described by Richey and her colleagues (2004). At the same time, it

employs different types of data collection based on a variety of research foci. It also suggests that developmental researchers report full data sets and research findings over a long time and on various sources. With this practice, on one hand, practitioners can better apply data and findings to their own works. On the other hand, researchers themselves can refine and validate their conclusions (Reeves, Herrington, & Oliver, 2005; Richey, et al., 2004).

Richey and Klein (2007) summarized the methodology of developmental research and specified the exact research procedure: 1) selecting a research problem – significance, feasibility, and benefit; 2) identifying sources of problems – from workplace, related to emerging technology, and related to design and development theory; 3) using the literature to identify and refine the research problem; 4) focusing the problem – transforming research problems into research questions, and determining the parameters of the study.

Based on Richey and her colleagues' establishment (2004), the exact research procedures can be summarized in the flow chart below:

Identify Participants
- designers, developers, and evaluators
- clients
- instructors and/or program facilitators
- organizations
- design and development researchers
- learners and other types of users

Research Design
- Case study
- In-depth interview
- Field observation
- Document analysis
- Evaluation
- Survey
- Experimental
- Expert Review
- Literature review
- Delphi
- Think-aloud protocols
- Replication

Collecting, Analyzing, and Reporting Data
- profiling the design and development context
- the conditions under which the development and mplementation took place
- results of predesign assessment and evaluation
- descriptive data presentations and qualitative data analyses
- etc.

Figure 1. The Research Procedure of Developmental Research.

Two Types of Developmental Research

The comprehensive explanation on developmental research is done by Richey and her colleagues (Richey, 1994; Richey & Klein, 2007; Richey & Klein, 2008; Richey, Klein, & Nelson, 2004). They originally defined three types of developmental research: type 1 was to describe and analyze product or program design, development and evaluation in a special context; type 2 was to study the extended impact of the product or programs on organization and learners, to address program's implementation and to maintain issues, and evaluation is one of common methods applied in type 2; and type 3 was to focus on the improvement of the process or particular components through studying the whole process (Richey, 1994). Driscoll (1995) described type 1 as systems-based evaluation, and type 3 as model development and technique development research. Richey, et al. (2004, 2008) further investigated the nature of developmental research and finally refined two types: type 1, product and tool research to draw context-specific conclusions, including product development, tool development, use and etc; type 2, model research to draw generalized conclusions, including model development, model validation, and model use. van den Akker (1999) uses "formative research" and "reconstructive studies" to refer to the refined two types respectively. The former usually occurs throughout the complete development cycle, and the latter occurs during, but especially after those design and development practices. Richey and Klein (2007) summarized various lines of developmental research, and finally defined two major types including plenty of representative clusters of developmental research (design and development research): (1) Product and Tool Research, including comprehensive design and development projects, specific project phases, and design and development tools; and (2) Model Research, including model development, model validation, and model use.

In particular, Product and Tool Research studies often concentrate on the production aspect of the IDT approach, and demonstrate the range of design and development procedures currently available to practitioners. Evaluation and case study are its major applicable methods. The research conclusions of this type often fall into the range regarding product and program: suggestions for improvement, defining conditions which promote successful use, the impact of product or program, and identifying those conditions facilitate efficient design, development and evaluation. In addition to specific knowledge with respect to the designed product/program and the foundational design and development procedures, Product and Tool Research study sometimes tends to present generalized "lesson learned", which is often supported by and discussed in the context of current related literature as well as the design, development, and evaluation project that prompted them.

Research on Design and Development Models more likely focuses on the more generic use of development processes, offering implications for any design or development project. Therefore, many of model research studies are about a particular IDT process from needs assessment to performance analysis so that their conclusions can be applied in related settings. Some model research also includes the use of traditional educational models in settings out of education. Both quantitative and qualitative methods are widely used in model research studies. The conclusions of model research studies mainly concern a particular technique and model, varying from validity or effectiveness of the techniques or model, conditions and procedures facilitating the successful use, explanations of the successes or failures encountered in using a particular technique or model, synthesis of events and/or opinions related to the use of a particular technique or model, and new or enhanced design, development, and/or evaluation model (Richey & Klein, 2007).

Each type of design and development research involves "doing the processes" or "studying the processes" under extensive collaborations between researchers and practitioners, also employ a range of qualitative and quantitative techniques (Richey, et al., 2008). Four stages of developmental research are identified by van den Akker (1999, p.7-8), including preliminary investigation (e.g. literature review; expert consultation; case studies of current practices and etc), theoretical embedding to articulate theoretical rationale for design choices, empirical testing in real user settings, and documentation, analysis and reflection on process and outcomes for building theory framework and methodology of design and development. Product and Tool Research may emphasize stages of theoretical embedding and empirical testing, and Model Research may focus on the stages of documentation, analysis and reflection.

The major differences between the two types of studies are shown in these two tables: research participants vary based on research types and project emphasis (Table 1), and research outcomes vary based on the study type (Table 2).

Table 1.

Common Participants in Design and Development Studies.

Type of Research	Project Emphasis	Type of Participant
Product & Tool Research	Product Design & Development (Comprehensive & Phases)	Designers, Developers, Clients, Subject Matter Experts, Evaluators, Learners, Instructors, Organizations
Product & Tool Research	Tool Development & Use	Designers, Developers, Clients, Evaluators, Users
Model Research	Model Development	Designers, Developers, Evaluators, Researchers & Theorists
Model Research	Model Validation	Designers, Developers, Evaluators, Clients, Learners, Instructors, Organizations
Model Research	Model Use	Designers, Developers, Evaluators, Clients

Note. Common Participants in Design and Development Studies. Reprinted from *Design and Development Research (p.88)*, by R. C. Richey, and J.D. Klein, (Eds.), 2007, NJ: Lawrence Erlbaum Associates, Inc. Copyright 2007 by Lawrence Erlbaum Associates, Inc.

Table 2.

The Varying Outcomes of Design and Development Research.

	Design & Development Research	
	Product & Tool Research	Model Research
Emphasis	Study of specific product or tool design and development projects	Study of model development, validation or use
Outcome	Lessons learned from developing specific product and analyzing the conditions which facilitate their use	New design and development procedures or models, and conditions which facilitate their use

Context-specific Conclusions ⇨ ⇨ ⇨　　**Generalized Conclusions**

Note. The Varying Outcomes of Design and Development Research. Reprinted from *Design and Development Research (p.13)*, by R. C. Richey, and J.D. Klein, (Eds.), 2007, NJ: Lawrence Erlbaum Associates, Inc. Copyright 2007 by Lawrence Erlbaum Associates, Inc.

Research Procedure in this Dissertation: Product and Tool Research

In this dissertation, the "doing the process" step was conducted first by designing the learning procedure through embedding SRL into a PSI-based course; and then conducted "studying the process": exploring whether or not the principles of SRL can be embedded into PSI framework effectively. The participants included: a designer, experts on PSI and SRL, experts on instructional design, and individual learners and instructors (potential users). Three major methods of research design were applied: Literature Review, Evaluation, and Survey. After the designer completed the design outline, the paper work was submitted to PSI and Self-Regulated Learning theoretical experts to conduct the Proof of Concept Evaluation. On the basis of theoretical experts' feedback, further Formative Evaluation was conducted among

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individual learners. These data and procedures were reported in the Chapter Four, and final

discussion was reported in the Chapter Five.
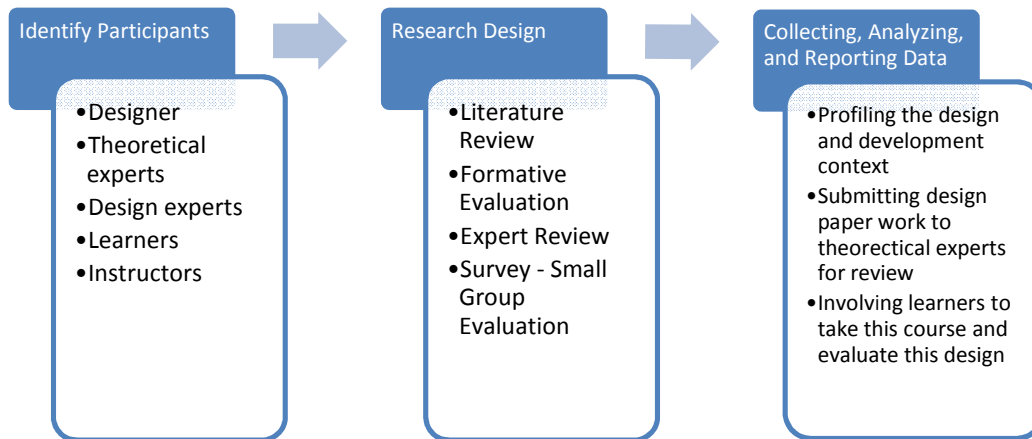
Figure 2. The Research Procedure of the Developmental Research in this Dissertation

Self-Regulated Studying Behavior

The self-regulated learning tools used in this course module were designed based on

researchers' studies on self-regulated studying behavior. This section will briefly review relevant

findings and conclusions.

On the basis of a number of research studies, self-regulation has been defined as cyclical

efforts to optimize cognitive, motivational, and behavioral processes leading to one's goal

attainment (Schunk & Zimmerman, 1998). The major features of this process are learners'

self-observation, self-evaluation and self-reaction (Zimmerman, 1990, 2002).

As discussed above, self-regulated learners' characteristics are different from traditional

students in a teacher-controlled classroom. They are: (a) monitoring their performance on a

regular basis; (b) behaving purposefully; (c) seeking useful aids initially; and (d) completing

learning objectives successfully (Zimmerman, 1989b; Zimmerman & Schunk, 2001).

Accordingly, Pintrich & Schunk (2002) believe that a self-regulated learner often displays a higher sense of self-efficacy. Individuals' expectations shape the goals they set for themselves and they might take relevant actions to reach the goals.

The course was designed to be a cultural and historical discussion class. Therefore, it was not a mastery-oriented course. Self-regulated learning was considered as a strategy to attract students' interests, to improve their self-efficacy, and finally to help students build up life-long learning skills and habits. In this process, students applied a "proactive way" (Zimmerman, 2002, p.65) to monitor their activities rather than simply reacting to teaching. Students could do this because they were assumed to know about their strength and weakness and therefore proactively seek solution for dealing with them.

Schunk and Zimmerman (1994; 1998) explain the specific component skills of setting up a self-regulatory process, including: 1) setting specific proximal goals for himself/herself; 2) adopting powerful strategies to reach the goals; 3) monitoring his/her performance selectively for signs of progress; 4) restructuring his/her environments to make it compatible with one's goals; 5) managing his/her time efficiently; 6) self-evaluating methods he/she applies; 7) attributing causation to results; and 8) adapting future methods based on his/her self-reflection.

When students learn a new discipline, few of them are immediately able to set up a self-regulatory process for their own learning, and some might lose interest shortly because of lacking intrinsic motivation and extrinsic guides (McPherson & Zimmerman, 2002). That means researchers and designers cannot simply assume that students are capable of self-regulated learning strategies; they should design a set of methods to help students learn these strategies. That was the goal of this course design.

Zimmerman (2000, 2002) divides self-regulatory process into three phases: the Forethought, Performance, and Self-reflection. They provide researchers and designers effective tools to develop self-regulated learning strategies and methods.

The forethought phase includes two major activities: task analysis and self-motivation. Task analysis involves setting specific proximal goals for themselves, and accordingly using powerful strategies to reach the goals. Self-motivation stems from Self-Efficacy Theory (Bandura, 1997). There are three variables influencing a student's self-efficacy belief: "outcome expectations" about personal consequences of learning, "intrinsic interest" referring to the students' valuing of the task skill for its own merits, and "learning goal orientation" referring to valuing the process of learning for its own merits.
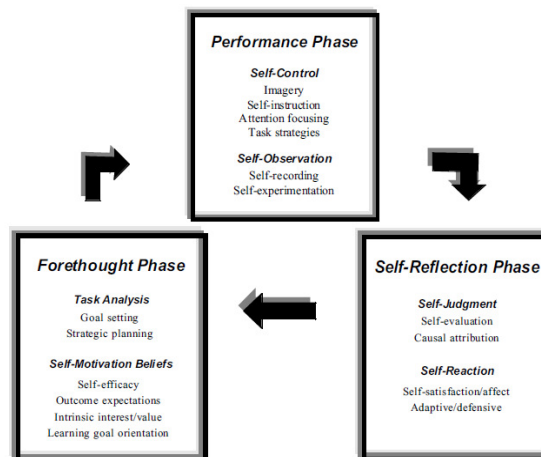
Figure 3. Phases and subprocesses of self-regulation. Reprinted from "Motivating Self-Regulated Problem Solvers," by B. J. Zimmerman and M. Campillo, 2003, p.239, Figure 8.1. Copyright 2003 by Cambridge University Press.

The performance phase of the process includes two major classes: self-control and self-observation. The former refers to the employment of specific methods or strategies identified in the forethought phase. Some exact skills are recommended, such as imagery,

self-instruction, attention focusing, and task strategies. The latter means self-recording personal events or self-experimentation to find out the cause of these events.

The self-reflection phase also contains two major classes: self-judgment and self-reaction. "Self-evaluation" is one form of self-judgment. Self-regulative students may compare self-observed performance with some standards, such as an objective standard, his/her previous performance or others' performance – a pedagogy is worth noticing: Bandura (1994;1997) thinks that teachers should encourage students to compare their performance with the goals set for themselves rather than against peers in order to help improve their self-efficacy. The other form of self-judgment is "causal attribution", which refers to beliefs about the cause of one's errors or successes. If students attribute their failure or success reasons to controlled cause (it often means extrinsic cause), they could be better motivated. This belief can be traced to Weiner's (1985) model of attributions, which outlines the processes through which learners form causal beliefs, including three dimensions: locus, stability, and controllability. These dimensions affect learners' subsequent motivation toward their task or activity. In this model, both environmental factors and personal factors (e.g., prior knowledge) affect individual learners' types of attributions. For example, those individuals who attribute their failure to poor teaching will have a different level of motivation in subsequent examinations from those who attribute their failure to their own lack of innate ability or lack of efforts.

The other class of self-reflection phase is self-reaction. It is often shown in three forms: self-satisfaction and positive affect regarding one's performance, adaptive responses, and defensive responses. Increased self-satisfaction may lead to higher motivation to learn; students with adaptive responses will modify their learning strategies if they find them ineffective; but defensive responses may results in a negative behavior on learning, such as dropping the class.

The three phases are one united, cyclical process. A change in any sub-class or single phase may impact the following learning behaviors, and, in return, impact this phase itself.

<p style="text-align:center">The Development of Self-Regulatory Process Tools</p>

Zimmerman, Bonner, and Kovach (1996) once suggested creating self-monitoring forms for students to help them establish self-regulated studying behavior. Self-monitoring is a covert form of self-observation, refers to one's cognitive tracking of personal functioning (Zimmerman, 2002, p.68). In the model, self-recording is a more effective form of self-observation. In this process, students are asked to collect tangible records.

In the Introduction section of the course, a set of self-regulative process forms (Appendix A-D) were provided and downloadable. Students could apply them to monitor their learning process and behaviors throughout the entire semester. This set of forms was aimed at novice learners and designed to improve their self-regulated skills for this course topic.

Zimmerman (2002) indicates that novice learners are quite different from expert learners. They often fail to engage in high-quality forethought and instead attempt to self-regulate their learning reactively. Most of them are not capable of self-monitoring systematically, and as a result, they tend to rely on comparisons with the performance of others to judge their learning effectiveness. This behavior may lead to extrinsic attribution: when they conduct self-evaluation, they will attribute their success or failure to those causes that they cannot control, and result in a defensive reaction.

On the basis of this perspective, this set of forms placed emphasis on the first phase of the self-regulatory process: the forethought phase (including two classes of task analysis and

building up motivational strategies), and helped students set proximal goals and learn how to monitor their own learning behaviors effectively.

An instructor in this comparative culture study course used his/her expertise on the subject matter to teach the course, shared his/her knowledge with students in the constructivist learning environment, and finally helped students meet their learning goals. The instructor is a learning facilitator in this process. At the same time, this process was designed to develop students' self-regulative skills. With the learning procedure designed in this course, the instructor was able to guide students to apply attached self-regulated learning tools, evaluate their performance, and provide suggestions to improve, although the instructor was not necessarily a SRL expert. Both an instructor and students were participants of this constructivist learning environment, they worked together to develop students' self-regulated learning skills though this platform.

A Self-Regulated Learning Framework based on an Adapted PSI Format

Keller (1968, p.83) defines five major components for his original PSI method, including:

- The go-at-your-own pace feature

- The unit-perfection requirement for advancement

- The use of lectures and demonstrations as vehicles of motivation

- The related stress upon the written word in teacher-student communication

- The use of proctors for feedback

Among the five components, self-pacing is the most controversial feature and many researchers, including Keller himself, admitted that it might lead to procrastination or incompletion (Bufford, 1976; Hess, 1971; Keller, 1968; Reiser, 1984; Sherman, 1972; Szydlik, 1974). Some researchers even thought that this feature did not necessarily contribute to students'

performance (Buskist, et al., 1991; Fox, 2004). However, self-pace is regarded as one of the most popular features for many PSI instructors and students (Cox & Lane, 1981; Fernald, et al., 1975; Lloyd & Zylla, 1981; Weisman & Shapiro, 1973), although some researchers have tried to improve this feature through, for example, setting conditions, self-pace undoubtedly still is a critical component in computer-based or web-based PSI course (Lamwers & Jazwinski, 1989; Price, 1999; Roberts, et al., 1988). Self-pacing is a particularly appropriate feature for web-based instruction.

The optional lectures as motivators have been proved by many studies not vital to student success in PSI courses, and therefore, a number of researchers have suggested removing or modifying this feature in instructional design practice (Brothen & Wambach, 1998; Buskist, et al., 1991; Grant & Spencer, 2003; Hornby & Anderson, 1995). Keller (1974a, p.19) himself stated his own opinion regarding this feature after he had more implementation in PSI practice that it "could be eliminated entirely without serious damage." Reflecting on these research findings and distinguishing web-based learning environment, lectures as motivator could be deleted from a web-based PSI instruction.

The use of student proctor for grading and immediate feedback has been intensively researched since the PSI model became an alternative to the dominant lecture-based method of teaching in 1960'. Many studies show that appropriate proctoring, including immediate feedback, coaching on unit guidance, multi-way communications with students and so on, leads to an improved performance (Chase & Houmanfar, 2009; Fernald, et al., 1975; Taveggia, 1976; Kulhavy, 1977; Kulik et al. 1980). When computers and the Internet are introduced to the PSI method, proctor feedback can be provided in various ways. More and more synchronous and asynchronous technologies are applied to provide feedback to students remotely and effectively

in PSI courses (Herrmann, 1982; Crosbie & Kelly, 1993; Pear & Novak, 1996). With the new technologies, proctor feedback may apply two kinds of styles: one is to allow program to automatically generate feedback; the other one is to keep human proctors providing more elaborate feedback via synchronous or asynchronous method.

Therefore, an adapted PSI model to be applied in this course design is shown as below:

Table 3.

The Original and Adapted PSI Model.

Original PSI Model	Adapted PSI Model	Self-Regulated Learning Methods
1. The go-at-your-own pace feature	• Keep unchanged • Students set task deadline for themselves • Students submit deadline setting to instructor; and discusses it with instructor if any issue through the semester	• Students set learning goals for themselves • Students work on Task Analysis for themselves (Appendix A)
2. The unit-perfection requirement for advancement	• Keep unchanged • Students have to demonstrate their mastery to one unit and complete all assignments before they move on to the next unit	• Students evaluate whether they meet the unit learning goals • Students determine whether they can move on to next unit (Appendix C & D)
3. The use of lectures and demonstrations as vehicles of motivation	• The use of lectures and demonstrations are removed • Students learn to build up and apply their own motivational strategies	• No designed motivators applied • Students will build up their own motivational strategies based on self-regulated tools provided in this class (Appendix B)
4. The related stress upon the written word in teacher-student communication	• Keep unchanged • All learning materials and supplemental information will be conveyed in written text, which is allowed to visit repeatedly • Print is no longer the unique medium of choice for PSI, but rather, internet-based modules. Students can access richer resources in multimedia formats	• Students are asked to submit these documents according to self-planned timeline throughout this course • The learning platform allows students to submit/modify all these documents unlimitedly • Instructor can access these submission asynchronously and provide feedback (Appendix A-D)

Table 3 (continued).

The Original and Adapted PSI Model.

Original PSI Model	Adapted PSI Model	Self-Regulated Learning Methods
5. The use of proctors for feedback	• Keep unchanged in general • Human instructors and proctors will be applied	• Human instructors or proctors are subject matter expert on this class topic; they are able to provide professional suggestions to students through their learning process on course resources, learning goals, outcomes, and etc. • They are not necessarily familiar with SRL tools. They just follow the steps in this designed system and offer suggestions based on their subject expertise.

<div align="center">The Course Structure</div>

This course content relied primarily on the book, "The United States and China" (Fairbank, 1983), and supplemental materials, including some other books of Dr. Fairbank and other relevant documents. There were four parts in this book, "Introduction", "The Old Order", "The Revolutionary Process", and "The United States and the People's Republic of China".

Self-Paced: At their own pace, students read units, applied the self-regulated learning tools to set their learning goals, determined their learning strategies, and monitored their learning performance. Some of the assignments needed to be submitted via asynchronous tools. When a student was ready and believed that he/she had mastered this unit, both the instructor and he/she worked together to decide whether he/she was allowed to proceed to the next unit. A portion of the assignments was counted into final grading.

Proximal Development of Self-Regulated Skills: The entire course was suggested to divide into at least three stages. And two mid-term exams and one final exam were conducted at the end

of the three stages respectively. Students only took these exams once and submitted to the instructor via asynchronous tools. The exam scores were counted into the final grading. Students were required to submit all self-regulated forms and assignments at their first learning stage. An instructor and this student determined together whether or not the instructor's coaching could be faded out gradually. If they decided that the student had been able to self-regulate his/her learning after the first stage, he/she was allowed to voluntarily submit self-regulated forms in the rest stages of the learning, but he/she still needed to submit the necessary papers to present his/her learning outcomes at each stage.

This course was conducted via the web. Proctoring was done over the web through using asynchronous communication tools at students' choice. Instructors' office hours were intended to be an opportunity for communication between instructors, guest instructors, proctors, and students. Using the Internet technologies and relevant tools, the interactions in this learning community were maximized. One instructor was assigned to manage this course over this semester.

Development of the Course

Keller and Sherman (1974) suggest PSI steps for instructors and students. The instructor part indicates: 1) the instructor designs course policy statement, which includes grading policy, final exam policy, incomplete policy, unit quiz rules, defining what a pass means, proctor assignment, internal proctor, class hours, and special announcements; 2) the instructor breaks content into topical chunks or units; and 3) the instructor develops study guides for each unit; the study guides include: introduction, unit objectives, study questions, and a study procedure; 4) the instructor designs unit quizzes.

During the design process, this course applied and adapted these principles based on actual needs. The purpose of this class was not only to teach this culture study subject to students, more importantly, students learned/improved their self-regulated skills through learning this course subject. Therefore, the instructor's role in this course included: 1) designing course policy statement, which includes grading policy, final exam policy, incomplete policy, defining a "pass", proctor assignment, internal proctor, class hours, and special announcements; 2) dividing content into topical units; in this course, students are suggested to break the entire learning into three stages; 3) helping students to develop their own guides for each unit; they may consider these aspects: unit objectives, study questions, and a study procedure; 4) considering the course learning purpose and the special learning subject contents, this course will not apply unit quizzes. Students will be allowed to participate in determining whether or not they meet their learning goals which are set by themselves; and 5) throughout the entire learning, the instructor will focus on helping students develop their self-regulated learning skills via the self-regulated learning tools (in Appendix A-D).

The Instructor Role and the Proctor Role

There were two types of assignments in this class. One was this set of self-regulative forms; the other one was class papers including short unit discussion papers and stage topic papers. If a proctor was assigned to this class, generally, he/she played the same role as an instructor did in this class – supervising students' completing their self-regulative forms, and grading the class papers.

Development of Course Policy and Syllabus

First, the course syllabus was provided in this section. The syllabus explained the course background, learning objectives, learning procedure introduction, class activities, and

assignments. Second, the policy statement included grading policy and exam policy. The four

self-regulated learning tools were introduced in this section. Students had a separate page to

access these four forms. Figure 4 shows the layout of the course policy and syllabus.

Introduction
Welcome to "The United States and China" study class! This module will conduct a culture comparative study via introducing Dr. Fairbank's book, "The United Stated and China" (1983), and some of his other major books in this field will be suggested to be supplemental reading materials. You are expected to have basic prior knowledge on the two countries' history and culture development, though it is not mandatory. However, it is necessary to have a strong interest to this subject since you will take a different learning journey from most of your previous in-classroom course. Your interest and insistence are major factors leading to your success in this class.

Objectives
• Throughout this class, you will write at least three discussion paper on topics you identify from these reading materials to convey your understanding and view of points to these topics; • You will establish your own learning goals, identify relevant resources, and know how to take advantage of these resources in the most appropriate ways; an instructor will help you evaluate whether or not your goals and learning strategies are appropriate; • You will monitor your entire learning process and initially adjust your learning strategies when necessary; • You will evaluate your learning performance, and summarize effective strategies to improve your learning ability; • You will be able to apply the method practiced in this class to other learning contexts.

Reading Materials
Required Material: The United States and China. John K. Fairbank. 4th. ed. Cambridge, MA: Harvard University Press, 1983. **Supplemental Materials:** 1. China: A New History. John K. Fairbank and Merle Goldman. Cambridge, MA: Belknap Press of Harvard University Press, 1992. 2. China Watch. MA: Harvard University Press, 1987. 3. The Cambridge History of China. John K. Fairbank and Denis C. Twitchett. Cambridge University Press, 1979. 4. Fairbank Center for Chinese Study website: http://www.fas.harvard.edu/~fairbank/

Learning Procedure
1. Briefly read this required book and break the contents into at least three stages for yourselves at the class preparation phase; you will complete this class in your formal learning phase after the preparation is done; 2. Establish learning goals of each stage for yourselves at the preparation phase; 3. Following the directions, complete the Self-Regulation Forms for each stage; 4. Submit your short unit discussion paper to your instructor based on your own schedule; 5. Submit your topic paper at the last week of each stage; 6. It is necessary to submit all assignments (self-regulative forms and class papers) to this course system at the first stage; however, you can discuss with your instructor on whether or not you will need to submit all the forms for the rest stages in the course.

Figure 4. Course Policy and Syllabus Webpage after students enter into this class.

Development of Unit Study Guides

The students were asked to purchase this book, "The United States and China" (Fairbank, 1983). This course also listed relevant learning materials. A database was applied to host students' and instructor's entries. Students had unlimited access to these materials at their own pace.

This class did not provide the exact study guides from the instructor. Students were asked to develop their own unit objectives, study questions, and a study procedure. Students should read the book and reference materials first, and then develop their own unit learning plan, such as, the interesting points and relevant historical background. Further, they developed their own "Unit Learning Objectives" for each unit to identify specific learning objectives to their own focus and interests; the instructor facilitated the entire procedure and provided improvement suggestions during this course. Mager's (1997) perspectives on how to structure an effective learning objective were referred in this section; students could access relevant information online and learn to effectively establish their learning goals for each stage and each unit. Next, they should develop their own "Study Questions" to cover the main points to help themselves better understand this unit. In this process, based on the unit learning objectives, they identified what supplemental learning materials they needed to read, and completed required class assignments.

Development of Unit "Pass/No"

There were no designed quizzes in this course. Students evaluated their own learning, and decided whether or not they moved on to the next unit. The instructor supervised this process and provided suggestions. It was the instructor's responsibility to make sure that a student met the learning goal he/she set for himself/herself at the beginning, but the supervision from the

instructor faded with the pace of students' growth. The instructor repeatedly reviewed each student's self-regulation forms to know their learning progress, and could require students to go back to re-learn this unit when the instructor found it necessary. This was an active learning process rather than a passive one. Instruction aimed at process planning more than content planning. It was the students who played an initiative role in structuring their own learning. This process is described by Knowles (1975; 1986) on contract learning of Andragogy. This part had thirty percent weight in the final grading. In other words, students could decide to give full-score to themselves in this part; or simply go back to re-view this unit. Under an instructor's supervision, they decided for themselves whether they had met their own learning goals.

Writing an essay for some units was mandatory. This part, a short unit discussion paper, was submitted to a proctor or an instructor through back-end database. Students were asked to submit 5 unit discussion papers throughout the entire class. This part occupied twenty percent of the final grade. Students were asked to explain his/her perspectives and provide relevant references aiming at one or several problems discussed in this unit.

Only when both the student and the instructor believed that this student had mastered this unit, did this student be recommended to access the next learning unit. This feature was mandatory at the first stage of the learning, and became gradually weaker from the second learning stage. Students checked instructor's comments in this e-learning platform. The unit passing rule (pass/fail type) was introduced in the course policy section.

Mid-term and final exams were comparative study projects. Students were asked to identify topics from the book. In addition to the book, he/she needed to discover other books or research to support his/her opinions. He/she should discuss their topics from different perspectives, and

finally conveyed his/her own point of view. The two occupied twenty percent of the final grade respectively.

Students set a timeline at the beginning of each learning stage. If one student could not meet his/her own planned schedule, he/she could discuss with the instructor to re-set the deadline. Students were encouraged to strictly follow the learning timelines and task deadlines they set for themselves at the beginning of the course. If they missed some of them, an instructor was responsible for providing coaching to adjust the plans properly.

<div align="center">Evaluation of Design Paper Work and Final Product</div>

This project timeline was:

Stage 1: Working on the course module design plan – the original draft of the chapter one to three in this dissertation; submitting the design plan to theoretical experts for review; revising the design plan based on experts' review feedback.

Stage 2: Completing the eLearning product design based on the revised design plan; inviting a small group of evaluators to evaluate this final product and its major features; revising the final product based on small group evaluation feedback.

Stage 3: Modifying the final product description and analysis paper work – the chapter one to five in this dissertation; submitting the summary to instructional design experts for further review; revising the final product and this dissertation based on instructional design expert reviewers' feedback.

There were three levels of evaluations conducted in the entire developmental research process: (1) expert review of the design paper work by theoretical experts in PSI and Self-Regulated Learning fields; (2) small group evaluation of the final course product by online

program learners – ITMA students; (3) and expert review of the completed designed course module and learning procedure by instructional design experts.

Expert Review- Proof of Theoretical Concepts

The first level of the formative evaluation is an expert review of this course module design plan. The original draft of the chapter one to three was submitted to four theoretical experts in PSI and SRL domains. In addition, Table 4 and Appendix A-D were attached to explain the theoretical base of the question design in the "Expert Review Checklist" (Appendix E and F).

Dr. John Burton reviewed the entire design not only from an advisor perspective, but also as a PSI expert. Dr. Metzler, a professor at Georgia State University, was invited to review the paper work on the adapted PSI framework as another PSI expert. The file was sent to them via emails. They were free to take any method to provide feedback: either filling out the "Expert Review Form" (Appendix E) or applying MS Office Word "Track Change" feature. Dr. Burton provided feedback via the "Track Change" feature; and Dr. Metzler sent this "Expert Review Form" back – he not only gave comments on fidelity to PSI, but also offered comments on fidelity to self-regulated learning.

Dr. Zimmerman, the professor at University of New York City, and Dr. Jones, the professor at Virginia Tech were invited to review the self-regulated theoretical parts. The file was sent to them via emails, too; and they also applied the Word "Track Change" to provide review comments.

Small Group Evaluation – E-Learning Course Feature Evaluation

Four ITMA students, currently enrolled or previously enrolled in at least two ITMA courses in the past three years, took part in the small group evaluation. When the researcher identified the small group evaluator candidates, in addition to their distance learning experiences, their

instructional experiences either in classrooms or in online environments were considered. They were asked to evaluate this product from two perspectives: online student user and online instructor user.

The four evaluators were given access to this course demonstration link in a limited time duration: http://204.111.165.95/SelfRegulated/index.html. The web page acquired two sets of IDs, one was for student users, and the other one was for instructor users. Their feedback was gathered via VT Survey. The questionnaire sample is presented in the Appendix G: Small Group Evaluation Checklist. This checklist design was based on the features and layout of this course module shown in Figure 5 and 6.

The evaluators were not asked to focus on the learning materials and learning outcomes themselves (unless some of them were especially interested in a certain subject); instead, they were requested to go through the entire course modules and provide comments on its e-learning features and the instructional procedure.

Expert Review- Instructional Design Evaluation

After the project was developed into a solid course based on above evaluations outcomes, Dr. Hodges, a professor at Georgia Southern University, was invited to review the entire work from an instructional design expert perspective. The design paper work was also sent to him via an email, and he provided feedback in a written email.

Dr. Cennamo, the professor at our IDT, was invited to review the completed project as a dual role – expert on instructional design and theorist of self-regulated learning. After going through the revised "Introduction" and "Discussion" parts submitted to her via a print file, Dr. Cennamo provided her comments in a written email, too.

CHAPTER FOUR: The Final Product

Overall

In this chapter, the final product and learning procedure are discussed in terms of the modifications made which were based on the outcomes of expert review and the small group evaluation summary. This chapter is to illustrate the development of this project after the design process has been introduced in the above chapter.

This e-learning course module was developed via SQL script language and Adobe Dreamweaver™. A personal computer running the Windows 7™ operation system was set as a server to run the database developed via SQL.

The student learning experience is shown in Figure 5. The students worked with four self-regulative forms and submitted five unit-discussion papers and at least three stage-topic papers in this course. During the process, they were allowed to update their self-regulative forms at any time. Instructors gave immediate and direct feedback to students as soon as the latter submitted/updated their self-regulative forms. The reason that this module emphasized the importance of immediate and direct feedback to students, instead of a formal instruction of all details, is based on the self-regulated learning researchers' belief: self-regulated learners are capable of transforming their mental abilities into academic skills; in this process, they control their thinking, take some purposed actions or strategies to learn, and motivate themselves to learn. The major features of this process are learners' self-observation, self-evaluation and self-reaction (Zimmerman, 1990, 2002). In short, self-regulated learning methods mainly concentrate on learning "learning methods" – teaching learner's megacognitive skills by social cognitive methods. This course module is to an attempt to illustrate this process and explore the channels

of applying this method into various subjects. On the other hand, PSI principles require

immediate feedback. The component helps shape students' learning behaviors (Sherman, 1982a).

Course Preparation Phase

Course Learning Phase

3
Submit Unit
Discussion
Paper

2
Submit/update
Motivational
Strategies Form

4
Submit Stage
Topic Paper

Access to
this Course

Roughly
Review this
Book

Break the
learning
into a few
stages

Learning
Stage 1

1
Submit Task
Analysis
Form

5
Submit
Performance
Phase Form

6
Submit Self-
Reflection
Form

Stage
2

Stage
3

Stage
4

Stage
5

Stage
6

Figure 5. The learning process that a student user follows in this course.

The course module interface and layout is described in figure 6, this is a big picture about the course module design. In addition to course information pages, the six databases, including "Task Analysis," "Motivational Strategies,", "Unit Discussion Paper,", "Stage Topic Paper,", "Performance Phase,", and "Self-Reflection," which allow students to submit their assignments, are core functions connecting students and instructors.
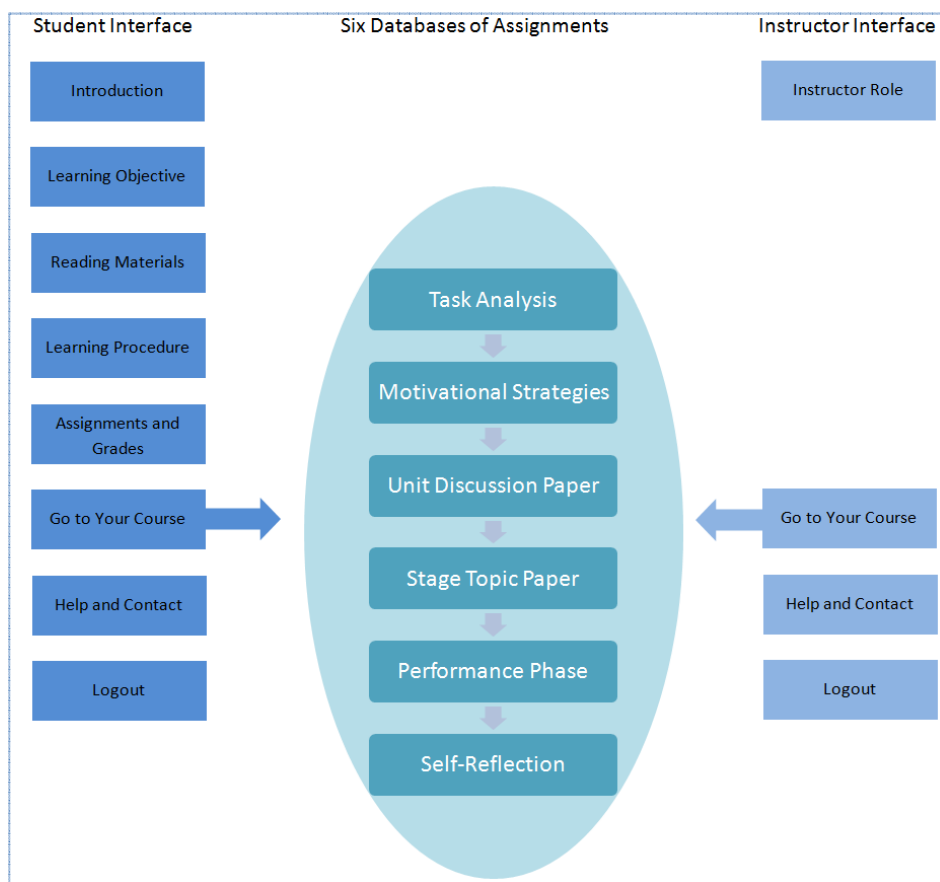
Figure 6. Course Module Interface and Layout.

The following sections briefly describe these pages.

Student Interface

Small group evaluators were given two sets of access to this course module: student ID and instructor ID. They access the course via the same page:

Figure 7: Login Page of This Class.

The overall learning procedure for students was presented on the "Introduction" page and illustrated on the "Learning Procedure" page. Both students and instructors could ask for help by clicking on the "Help and Contact" button of the navigation bar on any page.

Introduction Page

After students logged in to the class, they saw this Introduction page first:

Figure 8. Part I of Student Introduction Page.

On the left navigation bar, the syllabus and class policy were divided into five sections on the five web pages to give novice learners clearly-organized information: "course introduction," "course learning objectives," "reading materials," "learning procedure," and "assignments and

grades". Figure 8 presents a screen capture image of the top half page of this "Introduction" page. In this part, students were given information about a basic background, and a brief direction of taking this class. First of all, they needed to break this class into three learning stages.

Table 5 presents a concrete direction to students on how to take this class, including how to fill out each self-regulative form, what self-regulative skills they will take from this assignment, and the working procedure and rules when they work with these forms. This table was also placed on the Introduction Page for students.

Throughout the entire class, students were expected to work with four self-regulative forms and completed their personal discussion or topic papers.

These four forms included:

1. Task Analysis Form (Appendix A): Students determine their own learning goals for the entire class, for each learning stage, and for each learning unit. This form offers step-by-step instruction on how to set learning goals.

2. Motivational Strategies Form (Appendix B): Students identify the most effective motivational strategies for themselves through 25 questions, and are encouraged to repeatedly re-view these questions, and update their own strategies.

3. Performance Phase Form (Appendix C): Students apply this tool to monitor and control their learning process, and adjust their learning strategies accordingly.

4. Self-Reflection Form (Appendix D): Students evaluate their learning for the previous stage and apply these reflections to improve their learning in the next stage.

There were two kinds of papers that students needed to submit:

1. Unit Discussion Paper: there were total of 16 units in this class, and students were asked to choose 5 of them and complete a short discussion paper for this unit.

2. Stage Topic Paper: Students needed to submit topic paper for each of three (or more) learning stages. An instructor would consider two of these papers as two mid-term exams; and the third as a final.

Table 4.

Part II of Student Introduction Page.

Learning Task	Self-Regulative Skills for students	Remarks
Task Analysis Form	determine your learning goals	• Submit it at the *beginning of each learning stage* • You can keep updating it at any time in this class • Therefore, you need to submit this form for *three times* at least
Motivational Strategies Form	set the most effective learning and motivational strategies for yourself	• Submit it at the *beginning of this class* • You can keep updating it at any time in this class • Therefore, you need to submit this form for *one time* at least
Performance Phase Form	self-observe and self-control your learning process	• Submit this form at the *end of each learning stage* • You can keep updating it at any time in this class • Therefore, you need to submit this form for *three times* at least • Fill out this form against your Task Analysis Form every time

Table 4 (Continued).

Part II of Student Introduction Page.

Learning Task	Self-Regulative Skills for students	Remarks
Self-Reflection Form	review and evaluate your learning	• Submit this form at the *end of each learning stage* • You can keep updating it at any time in this class • Therefore, you need to submit this form for at least *three times* at least
Unit Discussion Paper	Consider it as one of your motivational strategies!	• Choose five units from the total 16 unites of this class • Submit unit discussion paper at the *end of each unit* of the five • Therefore, you need to submit at least *five* unit discussion paper
Stage Topic Paper	Consider it as one of your motivational strategies!!	• Submit the paper at the *end of each learning stage* • Therefore, you need to submit at least *three* stage topic papers in this class

Learning Objective Page

On this page, students were informed of the learning objectives of this class. In addition to the class subject, a special objective was emphasized in this objective statement: this was also a learning process of self-regulative skills; students were expected to be capable of applying the learning methods to other learning contexts after they complete this class.

Reading Materials Page

This class suggested that students purchase their own copy of the required textbook. Some relevant supplemental materials, most of them were also Dr. Fairbank's works, were listed here as reference when students worked on their paper assignments.

The official website (http://www.fas.harvard.edu/~fairbank/) of the Fairbank Center for Chinese Study, sponsored by Harvard University, gave an overall picture of Dr. Fairbank's research work and contribution to this field. It also provided a comprehensive background of this class subject. In this class, students were encouraged to seek and apply every resource as much as they could find – knowing how to identify appropriate sources and properly applying these sources are two of major characteristics of a self-regulated learner (Schunk & Zimmerman, 1994, 1998; Winne, 1995; Zimmerman, 1989b; Zimmerman & Schunk, 2001). These online references offered students with models helping them seek more resources from wider channels on their own.

Another critical feature of self-regulated learning was the mega-cognitive skill. Students were taught to learn, and to gain learning skills, through different learning materials (Zimmerman & Schunk, 2011). Whether or not students could set an appropriate learning goal for themselves was considered as a significant factor to be successful in this class. The instructions on how to write a learning goal in ITMA (Software Evaluation class) was incorporated on this page. Students were expected to learn to write, practice, and finally complete their own learning goals for different learning levels. In this process, instructors should provide immediate feedback as soon as students submitted a new entry about their learning goals.

Learning Procedure Page

This was an instructive flowchart illustrating the learning procedure. During the first week of this class, students completed the preparatory work for the class, including going through the book, breaking their learning into three stages, and establishing their learning goals. Beginning from week two, students worked with the set of self-regulative forms as part of the class.
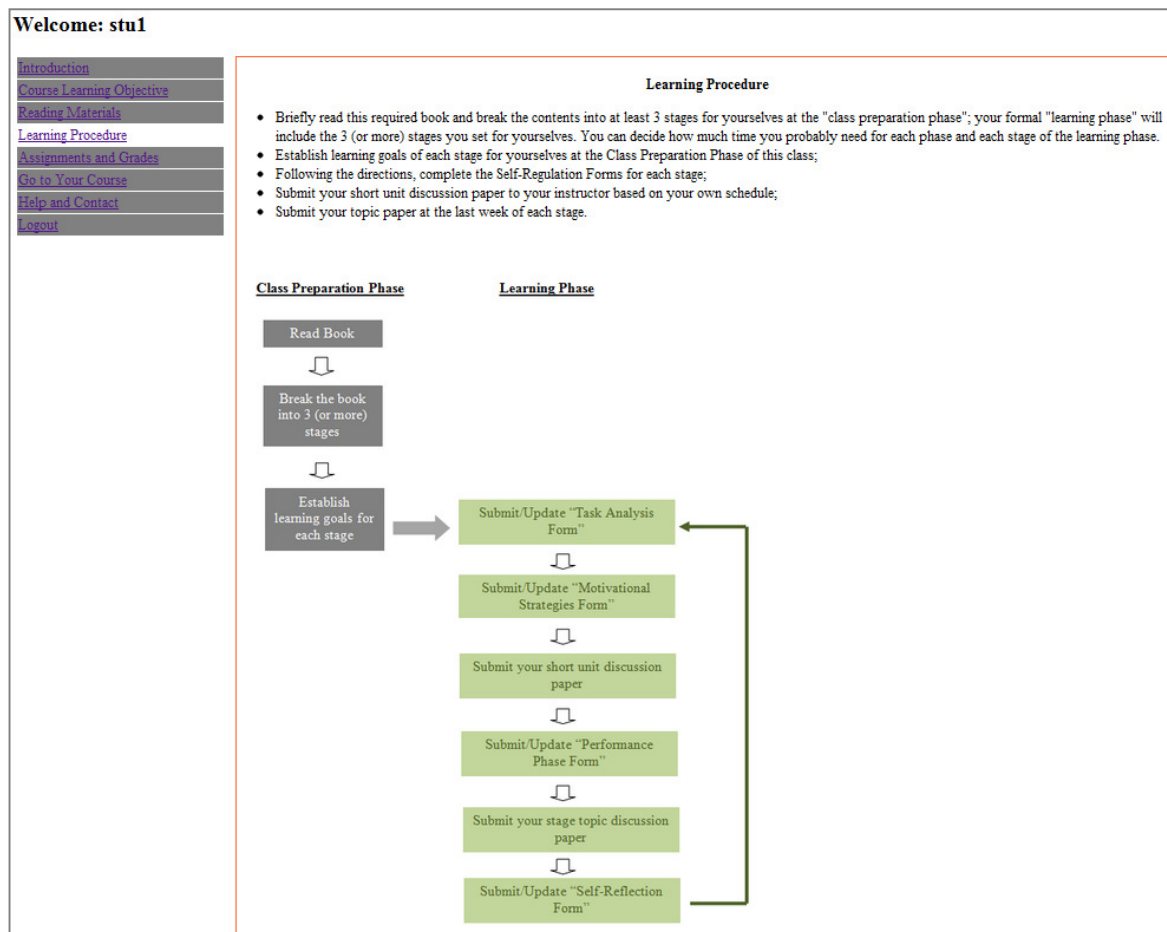

Figure 9. Learning Procedure Page.

Assignment and Grading Page

This page was also demonstrated in the design plan in Chapter Three. Completing the set of self-regulative forms and efficiently communicating with instructors on them was given a major

weight in the grading system. Topic papers for each of the three learning stages totally weighted 60% in the final grade. When instructors reviewed and graded these papers, they should concentrate on whether or not the paper had reflected the student's learning goal, whether or not they had applied various resources in their learning, whether or not they could use what they had learned in the previous stages/units to improve their following learning.

Go to Your Course Page

Students were able to access their self-regulative forms and worked on their assignments via this page. For students' convenience, this module also provided major learning material links on this page under the "Learning Resources" section at the top of this page.

There were six databases on the "Learning Procedure" section of this page. Students viewed their self-regulative forms, filled them out, submitted them, and updated them at any time of the entire class. Figure 9 shows the page view.

Welcome: stu1

Introduction
Course Learning Objective
Reading Materials
Learning Procedure
Assignments and Grades
Go to Your Course
Help and Contact
Logout

Learning Resources

The United States and China

How to Write a Learning Goal

Learning Procedures

1. Submit/Update "Task Analysis Form" and view instructor feedback

   Submit/Update Task Analysis Form

ID	Planning Date	Instructor Name	Review Date	Action

2. Submit/Update "Motivational Strategies Form" and view instructor feedback

   Submit/Update Motivational Strategies Form

ID	Planning Date	Instructor Name	Review Date	Action

3. Submit your short unit discussion paper and view instructor feedback

   Submit your short unit discussion paper

ID	Planning Date	Instructor Name	Review Date	Action
1	2012-02-15 15:30:59	ins1		

4. Submit/Update "Performance Phase Form" and view instructor feedback

   Submit/Update Performance Phase Form

ID	Planning Date	Instructor Name	Review Date	Action

5. Submit your stage topic discussion paper and view instructor feedback

   Submit your stage topic discussion paper

ID	Planning Date	Instructor Name	Review Date	Action

6. Submit/Update and submit "Self-Reflection Form" and view instructor feedback

   Submit/Update Self-Reflection Form

ID	Planning Date	Instructor Name	Review Date	Action

Figure 10. Go to Your Course Page – original view.

After students submitted entries to the six databases, they were able to see the list embracing the assignments they had already submitted. They could re-submit any assignment unlimited number of times during the class term, and every new entry would be shown. Figure 10 shows the page view after a student submitted some assignments and an instructor had viewed and given comments.

90

Figure 11. Go to Your Course Page – page view after submitting assignments.

When a student clicked on the link at the top of each database, such as the "Fill Out the Task

Analysis Form", "Fill Out the Motivational Strategies Form", on this page, she/he was able to

submit a new entry; when she/he clicked on the link inside the database frame, the "view &

Resubmit", she/he would see the previous entry, and could view the instructors' feedback, and choose to re-submit this form to the instructors.

The six databases were listed on this page. In the following section, the six databases will be introduced one by one.

Database 1: Task Analysis Form Page

When a student opened the "Task Analysis Form" window, she/he would see the direction information at the top of this page. This was a step-by-step instruction on working with this form. A complete designed form is in the Appendix A.

Figure 11 shows the working table of the Task Analysis Form. After a student submitted an entry to an instructor, the instructor could provide comments back to the student, and then the student could check the comments on this page.

Figure 12. Task Analysis Form Page – working table checking instructor comments view.

Database 2: Motivational Strategies Form Page

Motivational Strategies Form helped students identify the most effective learning strategies for their learning; and they could summarize their own personal strategies after they went through the questionnaire. The Motivational Strategies Form (Appendix B) is the form design, and Figure 18 shows the sample of this web page.

When a student opened the Motivational Strategies Form, the directions were presented at the top of the page. They chose from a 7-point Likert Scale embracing 25 items to construct their motivating strategies. Figure 12 is a sample page of this database.

Motivated Strategies for Learning Questionnaire for "The United States and China" Course

Student Name: stu1, Submit Date: 2011-07-16 14:48:16, Review Date: 2011-07-16 14:48:44

		Not Very True of Me .... Very True of Me
1.	I prefer class work that is challenging so I can learn new things	○1 ○2 ○3 ◉4 ○5 ○6 ○7
2.	I'm certain I can understand the ideas taught in this course	○1 ○2 ○3 ◉4 ○5 ○6 ○7
3.	I think I will be able to use what I learn in this class in other classes	○1 ○2 ○3 ◉4 ○5 ○6 ○7
4.	I expect to do very well in this class	○1 ○2 ○3 ◉4 ○5 ○6 ○7
5.	Compared with others in this class, I think I'm a good student	○1 ○2 ○3 ◉4 ○5 ○6 ○7
6.	I often choose topics I will learn something from even if they require more work	○1 ○2 ○3 ◉4 ○5 ○6 ○7
7.	I am sure I can do an excellent job on the problems and tasks assigned for this class	○1 ○2 ○3 ◉4 ○5 ○6 ○7
8.	Even when I do poorly on an assignment I try to learn from my mistakes	○1 ○2 ○3 ◉4 ○5 ○6 ○7
09.	I think that what I am learning in this class is useful for me to know	○1 ○2 ○3 ◉4 ○5 ○6 ○7
10.	Compared with other students in this class I think I know a great deal about the subject	○1 ○2 ○3 ◉4 ○5 ○6 ○7
11.	When I study for assignments and activities, I try to put together the information from all sources	○1 ○2 ○3 ◉4 ○5 ○6 ○7
12.	I ask myself questions to make sure I know the material I have been studying	○1 ○2 ○3 ◉4 ○5 ○6 ○7
13.	It is hard for me to decide what the main ideas are in what I read	○1 ○2 ○3 ◉4 ○5 ○6 ○7
14.	When work is hard I either give up or study only the easy parts	○1 ○2 ○3 ◉4 ○5 ○6 ○7
15.	When I study I put important ideas into my own words	○1 ○2 ○3 ◉4 ○5 ○6 ○7
16.	I always try to understand what the textbook is saying even if it doesn't make sense.	○1 ○2 ○3 ◉4 ○5 ○6 ○7
17.	When studying, I copy my notes over to help me remember material	○1 ○2 ○3 ◉4 ○5 ○6 ○7
18.	Even when study materials are dull and uninteresting, I keep working until I finish	○1 ○2 ○3 ◉4 ○5 ○6 ○7
19.	I use what I have learned from old homework assignments and the textbook to do new assignments	○1 ○2 ○3 ◉4 ○5 ○6 ○7
20.	I often find that I have been reading for class but don't know what it is all about	○1 ○2 ○3 ◉4 ○5 ○6 ○7
21.	When I am studying a topic, I try to make everything fit together	○1 ○2 ○3 ◉4 ○5 ○6 ○7
22.	When I'm reading I stop once in a while and go over what I have read	○1 ○2 ○3 ◉4 ○5 ○6 ○7
23.	I outline the chapters in my book to help me study	○1 ○2 ○3 ◉4 ○5 ○6 ○7
24.	I work hard to get a good grade even when I don't like a class	○1 ○2 ○3 ◉4 ○5 ○6 ○7
25.	When reading I try to connect the things I am reading about with what I already know.	○1 ○2 ○3 ◉4 ○5 ○6 ○7

Self-reflection:

Motivational strategies for the United States and China class.

Here the student can review his/her writing, update it, and re-submit it.

[Submit] [Reset]

Comments from Instructor:

Instructor Comments:

Here are some suggestions for you.

Here the student can check up an instructor's feedback.

Figure 13. Motivational Strategies Form – working table checking instructor comments view.

Database 3: Performance Phase Form

The Performance Phase Form provided a tool of monitoring learning process to students. They were asked to self-record their own learning processes from five different aspects for each learning unit, such as "how to apply a learning resource". This form is in Appendix C. Figures 13 shows a sample of this working table webpage.

Figure 14. Performance Phase Form – working table checking instructor comments view.

Database 4: Self-Reflection Form

The Self-Reflection Form provided students with a tool to self-evaluate their own learning.

Students were asked to evaluate their learning in the previous stage and reflect their learning, and

then improved the next stage of learning. This form is in Appendix D. Figure 14 shows this page

view on a student interface.

95

Figure 15. Sample of Self-Reflection Form.

Database 5: Unit Discussion Paper Page

Students were asked to choose five from the sixteen units and completed five unit discussion papers. They would receive comments from a proctor or an instructor for each paper; they could also update any paper based on the instructor's comments and re-submit it. Figure 15 shows the working table of submitting this paper; when a proctor or an instructor gave comments on this paper, the comments would be shown at the bottom of this page.

Welcome: stu1

Introduction
Course Learning Objective
Reading Materials
Learning Procedure
Assignments and Grades
Go to Your Course
Logout

Short unit discussion paper:

Student Name: stu1, Submit Date: 2011-07-16 15:21:21, Review Date: 2011-07-16 15:21:46

Discussion Paper for Unit 2: The Nature of Chinese Society in the Nineteen Century

After a student submits this paper and an instructor gives feedback, the student can check the feedback here.

Instrucotr Comments:

Here are some suggestions for you.
Submit Reset

Figure 16. Unit Discussion Paper Page.

Database 6: Stage Topic Paper Page

Students were asked to submit a topic paper for each one of the three learning stages. They would receive comments from a proctor or an instructor for each paper; they could also update any paper based on the proctor or instructor's comments and chose to re-submit it. The figure 16 shows the working table of submitting this paper; when a proctor or an instructor gave comments

to this paper, the comments would be shown at the bottom of this page. This page is almost

identical with "Unit Discussion Paper Page".
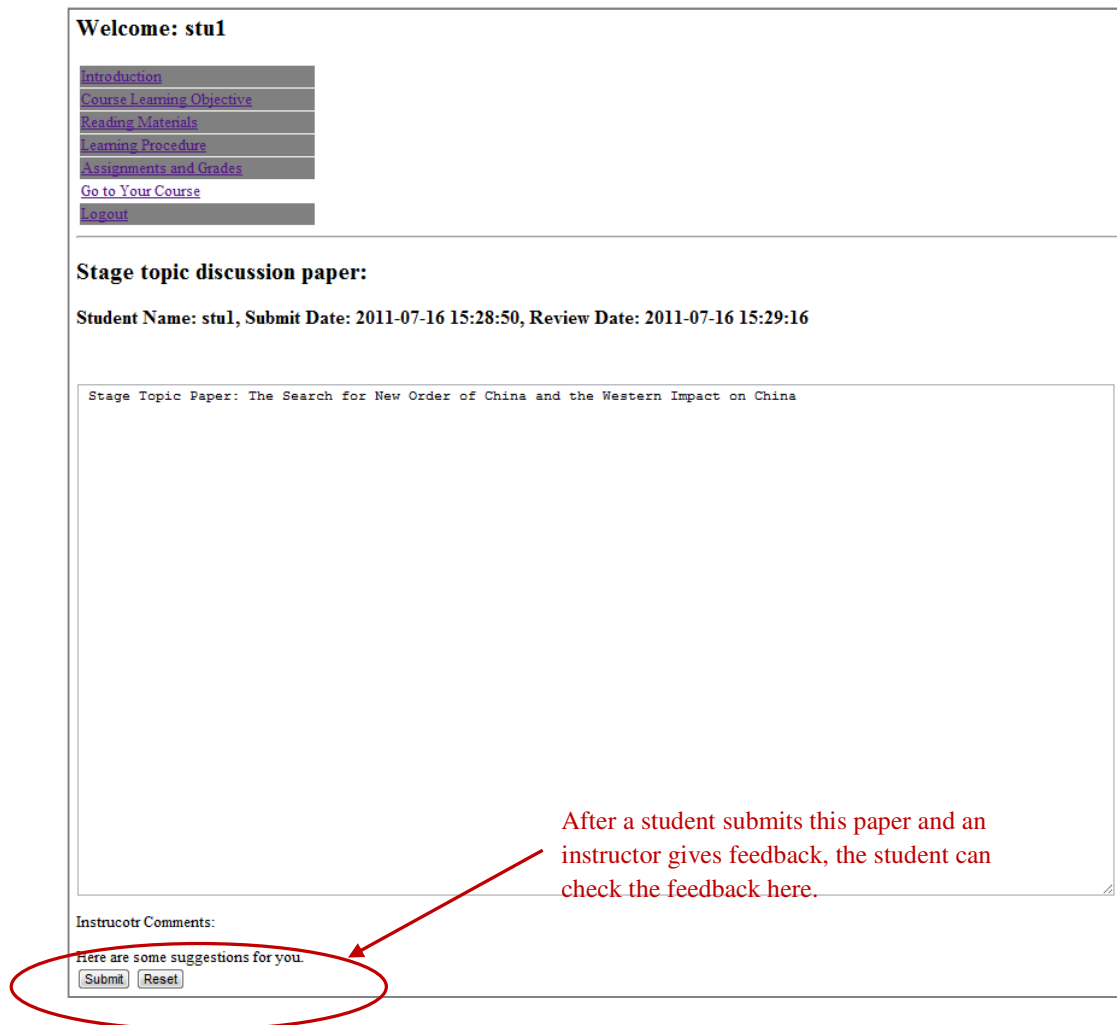
Figure 17. Stage Topic Paper Page.

Instructor Interface

The proctor's role was filled by a previous student who had taken this class before, and had

knowledge of the class subject.

This class did not provide additional training to instructors on how to direct students

working on this set of tools. Through the set of self-regulated learning forms and learning

procedure, instructors would follow a step-by-step process to direct students' learning on the comparative culture study class, and gradually helped students gain the learning outcome of this class: improve their self-regulated learning skills. However, some basic information and working tables were offered via instructor interface.

<center>Instructor Role Page</center>

On this page, instructors were given information about this class. Most of the information had been presented on the students' interface pages. Figure 17 gives a sample of some information on this page.

Figure 18. Sample of Instructor Role Page.

The flowchart indicating students' learning procedure (Figure 11) was also on this page for the instructor's reference.

<center>99</center>

In addition, two tables, directing an instructor's working schedule and responsibilities from the PSI and SRL perspectives respectively, were presented on this page.

"Supervising Students' Learning" (Table 6) explained the working schedule and frequency of an instructor, and their responsibilities from a self-regulated learning perspective. "Important Responsibilities of an Instructor or a Proctor" (Table 7) described these from an adapted Personalized System of Instruction perspective.

Table 5.

Supervising Students' Learning.

Learning Task	Self-Regulative Skills for students	Students' Work	Instructor's Work
Task Analysis Form	determine your learning goals	• Submit it at the *beginning of each learning stage* • You can keep updating it at any time in this class • Therefore, you need to submit this form for *three times* at least	• Provide feedback to students no later than one week after they submit one entry • You need to provide your feedback to each student on this form for at least three times
Motivational Strategies Form	set the most effective learning and motivational strategies for yourself	• Submit it at the *beginning of this class* • You can keep updating it at any time in this class • Therefore, you need to submit this form for *one time* at least	• Provide feedback to students no later than one week after they submit one entry • You need to provide your feedback to each student on this form for at least one times
Performance Phase Form	self-observe and self-control your learning process	• Submit this form at the *end of each learning stage* • You can keep updating it at any time in this class • Therefore, you need to submit this form for *three times* at least • Fill out this form against your Task Analysis Form every time	• Provide feedback to students no later than one week after they submit one entry • You need to provide your feedback to each student on this form for at least three times
Self-Reflection Form	review and evaluate your learning	• Submit this form at the *end of each learning stage* • You can keep updating it at any time in this class • Therefore, you need to submit this form for *three times* at least	• Provide feedback to students no later than one week after they submit one entry • You need to provide your feedback to each student on this form for at least three times
Unit Discussion Paper	Consider it as one of your motivational strategies!	• Choose five units from the total 16 unites of this class • Submit unit discussion paper at the *end of each unit* of the five • Therefore, you need to submit at least *five* unit discussion paper	• Provide feedback to students no later than two weeks after they submit one entry • You need to provide your feedback to each student on five of the papers at least.
Stage Topic Paper	Consider it as one of your motivational strategies!!	• Submit the paper at the *end of each learning stage* • Therefore, you need to submit at least *three* stage topic papers in this class	• Provide feedback to students no later than one week after they submit one entry • You need to provide your feedback to each student on the papers.

Table 6.

Important Responsibilities of an Instructor or a Proctor.

Original PSI Model	Self-Regulated Learning Methods	Instructor's Responsibilities
1. The go-at-your-own pace feature	• Students set learning goals for themselves • Students work on Task Analysis for themselves (Task Analysis Form)	• Help students set reasonable goals and supervise their learning process • Remind them of amendment when necessary • Leave them to make a decision
2. The unit-perfection requirement for advancement	• Students evaluate whether they meet the unit learning goals • Students determine whether they can move on to next unit (Performance Phase Form, & Self-Reflection Form)	• Supervise their learning process and review their unit discussion paper • Provide feedback and suggestions on whether or not you think they are eligible to moving on • Leave them to make a decision
3. The use of lectures and demonstrations as vehicles of motivation	• No designed motivators applied • Students will build up their own motivational strategies based on self-regulated tools provided in this class (Motivational Strategies Form)	• Review their motivational forms the motivators they build up for themselves • Provide your feedback
4. The related stress upon the written word in teacher-student communication	• Students are asked to submit these documents according to required timeline through this semester • In addition, the learning platform allows students to submit/modify all these documents unlimitedly • Instructor can access these submission asynchronously and provide feedback (All the four forms)	• Provide your feedback as soon as you can via the learning system and emailbox. • You leave them to make all decisions of their learning progress
5. The use of proctors for feedback	• The human instructors or proctors must be subject matter expert on this class topic • They should be familiar with self-regulated learning tools and are able to provide professional suggestions to students through their learning process on how to better apply these tools to enhance their self-regulated learning skills	• Your feedback and suggestions are not a decisive factor on whether or not they should move on to a new learning unit • However, you should let them know if you find that they have not met the learning goal they set for themselves in a certain unit, and provide improvement suggestions. • Leave them to make a decision

Go to Your Course Page

Instructors' "Go to Your Course" page presented a different layout from that of the students. This page is connected with those six databases of student interface. When an instructor opened this page, he/she would see a list of students' assignments ordered by submission time. If an assignment had been reviewed by the instructor already, the "Instructor Review Date/Time" would show the exact time. Otherwise, this row for this assignment was blank. Figure 18 gives a sample of this page. All assignments submitted by ID "stu1" had been reviewed; therefore the exact review time was shown for each assignments of the stu1's. None of assignments submitted by ID "stu2" had been reviewed so far on this list; therefore, nothing was shown on the review time on these four assignments of the stu2's. An instructor could click on the "Review" link to open students' assignments.

Welcome: ins1

Instructor Role
Go to Your Course
Help and Contact
Logout

ID	Student	Assignments	Submit Date/Time	Instructor Review Date/Time	Action
20	stu2	Performance Phase Form	2011-07-16 15:43:30		Review
19	stu2	Motivational Strategies Form	2011-07-16 15:43:22		Review
18	stu2	Short Unit Discussion Paper Form	2011-07-16 15:43:14		Review
17	stu2	Task Analysis Form	2011-07-16 15:43:08		Review
16	stu1	Stage Topic Discussion Paper Form	2011-07-16 15:28:50	2011-07-16 15:29:16	Review
15	stu1	Short Unit Discussion Paper Form	2011-07-16 15:21:21	2011-07-16 15:21:46	Review
14	stu1	Stage Topic Discussion Paper Form	2011-07-16 15:19:19	2011-07-16 15:20:11	Review
13	stu1	Performance Phase Form	2011-07-16 15:07:04	2011-07-16 15:07:35	Review
12	stu1	Motivational Strategies Form	2011-07-16 14:48:16	2011-07-16 14:48:44	Review
11	stu1	Stage Topic Discussion Paper Form	2011-07-13 20:53:34	2011-07-13 20:53:57	Review
10	stu1	Short Unit Discussion Paper Form	2011-07-13 20:35:12	2011-07-13 20:35:55	Review
9	stu1	Motivational Strategies Form	2011-07-13 19:24:31	2011-07-13 19:25:00	Review
8	stu1	Task Analysis Form	2011-07-13 16:41:50	2011-07-13 16:42:23	Review
7	stu1	Self-Reflection Form	2011-07-12 21:45:30	2011-07-12 21:45:58	Review
6	stu1	Stage Topic Discussion Paper Form	2011-07-12 21:45:17	2011-07-12 21:46:05	Review
5	stu1	Performance Phase Form	2011-07-12 21:44:41	2011-07-12 21:46:11	Review
4	stu1	Short Unit Discussion Paper Form	2011-07-12 21:44:26	2011-07-12 21:46:19	Review
3	stu1	Motivational Strategies Form	2011-07-12 21:43:57	2011-07-12 21:46:25	Review
2	stu1	Task Analysis Form	2011-07-12 21:43:35	2011-07-12 21:46:30	Review
1	stu1	Task Analysis Form	2011-07-12 21:43:02	2011-07-13 16:41:09	Review

Figure 19. Go to Your Course Page for Instructor.

CHAPTER FIVE: Discussion

A review PSI's history shows that the major causes of PSI's fall came from outside instead of PSI itself (as discussed in the Chapter 2), such as teachers' worrying about the threat from PSI, or teachers' reluctance to do additional work at the preparation stage in a PSI-based class. Most researchers and practitioners actually did not deny PSI's effect on improving students' performance. Sherman himself and the Georgetown Center for PSI had found that a rigid definition of PSI would not result in positive impact on PSI's development (Sherman, 1992). PSI, this mature learning system, was awaiting new chances and new blood to refresh its vitality. These new chances came in the form of computer technologies and the Internet age.

Supported by new technologies and the Internet, the e-learning system shares key features with PSI naturally and improves these features' applications.

In this chapter, the major characteristics of this product and the instructional procedure will be further analyzed on the basis of expert review feedback and small group evaluation results. These analyses will lead to a comprehensive discussion on applying this instructional procedure in a wider instructional context and improving its implication in the real world.

Fidelity to PSI

Expert review feedback approved that the framework design of this course followed the basic principles of PSI. In the PSI theory expert's review, the reviewer commented that most of the design showed great fidelity to PSI, and it was clear that the researcher had knowledge in using PSI for this course.

First, even with the modifications (e.g., each student picks his/her own learning goals), this self-paced feature of PSI was intact in this course. As a core function of PSI, the self-paced feature in this course allowed students to determine the learning length, when to submit

assignments, when to move on to the next learning unit, and whether or not re-submit a certain assignment. Under an instructor's facilitation, students self-controlled their learning progress to a large extent.

Second, the function supporting both students and instructors contributing to the "unit-perfection requirement for advancement" was acceptable. The reviewer's concern was that an instructor would not really know this until students began the course, and suggested to document the time to completion. As a response to this suggestion, on the "Go to Your Course" page, the task list shown on this page allowed instructors to track students' completion time closely.

Third, this course did not use lectures and demonstrations as vehicles of motivation anymore; instead, it allowed students to identify the most appropriate motivators for them. The PSI expert reviewer worried that it might have violated fidelity to basic PSI, and at least opened the door to the possibility that students could select and apply inappropriate kinds of motivators. The instructional design expert reviewer to this project also pointed that the lectures in PSI were meant to be more of enrichment or motivational. It could be regarded as a major feature of PSI and therefore challenged whether or not removing it might tip the scale in the wrong direction of fidelity to PSI. Previous studies had partially involved this issue as well. Some researchers including Keller himself indicated that using lectures and demonstrations as vehicles of motivation was not an effective way to motivate students (Brothen & Wambach, 1998; Buskist, Cush, & DeGrandpre, 1991; Hornby & Anderson, 1995; Keller, 1990). This design project followed these researchers' perspective by removing this ineffective feature, and further, made instructors supervise students' process applying their motivators in the entire learning procedure. Students were encouraged to re-view and update their "Motivational Strategies Form" repeatedly

with the pace of their own learning experiences' growth, and this process would allow them to re-evaluate their learning continually, and identify the most favorable reinforcement.

Fourth, the written communication was emphasized in this course. All the communications between instructors and students were conveyed with electronic delivery. The PSI expert reviewer agreed that electronic delivery was also an effective channel for a tangible record of written communication.

Fifth, the use of human proctors contributed to this course as instructors' backup, and also worked as a connected function of self-regulated learning. When a previous student of this course became familiar with this subject contents after taking this course, in this e-learning environment, he/she could share what he/she had learned with new students. The proctor could assist the learning by suggesting new students whether their learning goals were set properly, whether the learning resources they had identified were helpful, and whether the strategies they had applied to motivate their learning were effective. Again, the proctor, just like the role of an instructor in this course, did not have to be an expert on SRL – even he/she had taken this course. What proctors could do was to provide learning suggestions to new students on the basis of their own subject matter knowledge.

In addition to self-determined motivators, another major concern of the PSI expert reviewer was self-selected learning goals and self-determined contingencies, and questioned whether or not a person could be allowed to control both the behavior and its consequences. Self-selected goal and self-reflection were important functions in this developing self-regulated learning skill course. Without them, the research possibly would lack the theoretical foundation of combining PSI methods and SRL construct.

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Skinner's works offer theoretical support to address this concern. In his study about human behavior (Skinner, 1953, p.230-241), Skinner indicated that when a response led to conflicting consequences (both positive and negative reinforcement), an individual could take a good many different forms of self-control to control part of his own behavior. These nine techniques of control (e.g. physical restraint and physical aid, changing the stimulus, depriving and satiating, manipulating emotional conditions, etc) were employed to control antecedents or consequences on different occasions. That is to say, a behavior could be reinforced by a controlling response (self-selected) and impact the controlled response (consequences). Therefore, Skinner gives a bigger picture on how people control their behaviors and consequences, and provides a behaviorist framework for PSI applied in this course module incorporating SRL procedures. In this course, when a student self-reflected his/her learning against his/her self-selected goals, he/she would evaluate his/her learning performances automatically based on his anticipating outcomes. In this process, the controlling response manipulated "any of the variables of which the controlled response is a function" (Skinner, 1953, p.231) and finally impacted the controlled response. This is the self-regulated learning process that was expected to be observed in this design; it also follows behavioral orientation.

<div align="center">A Possible Combination of PSI and SRL</div>

In addition to exploring PSI's application to new technologies, this research also discussed the possibility of combining features of PSI and SRL, and designed a PSI-based learning module by incorporating SRL procedures.

Based on the expert review and small group evaluation feedback, the combination is feasible.

The SRL theorist agreed that the PSI modification (Table 4) seemed like a reasonable effort to incorporate advantageous SRL features.

Self-selected learning goals and motivators are two major modifications to PSI in this course. Working with the self-paced feature, the two altered features are fit to self-regulated learning procedure naturally. Zimmerman and Campillo (2003) describe the phases and subprocesses of self-regulation. In the cycle, learners conduct task analysis to set learning goals; and build up their self-motivations based on respective self-efficacy beliefs. The two altered features, self-selected learning goals and self-motivators, therefore became one part of this system.

First, the self-paced feature is a primary vehicle of self-regulation. Most novice learners are not capable of self-monitoring systematically, and as a result, they tend to rely on comparisons with the performance of others to judge their learning effectiveness. This behavior may lead to extrinsic attribution: when they conduct self-evaluation, they will attribute their success or failure to those causes that they cannot control, and result in a defensive reaction (Zimmerman, 2002). Self-paced structure provides a foundation to self-regulated learners' efficiently self-monitoring.

In this course, learners are given complete power to decide their learning pace. The feature of "self-paced" keeps learners (even if they could be novice learners) from comparing their learning experiences with the performance of others when they monitor and evaluate their own learning. Learners submit their assignments; only an instructor and this learner can only see and re-visit his/her own assignments. The system keeps learners from seeing others' learning records. Both the Performance Phase Form (Appendix C) and Self-Reflection Form (Appendix D) are set against the concrete learning goals in the Task Analysis Form (Appendix A); therefore learners' self-evaluation is always aimed at their own performance.

Second, self-determined motivators help shape and improve novice learners' self-regulated learning skills at the forethought phase. As Bandura (1997) indicated, self-motivation is one critical form of self-efficacy belief. Appropriately individualized motivation strategies are directly connected with the three variables influencing a student's self-efficacy belief, "outcome expectations," "intrinsic interest," and "learning goal orientation."

In addition, both the PSI and SRL models emphasize the importance of tangible records in learning. The electronic delivered communications between instructors and students in this course are consistent with PSI's feature on using written communication for future reference; furthermore, they are a form of self-recording in a self-regulated learning, which is a more effective form of self-observation.

The stress upon written teacher-student communication is a primary component of PSI, including unit introductory, study questions, text learning materials, and quizzes (Keller, 1968). When Keller designed this feature for PSI, his motivation was to urge learners to actively read, study, and respond in writing to questions over textual materials, rather than simply passively respond to instructors in traditional lectures. This feature meets self-regulated learning's requirement on learners' self-recording in the entire Performance Phase.

In the phases and sub-processes of self-regulation (Figure 3) described by Zimmerman and Campillo (2003), there are two major forms in the self-observation of learners' Performance Phase: self-recording and self-experimentation. In this class, self-recording is more effective because it asks learners to collect tangible records especially for novice learners. They can review all the learning materials and their learning process repeatedly and accordingly take actions to influence their learning.

In this adapted PSI-based e-learning course, all the communications and instructions are conveyed through written forms with electronic delivery. Either from PSI perspective or from self-regulated learning perspective, tangible records help students better monitor their learning process.

<p style="text-align:center">Building A Self-Regulated Learning Expert Model</p>

Altered PSI features became a part of the SRL procedure in this module. However, the SRL theorist was concerned that some key SRL elements, such as strategic planning and modeling, might not have been included into this adapted PSI model. When reviewing the SRL procedure, the theorist believed that only experts on both SRL and subject matter were qualified to teach a course like this to develop novice learners' self-regulated learning skills. Effective models (instructors) should be knowledgeable in subject matter as well as about SRL. Otherwise, instructors could make mistakes in demonstrating self-correction. An instructor who was not personally skillful was unlikely to appear creditable to observing learners. The expert reviewer of SRL theory actually did not review the final product. His concern was based on the design plan (major parts of the chapter one to three). Apparently, he questioned whether or not a designed learning system can play an "expert" role in this process, whether or not an instructional designer can help the strategic planning and modeling for learning.

This concern is basically about how instructional designers design.

Instructional design is a very new discipline. In practice, instructional designers are like architects who draw a building's blueprint. They need to consider whether or not this building is compatible with the bigger environment, what the layout is for each floor so that residents will feel convenient and comfortable, and what constructional materials to be used for various functional purposes. These processes involve establishing instructional goals, identifying entry

behaviors and learner characteristics, developing instructional strategies, and many specific efforts. Sometimes, instructional designers may also take the role of a builder – they will directly use constructional materials to build this structure based on the blueprint and specific design paper. For instance, given the designed learning outcomes and learner characteristics, instructional designers probably use different tools and resources to develop learning materials into various media: written formats, video, online settings, and so on. Instructional designers often work with subject matter experts, course developers (programmers under some circumstances), and cross-function and cross-level instructional product users to develop instruction; sometimes they also play or partially play the role of the latter.

ALEKS® (as cited in Eyre, 2007) provides a good example of how a designed learning system takes part of an instructor's responsibilities in a computer-based environment. On the basis of pretest and posttest results, the system evaluates whether the answer is correct, whether the student has mastered a certain unit, and then decides whether or not the student can move on to the next unit.

In this dissertation, this PSI-based instruction relies on a structured computer-based course module with SRL procedure embedded. This module offers a modeling process applying four steps defined in Bandura's (1986) observational learning: attention, retention, reproduction, and motivation. Bandura mentioned that people are motivated to imitate by a number of motives including: past reinforcement, promised reinforcements, and vicarious reinforcement. In Schunk and Zimmerman's (2003) Social Cognitive approaches, they provide a clearer model on how self-regulatory competence influences learners' level of development from two aspects: social influences and self influences. Here, promised reinforcements (adding imagery) are exemplified

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by self influences, such as internal standards, and self-efficacy beliefs. Table 8 illustrates this model.

Table 7.

Social Cognitive Model of the Development of Self-Regulatory Competence.

Level of Development	Social Influences	Self Influences
Observational.	Models. Verbal description.	
Emulative.	Social guidance. Feedback.	
Self-controlled.		Internal standards. Self-reinforcement.
Self-regulated.		Self-regulatory processes. Self-efficacy beliefs.

Note. Social Cognitive Model of the Development of Self-Regulatory Competence. Reprinted from "Self-regulation and learning," by D. H. Schunk, and B. J. Zimmerman, 2003, In W. M. Reynolds & G.E. Millers (Eds.), *Handbook of psychology: Educational psychology, 7,* 2003, p.64. Copyright 2003 by John Wiley and Sons.

This adapted PSI-based module is trying to apply the channels of influences (social influence and self influence, as shown in the Table 8) to shape learners' self-regulative behaviors.

From this Table 8, one can find that a learner's level of development includes four stages, starting from an "observer" to his/her learning environments to an "emulator," to a "self-controller," and to a completely "self-regulated learner." In this process, a learner's dependence on his/her environments decreases gradually. He/she finally builds up the self-efficacy beliefs and becomes a self-regulated learner. At the beginning of this process, "modeling" is a major method of social influence. When learners become self-controllers or

self-regulators, they more rely on self-influences, such as setting internal standards, and using self-reinforcement.

Considering the SRL expert reviewer's comment, if replacing "SRL expert instructor" with "SRL expert model," one might find that actually this design still followed SRL principles. Zimmerman and Tsikala (2005) summarize existing studies on whether or not computer-based learning environments could be used as self-regulatory tools, and partially play an expert role on both subject matter and SRL, to enhance learning. For example, they recognized that a computer-based "planning grid" was an effective learning planning tool. Supported by an experienced subject matter instructor, the current design in this research essentially has already provided a "SRL expert model."

This process is illustrated by the "Task Analysis Form" (Appendix A). In this form, students needed to fill out a learning goal, prior knowledge, available resources, and the first step actions, and so on based on their preparation to this course. If this design had made it a completely computer-based SRL environment, the page might have directly shown a "planning grid" including the possibly optional items to allow novice students to simply choose. However, this research tired an alternative method. This design asked students to make their own decision for these important learning events at the very beginning. Just as Zimmerman (2002) indicates, self-regulated learning is not a single personal trait that individual students either possess or lack. Instead, it involves the selective use of specific processes that must be personally adapted to each learning task. In this research-type course, there was no solid standard to evaluate "wrong" or "right." Students must mainly depend on individuals' personal knowledge, experiences, and preference to make their own choices. A major responsibility of an experienced subject matter instructor in this course was, on the basis of their content knowledge, to direct the orientation

when it drifted off the route. Therefore, this design asked students to first provide their own preference. At this point, both the computer-based learning environment and the subject matter instructor cooperated to build this "SRL expert model" to make sure that students were correctly oriented.

In this course, either instructor users or student users are not SRL experts. They both are participants in this learning environment. They work together to set individual learning goals, and monitor the learning process. It is the PSI-based structure, under an instructor's subject matter support, that plays the "dual expert" role (for both SRL and subject matter) in the learning environment. At the first learning stage, students have to go through all the learning activities under an instructor's facilitation – this is a "modeling" (Schunk & Zimmerman, 2003) process for both instructor users and student users on how to use a SRL method. In this stage, an instructor shares his/her knowledge on the subject matter, follows the learning procedure to provide guidance and feedback based on their subject matter knowledge.

It is the project designer, not the instructor, who has initially figured out the strategic planning and modeling, and who has completed it through this structured PSI-based model with SRL procedure embedded.

More Self-Regulated Learning Characteristics

When an instructional design expert evaluated the completed product, he thought that this course was "externally regulated" instead of "self-regulated." Even though students could determine their learning pace, they still needed to strictly follow the course's requirements on learning activities.

Some previous studies share different perspectives on this concern. For example, Ross and Morrison (1989) claim that learners should not be given control on determining instructional

events which can alter the supportive contents. Hannafin (1984) also indicates that not all learning tasks could fully benefit from self-control. We already knew that learner-control and program-control comparison research is invalid; there is no significant difference between them, and research should focus more on differences between individual learner, and the nature of learning tasks (Hannafin & Sullivan, 1996; Lockee, Burton, & Cross, 1999; Reeves, 1993; Williams, 1993). Therefore, this research concentrated on individual learner differences and their learning development stages when considering program-control (regulated) and learner-control (self-regulated).

Following these researchers and the instructional design expert's views, this project incorporated "fading" of its supportive functions. Woods, Bruner, and Ross (1976) introduced the term "scaffolding" to define the interactions between adult tutors and children learners. Under the scaffolding support from adults, learners become gradually knowledgeable and are able to complete more advanced activities. When an individual increasingly gains control of his learning task, scaffolding supporting is fading and finally removed. Collin, Brown, and Newman (1989) regard "fading" as an essential feature of scaffolding support. Burton, Moore and Magliaro (1996) also indicate that "fading" is an important teaching and training concept that can be traced to behavioral theories. A designed instructional system should build appropriate stimulus–response associations. When a student has been able to perform desired behavioral change, the support from the learning environment will be fading. "Fading" is one of critical components to impact instructional effectiveness. Some studies (Hogan & Pressley, 1997; Palincsar, 1998; Palincsar & Brown, 1984) further connect "scaffolding" or "fading" with Vygotsky's (1978) Zone of Proximal Development. People's learning happens in the "zone" between lower level (actual level) and higher level (potential level). Lower level is what an

individual learner can do without help; and higher level is what he can do with scaffolding support from adults, capable peers, and tools. Guidance from the learning context is fading when learners become gradually capable. Through incorporating the concept of "fading," on one hand, the basic learning activities in this design were kept unchanged; on the other hand, this course promoted the process of proximal development of self-regulated learning skills, which ultimately allowed learners to decide their pace based on their own individual characteristics.

When a novice learner believes that he/she has become an experienced self-controller or a self-regulated learner, he/she can decide the quantity of coaching he/she would like to receive from an instructor or a proctor. This course requires that a student complete each single learning event at the FIRST learning stage, and allows a student to optionally submit their SRL forms starting from the SECOND stage of their learning with no effect on their final grades. At the same time, when the instructor finds that a student does not prove his/her mastery and has transferred to "self-regulated" mode at any stage, the instructor can ask the student to go back the "regulated" mode. From highly structured "regulated," to partial or completely "self-regulated," the set of learning tools helped to adjust to the varying zone of proximal development among adult learners.

The instructional design expert reviewer also expressed concern about one feature of this project from a design perspective: immediate feedback. He noted that one of the keys of PSI is the immediate feedback, which often came in the way of right/wrong on multiple-choice tests and the availability of a human proctor for some tutoring. This course module however, allowed a somewhat extended period of time between the work and feedback, which might make it less effective. In order to address this concern, the modified design connected this feature with self-regulation to weaken the possible inefficiencies caused by the delay. In this course, students

determine the timeline and frequency of accessing their course for themselves, and determine when to check instructors' feedback and how to take following actions. This follows Brothen and Wambach's (2000) study finding that students' checking of their grades encourages behaviors relevant to self-regulation of learning. Checking grades (in this course, it means checking instructors' feedback) positively associates with some learning behaviors such as accumulating points and studying for the final examination. In the formative evaluation of this study, small group feedback was consistent with Brothen and Wambach's conclusions on positive effect from self-monitoring. They found that self-monitoring made students devote more time and energy to their studies, attribute success to their self-regulation, and change their orientation to become more self-regulated in their own approach to learning. Small group feedback showed that the tools applied in this course are good methods to help them review their learning and adopt more active strategies. For example, one small group participant comment on "Performance Phase Form" was: "*This format is one of the most efficient ones in your interface. I see all of the comments together very conveniently arranged...nicely done! I think I would like to frequently access this page to know my learning, and may therefore read one more time the textbook to plan my next steps…*" A related comment was: "*This program is an ambitious one with evidence of a great deal of planning and insight! The components make logical sense to me, especially as I take a step back and see the big picture. This is a course that I would enjoy taking. I believe it will teach me better learning strategies. I am happy to see that I can decide so much in a course. It is time-consuming, but I like planning my own learning!*"

Learner Perspective: From a Novice Learner to an Experienced Learner

In addition to designing a PSI-based learning module, this study further explored an instructional design model using a PSI course to develop learners' self-regulated learning skills.

The target audiences of this course were considered to be novice learners of self-regulated learning methods and this course subject. Therefore, the entire procedure and the four self-regulative forms included a large amount of details, and specific step-by-step instructions on how to set proximal goals, how to monitor their learning process effectively, and how to build up self-regulative skills in this process. For example, the original version of the Motivational Strategies Form (Appendix B) listed 36 questions and tried to help students explore their learning experiences and motivational strategies from different perspectives. A couple of critical questions were asked via several ways repeatedly. However, the small group evaluation results share different points of view.

Some evaluators thought the Motivational Strategies Form a supportive tool to help the students know more about their own learning strengths and weaknesses. One evaluator suggested that this kind of tool should be placed on all online courses to help distance instructors understand students better.

Feedback from other evaluators indicated an obvious gap between novice learners and experienced learners. For example, question number four in the Motivational Strategies Form, *I like what I am learning in this class*, from a novice learner perspective, if she/he has not started the class, she/he does not know the answer to this question as yet. However, when for the second and third time the student completes this form, she/he will be able to answer this and other similar questions in a better way. It is different for an experienced learner in this situation. Unlike a first time learner, an experienced learner tends to set learning plans proactively (Bransford, Brown, & Cocking, 1999). When a course provides a chance to encourage learners to probe the main topic and set their own learning goals initiatively, experienced learners are more likely to probe the contents and course requirements on their own and to associate their own

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learning needs with the course rubric. When setting personal motivational strategies against this tool, they will have known roughly of this course's main topic, what they want to learn, and what resources they will seek and apply. Just like Zimmerman (2002) has said regarding novice learners and expert learners: novices often fail to engage in high-quality forethought and instead attempt to self-regulate their learning reactively. From "reacting" to "forethought", this is a proximal process from a novice to an experienced learner.

This research anticipated applying this practice to encourage novice learners to take the initiative in their learning by reviewing this Motivational Strategies Form repeatedly instead of only completing and submitting the form to an instructor as a single task. Though this tool was only required to be submitted to an instructor one time in the entire learning process, growing self-regulated learners would be aware of applying it to reflect the learning process and build up their megacognitive strategies. Skinner's (1953) theory supports the design. A learner could take many different techniques of self-control to control part of his own behavior. Therefore, aiming at changing consequences, the learner could apply different motivators (e.g. changing stimulus or using aversive stimulation), and show the new motivational strategies to the instructor.

The outcomes of small group evaluation also supported that this course could effectively develop a novice learner's self-regulated learning skills. The results are discussed in the below.

In the small group evaluation, evaluators did give positive feedback to the four SRL forms used in this course, especially about this question: "*The Self-Regulation Phase Form helps me evaluate my learning performance, and helps me improve my learning strategies. I think that I am obviously able to apply what I have found from the first learning stage to improve my learning in the stage 2 and 3*". All evaluators chose "agree" or "strongly agree" (5-point Likert scale from "strongly disagree" to "strongly agree") in this question. And in the following

verbatim feedback, their comments were favorable, too. For instance, *"this could easily be a requirement of any online course;"* and *"I think this form does a great job of getting students to reflect on what they have done, and what they should change to continue to do well in the future*."

Additional Findings of this Research

In addition to the original research assumption, this research has also provided an example that the PSI can be applied in more areas. PSI has proven its effectiveness and acquired favorable learner evaluations on mastery of course contents (Burton, Moore, & Magliaro, 1996). Given the computer and new technologies used in instructional design, the outcomes of this research suggest that developing a set of procedures allowing PSI and SRL methods to be combined in a research-type course is also possible.

The studies on self-regulated learning may already have provided theoretical support. Bandura (1986) believes that people control their own behavior through three steps of self-observation, self-judgment and self-response. Some early researchers of self-regulated learning also start investigating how learners manage their resources, set their goals, establish their plan, and monitor their learning process. In a self-regulated learning process, individual learners not only determine what actions they need to take to improve their learning, they also are concerned about what they will learn and take part in decision making (Corno & Mandinach, 1983; Kirschenbaum, 1987; Wood & Bandura, 1989).

When we find that PSI and SRL actually share some features (see Table 4), and, even with modification to certain features, the alteration still does not drift off the route, we may be able to apply the alternation to a large area.

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In this project, the course of historical and cultural comparison study was structured first by an adapted PSI method, and a set of self-regulated learning tools (four self-regulated forms) allowing students to determine what they expect to learn from this course was applied. Students were asked to identify learning resources by themselves, and monitor the learning process with instructor's supervision under the adapted PSI administration. Except for the course structure, the instructor offered limited instruction to students' learning while students self-regulated this process through self-task-analysis, self-motivation, self-control, and self-evaluation. The entire process was self-paced under an instructor's (or a proctor's) facilitation. The "self-pacing" feature was the key connection between the embedded PSI framework and SRL procedure.

Further, when a student became familiar with the learning procedure, the instructor's facilitating would be fading out gradually. Students were allowed to determine whether or not they would continually submit the four self-regulated forms to the instructor after the first learning circle (the first stage). They could choose to only submit the final stage writing paper presenting their learning outcomes.

There were two basic requirements for an instructor or a proctor in this class. First, he/she should be an expert on this subject matter, just like traditional classroom teachers, who are capable of identifying relevant resources and evaluating learning outcomes. They therefore could offer reasonable suggestions to students properly in the entire process. However, he/she did not have to be a professional of self-regulated learning procedure. The learning tools offered in this designed system were designed to model step-by-step instructions to help individuals learn and improve their self-regulated learning skills from both instructor perspectives and student perspectives.

Second, an instructor or a proctor was required to provide feedback as soon as a new entry was submitted. The immediate response is an important factor in a PSI course. Self-paced learning and remote facilitation inevitably may lead to some extended lag between a student's work and an instructor's feedback. It could be especially obvious at the beginning stage of the learning. However, when a novice learner has already shaped his/her learning style through his/her communications with an instructor/proctor time by time, he/she was expected to eventually build up his/her own self-regulated learning strategies. Within this self-paced learning process, a self-regulated student was able to determine when and how to track an instructor's feedback in a most efficient way for himself/herself and accordingly adjust his/her learning strategies. New technologies and devices have also cooperated with this trend. For example, a portable PDA can host a course like this and send immediate reminders to a learner on new entries.

<div align="center">Extended Work of this Project</div>

PSI and self-regulated learning are two different constructs. This research applied the major features of each one to create a new learning procedure. PSI is built on behaviorism, and self-regulated learning theory is based on constructivism. This study expects to show a successive connection among theoretical trends instead of opposition.

The selection of this class subject is just one example of the learning procedure. A possible future work is going to be placed in a wider learning community for various learning subjects.

Table 7 reviews a self-regulated learner's level of development. One can see that well-structured models, direct instruction (verbal description), emulative and social guidance, and individualized pertinent feedback are major channels for learners to enhance their

self-efficacy beliefs. In this study, a set of self-regulative forms provide modeling. All communications are in written form, allowing students to download, access, and keep tangible records. A "supervisor" role is also assigned to the class instructors so that they can provide pertinent feedback to assist (and "adjust" or "amend") the students' self-monitoring process. This research tentatively applied modeling, verbal description, and feedback; however, the emulative and social guidance was not defined as a direct and reliable channel to influence this process (feedback from the instructor could be considered as one kind of social guidance; however, it is not complete).

As has been discussed above, novice learners tend to rely on comparisons with the performance of others to judge their learning effectiveness. This self-paced distance learning is building an environment to keep them concentrating on their own progress. As a result, this design keeps them from accessing peers' progresses and learning outcomes, and therefore unfortunately keeps them from sharing peers' learning findings and experiences.

A new version of this class module could be improved through upgrading the learning materials layout.

In this class, students were asked to purchase the copy of the required textbook, and also provided a list of other resources as additional reading materials. Some changes will be made:

First, instead of a regular book, this book will be edited into a computer-based eBook. Students can access different chapters based on learning needs.

Second, a database will be established behind this eBook. This database will allow students to take personal notes to any text.

Third, and also the most major improvement, the eBook will be designed as a learning platform. The previous students' notes can be accessed, re-organized by users' needs, and viewed by users. For example, if a student has concern regarding a certain problem, in addition to the relevant resources listed, he/she can also acquire all previous students' notes and instructors' feedback to these notes.

With these design changes, students can always discuss their own problems with peers who encounter the same problem – they do not have to know the progress of those peers who are currently in this class but still will be able to share their learning outcome among each other. On the other hand, this eBook becomes a learning knowledge management system for accumulating knowledge. The previous class's learning outcome can always benefit the class which follows.

Forth, some research studies have used interim grades as sources of learning and motivation and received positive effectiveness (Brothen & Wambach, 2000; Zimmerman & Schunk, 2011). Even though the subject matter is not a mastery-oriented pedagogy, using grades can still be considered as an effective motivator.

Even further, a better version of this module does not require a typical teaching mode to conduct the course: an instructor and a proctor, and a group of students. It will be a more ideal community of learning to allow any ONE single student to work with a group of instructors asynchronously. The student can select appropriate instructors to receive one of his/her assignments based on this topic and instructors' expertise. A learning platform with an eBook embracing historical learning experiences makes this mode possible and resource-efficient.

Obviously, this method is not necessarily fit to all subjects. For some simply structured classes with obviously right/wrong answers, such as elementary mathematics, and anthropotomy,

students might benefit more from clear instruction, a large amount of practice, and right answer to questions; self-selection and self-pace are not the best way. However, for more complicated subjects, such as Finance, when explaining some intricate concepts of options, advanced students must be interested in others' understanding and experiences in different market models and economic situations to enhance their own knowledge.

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Task Analysis Directions:

1. Based on the course structure, we suggest you divide your learning journey into three stages and set goals for each one. You may consider there are two midterm exams (at the end of the first two stages respectively) and one final exam (at the end of the last stage). There are total 16 unites in this course; and we do not recommend that you have more than 6 units in one stage.
2. Make your goals "smart" enough by making them: **specific, measurable, action-oriented, reasonable, and timely**.
3. You are asked to fill out this form at the first week for each stage and submit to your instructor. Your instructor will review the form with you together at the end of each stage. That means you need to submit three single forms to your instructor with an update. Please refer to the "Course Introduction" to determine your goals.
4. If you cannot reach goals in a certain stage, you may discuss with your instructor to re-set the goal at any time throughout this course.

Steps:

1
- Identify your ultimate goal in this stage
- Review your prior knowledge and evaluate where you're at now in relation to your goal
- Identify the resources you need for reaching your goal

2
- Determine the first step towards your goal – make it simple and feasible
- Determine a starting date for the first step

3
- Think about possible obstacles and difficulties you'll encounter
- Consider ways to overcome those obstacles and difficulties

4
- Establish measurable "milestones" down the path to your goal
- Pick out "rewards" for milestones reached successfully
- Set deadline for your goal

TASK ANALYSIS FORM FOR "THE UNITED STATES AND CHINA" COURSE

Student Name: _____   Planning Date: _____

Course Unite	Step 1			Step 2		Step 3		Step 4		
	Goal	Prior Knowledge	Available Resources	First Step Actions	First Step Start Date	Obstacle to meet	Potential Solutions	Milestones	Rewards to Milestone	Final Deadline
Final Goal										
Stage 1										
Unit [ ]										
Unit [ ]										
Unit [ ]										
Unit [ ]										
Unit [ ]										
Unit [ ]										
Stage 2										
Unit [ ]										
Unit [ ]										
Unit [ ]										
Unit [ ]										
Unit [ ]										
Unit [ ]										
Stage 3										
Unit [ ]										
Unit [ ]										
Unit [ ]										
Unit [ ]										
Unit [ ]										
Unit [ ]										

Appendix B: Motivational Strategies Form

Building Up Your Own Motivational Strategies Directions:

1. The Motivated Strategies for Learning Questionnaire (MSLQ) was developed to identify your strengths and weaknesses as a learner, including the learning strategies you use and your academic motivation.
2. It is important that you answer all of the questions honestly. There are no right or wrong answers.
3. Fill out this form and submit it to your instructor during the first week of this course. Your instructor will review this form with you two times: during this course and at the end of this course.

MSLQ FOR "THE UNITED STATES AND CHINA" COURSE

Student Name: _____   Completion Date: _____

Please darken in the circle of the response that best describes you:

① Not Very True of Me … Very True of Me ⑦

1. I prefer class work that is challenging so I can learn new things	① ② ③ ④ ⑤ ⑥ ⑦
2. I'm certain I can understand the ideas taught in this course	① ② ③ ④ ⑤ ⑥ ⑦
3. I think I will be able to use what I learn in this class in other classes	① ② ③ ④ ⑤ ⑥ ⑦
4. I expect to do very well in this class	① ② ③ ④ ⑤ ⑥ ⑦
5. Compared with others in this class, I think I'm a good student	① ② ③ ④ ⑤ ⑥ ⑦
6. I often choose topics I will learn something from even if they require more work	① ② ③ ④ ⑤ ⑥ ⑦
7. I am sure I can do an excellent job on the problems and tasks assigned for this class	① ② ③ ④ ⑤ ⑥ ⑦
8. Even when I do poorly on an assignment I try to learn from my mistakes	① ② ③ ④ ⑤ ⑥ ⑦
9. I think that what I am learning in this class is useful for me to know	① ② ③ ④ ⑤ ⑥ ⑦
10. Compared with other students in this class I think I know a great deal about the subject	① ② ③ ④ ⑤ ⑥ ⑦
11. When I study for assignments and activities, I try to put together the information from all sources	① ② ③ ④ ⑤ ⑥ ⑦
12. I ask myself questions to make sure I know the material I have been studying	① ② ③ ④ ⑤ ⑥ ⑦

13. It is hard for me to decide what the main ideas are in what I read	① ② ③ ④ ⑤ ⑥ ⑦
14. When work is hard I either give up or study only the easy parts	① ② ③ ④ ⑤ ⑥ ⑦
15. When I study I put important ideas into my own words	① ② ③ ④ ⑤ ⑥ ⑦
16. I always try to understand what the textbook is saying even if it doesn't make sense.	① ② ③ ④ ⑤ ⑥ ⑦
17. When studying, I copy my notes over to help me remember material	① ② ③ ④ ⑤ ⑥ ⑦
18. Even when study materials are dull and uninteresting, I keep working until I finish	① ② ③ ④ ⑤ ⑥ ⑦
19. I use what I have learned from old homework assignments and the textbook to do new assignments	① ② ③ ④ ⑤ ⑥ ⑦
20. I often find that I have been reading for class but don't know what it is all about	① ② ③ ④ ⑤ ⑥ ⑦
21. When I am studying a topic, I try to make everything fit together	① ② ③ ④ ⑤ ⑥ ⑦
22. When I'm reading I stop once in a while and go over what I have read	① ② ③ ④ ⑤ ⑥ ⑦
23. I outline the chapters in my book to help me study	① ② ③ ④ ⑤ ⑥ ⑦
24. I work hard to get a good grade even when I don't like a class	① ② ③ ④ ⑤ ⑥ ⑦
25. When reading I try to connect the things I am reading about with what I already know.	① ② ③ ④ ⑤ ⑥ ⑦

Designed based on Pintrich, R. R. & DeGroot, E. V. (1990). Motivational and self-regulated learning components of classroom academic performance, *Journal of Educational Psychology, 82*, 33-40.

Appendix C: Performance Phase Form

Performance Phase Directions:

1. There are two classes in this phase: self-control and self-observation, which provide self-monitoring strategies to your learning.
2. This tool will help you better monitor your learning process in the entire course.
3. This tool provides guidance in helping you to identify feasible self-control strategies for yourself.
4. You are expected to update this form at the end of EACH unit against your **TASK ANALYSIS FORM**. Your instructor is available to discuss on the strategies with you throughout the entire course.

SELF-MONITORING FORM FOR "THE UNITED STATES AND CHINA" COURSE

Stage 1	How did you apply available resources?	How did you start your first step action?	How did you conduct the following actions?	What obstacles did you meet and how did you deal with them?	Rate how much you reached your goal (1-10)
Unit [ ]					
Unit [ ]					
Unit [ ]					
Unit [ ]					
Unit [ ]					
Unit [ ]					

SELF-MONITORING FORM FOR "THE UNITED STATES AND CHINA" COURSE (cont')

Stage 2	How did you apply available resources?	How did you start your first step action?	How did you conduct the following actions?	What obstacles did you meet and how did you deal with them?	Rate how much you reached your goal (1-10)
Unit [ ]					
Unit [ ]					
Unit [ ]					
Unit [ ]					
Unit [ ]					
Unit [ ]					
Stage 3	How did you apply available resources?	How did you start your first step action?	How did you conduct the following actions?	What obstacles did you meet and how did you deal with them?	Rate how much you reached your goal (1-10)
Unit [ ]					
Unit [ ]					
Unit [ ]					
Unit [ ]					
Unit [ ]					
Unit [ ]					

Self-Reflection Directions:

1. This phase includes two classes: self-judgment and self-reaction.
2. This tool will help you evaluate your learning performance objectively and guide to you make a proper decision.
3. You are asked to fill out this form with the 16 questions at the end of EACH stage and submit to your instructor. Your instructor will review this form with you. Therefore you need to at least fill out this form **three times** throughout this course. You may update this form as many times as you need.

SELF-REFLECTION FORM FOR "THE UNITED STATED AND CHINA" COURSE

Student Name: _____

Stage 1① 2② 3③ (Please darken the circle for the stage you are going to evaluate)   Evaluation Date: _____

Working with your instructor, please give answers to the <u>FOUR</u> aspects of the following 16 questions:

Verbatim Answer:

What Factors are Leading to the Results?

What Will You Do Next?

Instructor Comments and Suggestions:

1. How much time and effort did you put into this stage?
2. What do you think your strengths were in this stage?

SELF-REFLECTION FORM FOR "THE UNITED STATED AND CHINA" COURSE (cont')

Verbatim answer:

What factors leading to the results?

What will you do next?

Instructor comments and suggestions:

3. What do you think your weaknesses were in this stage?
4. How could you improve your learning in the next stage?
5. What are the most valuable things you learned in this stage?
6. How do you compare your accomplishments with what you expected at the start?
7. What are you proud of learning in this stage?
8. What kinds of things were difficult or frustrating? Which were easy?
9. What's the most important thing you did this stage?
10. Think of some important moments from this learning stage, such as your best moments, worst moments, crises, or turning points.
11. What did you learn from each of these moments?
12. What idea or skill was hardest to really understand?
13. What idea or skill was easiest/naturally to really understand?
14. What were a few ways that you could have done a better job?
15. What advice do you have for yourself? What would you do differently if you had a chance to do this all over all?
16. What other comments do you have in regard to this stage of the course?

Appendix E: Expert Review Checklist for PSI Concepts

Formative Evaluation:
Expert Review Checklist for PSI Concepts

1. Do you think the self-pacing applied in this course replicates Keller's self-pacing in his PSI model?

   Rate from 1 to 5: [   ]
   Comments:

   _____

   _____

   _____

2. Do you think that the current design (both students and instructor contribute to the "unit-perfection requirement for advancement") is acceptable for an adapted PSI?

   Rate from 1 to 5: [   ]
   Comments:

   _____

   _____

   _____

3. Do you think it is effective to allow students to evaluate and apply their own motivators and remove the original feature of using of lectures and demonstrations as vehicles of motivation?

   Rate from 1 to 5: [   ]
   Comments:

   _____

   _____

   _____

4. In this PSI-structured course, is the emphasis on the written word?

   Rate from 1 to 5: [   ]
   Comments:

   _____

   _____

   _____

5. Does the course introduction and syllabus clearly communicate to the student the purpose of this course and process of learning?

   Rate from 1 to 5: [   ]
   Comments:

   _____

   _____

   _____

6. Overall, do you think this adapted version of PSI meets Keller's original PSI model design and Sherman's recommendations?

   Rate from 1 to 5: [   ]
   Comments:

   _____

   _____

   _____

7. Do you have any additional comments?

   _____

   _____

   _____

Formative Evaluation:
Expert Review Checklist for Self-Regulated Learning Concepts

1. Do you think the "Task Analysis Form" helps students set their learning goals and plan their learning strategies effectively (See Appendix A)?

   Rate from 1 to 5: [   ]
   Comments:

   _____

   _____

   _____

2. Do you think the "Motivational Strategies Form" helps students evaluate their own motivational strategies and effectively determine the motivational strategies they can apply in this class (See Appendix B)?

   Rate from 1 to 5: [   ]
   Comments:

   _____

   _____

   _____

3. Do you think the "Performance Phase Form" meets Self-Regulated Learning principles on improving learners' "Self-Control" and "Self-Observation" (See Appendix C)?

   Rate from 1 to 5: [   ]
   Comments:

   _____

   _____

   _____

4. Do you think the "Self-Reflection Phase Form" helps learners effectively self-judge and self-reflect (See Appendix D)?

Rate from 1 to 5: [   ]
Comments:

_____

_____

_____

5. Do you think the set of forms (Appendix A-D) can help learners process an efficient self-regulated learning and becomes a re-cycling procedure to improve learners' self-regulated learning skills?

Rate from 1 to 5: [   ]
Comments:

_____

_____

_____

6. Do you have any additional comments?

_____

_____

_____

Formative Evaluation:
Small Group Evaluation Checklist

1. The length of this course is reasonable for a 16-week course.

   Strongly Agree [   ]   Agree [   ]   Neutral [   ]   Disagree [   ]   Strongly Disagree [   ]
   Comments:

   _____

   _____

2. It is feasible and efficient that the course is suggested to be broken into three stages.

   Strongly Agree [   ]   Agree [   ]   Neutral [   ]   Disagree [   ]   Strongly Disagree [   ]
   Comments:

   _____

   _____

3. The Course Policy and Syllabus clearly established the focus of this course.

   Strongly Agree [   ]   Agree [   ]   Neutral [   ]   Disagree [   ]   Strongly Disagree [   ]
   Comments:

   _____

   _____

4. The class webpage give me clear idea on how to take this class.

   Strongly Agree [   ]   Agree [   ]   Neutral [   ]   Disagree [   ]   Strongly Disagree [   ]
   Comments:

   _____

   _____

5. The Task Analysis Form helps me clearly set my learning goals and plan learning.

   Strongly Agree [   ]   Agree [   ]   Neutral [   ]   Disagree [   ]   Strongly Disagree [   ]
   Comments:

   _____

   _____

6. The Motivational Strategies Form effectively helps me evaluate my strengths and weakness as a learner and identify appropriate learning strategies.

   Strongly Agree [   ]   Agree [   ]   Neutral [   ]   Disagree [   ]   Strongly Disagree [   ]
   Comments:

   _____

   _____

7. The Performance Phase Form is an efficient tool helping me to monitor the entire learning process.

   Strongly Agree [   ]   Agree [   ]   Neutral [   ]   Disagree [   ]   Strongly Disagree [   ]
   Comments:

   _____

   _____

8. The Self-Regulation Phase Form helps me evaluate my learning performance, and helps me improve my learning strategies. I think that I am obviously able to apply what I have found from the first learning stage to improve my learning in the stage 2 and 3.

   Strongly Agree [   ]   Agree [   ]   Neutral [   ]   Disagree [   ]   Strongly Disagree [   ]
   Comments:

   _____

   _____

   _____

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9. Do you have additional comments to any aspect of this online course?

_____

_____

_____

_____