AFFORDANCES OF EXTERNAL REPRESENTATIONS IN INSTRUCTIONAL DESIGN: THE EFFECT OF NARRATIVE AND IMAGERY IN LEARNING

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This study consists of both theoretical and empirical inquires. Theoretically, it examines the primary functions of narrative and mental imagery and identifies the relationship between them, which leads to a proposal of a novel framework to interpret semiotic resources. Combining this framework with Halliday's linguistic functional theory, a method to empirically investigate semiotic resources is further developed. The study then uses a latent construct method to empirically test a number of identified functions of narrative in a real learning situation when learning experience is examined.

This study is the first to investigate the functional relationship between narrative and mental imagery and to suggest a fundamental theory investigating representations of a multimodal nature. The study is also among the first to identify latent constructs investigating student's learning experience. Data are collected from 190 library professionals who enrolled in three sections of an online course, two sections in the narrative group and one section in the plain text group, administered through Blackboard 4.0, and data analyses are based on those who completed the course and responded to the instruments.

Essay data are analyzed using content analysis method using the narrative analysis framework developed based on the semiotic resources framework. Quantitative data analysis methods include univariate data analysis, factor analysis, and structural equation modeling that tests the proposed model and verifies the relationships between the latent variables.

The empirical findings support the hypothesis about the functions of narrative identified in theory, and narrative is found to provide a more favorable and positive learning context than expository text does. The results show that participants who enrolled in the narrative sections of the course gained higher creative scores and gained better results in performance-based and attribution-based experiences. The model testing results indicate that even though more time spent during learning led to better outcome and performance in both groups, more time spent means more satisfaction for the individuals in the narrative group, but led to less satisfaction for the individuals in the non-narrative group.

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CHAPTER 1

INTRODUCTION

1.1 Introduction of Research

With new social conditions made available by the advance of technologies, designing online user systems that are not only effective but also engaging has become an increasing concern of both academia and industry. A system that is effective means that one can gain a sense of satisfaction after using it. An engaging system, on the other hand, means that the system is capable of providing an environment that allows one to explore, discover, analyze, and validate something new. Having these two qualities becomes fairly necessary for almost every system recently. In other words, regardless of if it is an online shopping mart or an academic online instructional mechanism, a system has to achieve these objectives or contain these system attributes for its users in order to be regarded as successful for its own purpose. This, nonetheless, plays an emphasis on content representation in system design.

In academia, though competition is not an entrenched theme in online instructional design compared to other fields such as marketing in e-commerce, the importance of content representation as a means of achieving these two objectives for its system users is not new. Creating effective learning contexts through content design has always been regarded as the key to the advancement of instruction, leading to better learning outcomes for individuals and educational achievement in schools. The consensus is that, in order to facilitate the transformation of abstract information the application of proper methods in knowledge representation and the allowing of the system to contain

constructive contexts is necessary. This is also called the grounding problem of representation in system design.

Lately, different types of representational techniques such as narratives presented in different formats, visual tools such as images and videos, and those having a multimodal nature have been increasingly adopted into everyday communication and system design in nearly every arena. With this noticeable shift, people's attitude toward using more diverse methods to represent knowledge, especially using multimodal representations, has also changed. People become more tolerant towards using diverse resources and different formats in formal social and educational settings for information transformation. Visual and multimodal resources are less likely regarded as inferior to words when are applied for a formal situation. Instead, people see them as having their own advantages in transferring information and creating new experiences in people's life and are discovering and recognizing their unique characteristics more each day. Most of all, the application of storytelling in different formats is in a clear booming trend, and the use of narratives inevitably brings new social perspectives to the grounding issue in representation. Nevertheless, a clear interpretation of multimodal resources, such as narratives and visual representations in different forms is still an urgent requirement in their application. Theories related to their use need to be established, and methodologies informing their investigation need to be discovered and explained.

The solution to the grounding problem of representation starts from choosing and applying the right representational methods in system design, which also means that, a designer has to have a true understanding of the capabilities of each of the

representational methods selected. The heated discussion over the characteristics of each of the common representational methods applied in online educational systems such as plain text, image, video and film, has been carried out over a decade. However, until now, there still has no tenet to guide design practice over representational method selection, and this issue has become more challenging with the increasing use of unconventional resources in different formats in social communication other than plain text or words. New social perspectives arise that are pertinent to representational resources and their effects simply could not be directly interpreted as rules. It becomes obvious that someone has to take a rather serious analytical view at the issue. As anticipated, the burden of the explanations of different representational methods falls on the shoulders of educational researchers who have to vigorously apply diverse resources in system design and systematically analyzes their effects.

More specifically, and to this study's concern, the task starts from the exploratory investigation of narrative and its relationship to mental imagery because the relationship between the two is regarded as one important theoretical origin of representation. As a fundamental representational system, narrative is known to be able to convey emotions (Frith & Frith, 1999; Gernsbacher, Goldsmith, & Robertson, 1992; Oatley, 1992, 1999), to form the concept of self (Battersby, 2006; Bruner, 1986, 1990, 2002, 2004; Charles, 1989; Foucault, 1997; Gergen & Gergen, 1988), and to transcend meanings through eliciting rich mental images (Green & Brock, 2000; Turner, 1996). Consequently, narrative has been proposed as a solution to the "grounding issue" talked by Searle (1980) in representation as a method to embody emotion and context. Among these

existing beliefs, the implied link between narrative and mental imagery is a particular interest to this study. However, narrative and imagery have been the subjects of discussion and research in separate fields, and the interpretation of narrative has been limited to social linguistics, and that of imagery to visual studies and psychoanalysis. The lack of theoretical support for what has been implied about the relationship between narrative and imagery is therefore obvious.

As the trend of using narrative, visual representation, and multi-mode resources and multimodal representations in system design will continue, a fundamental question remains to be answered is: What is the relationship between a particular type of representation and the mental activities that are provoked? This question also challenges the fundamental issue of meaning and form in knowledge representation. This, nevertheless, has to be answered through a series of investigations of the relationships between several important cognitive concepts, such as internal and external representations, narrative, mental imagery, visual resource, and multi-mode and multimodal representations.

Based on the background, this study first investigated the functional effects of narrative and mental imagery and identified their relationship, then proposed a structural framework of semiotic resources in which an analytical method to investigate representations with a multimodal nature was introduced. The empirical study using content analysis and structural equation modeling techniques in a real learning environment also established the identified effects of narrative as well as its relationship with imagery.

1.2 Statement of the Problem and Research Questions

System design, which has the very purpose of facilitating cognition through building contextual concepts, requires speculation on the effect of its representation related to perception, memory, emotion, self-identification, and motivation of the individual. Many scholars suggest that the narrative approach is unique and has advantages in supporting these cognitive utility (Blatt, Auerbach, & Levy, 1997; Britton & Pellegrini, 1990; Bruner, 1986, 1990, 2002, 2004; Chatman, 1990b; McCabe & Peterson, 1991; Minsky, 1982; Shank & Ableson, 1977, 1995; Singer & Singer, 1990; Wertsch, 1991), but few investigated the different primary functions that the narrative approach has (Dunbar, 2005; Herman, 2000), let alone in a formal educational context (Thomas & Young, 2007). With the narrative approach increasingly being applied into instructional design, such as in the virtual world, the individual functions of narrative and its relationship with mental imagery merit detailed investigation.

The interpretation of narrative approach also leads to other important representational issues. These issues include in what manner visual representations benefit the mental activities of the individual, and what differences exist between narrative and other representational methods (Chatman, 1990b; Fludernik, 1996; Lieblich, Tuval-Mashiach, & Zilber, 1998; Jahn, 1997). The investigation of these questions, therefore, falls into the theoretical interpretation of semiotic resources (Eco, 1976; Halliday, 1985; Hodge & Kress, 1988; Iedema, 2003; Kress, 2000, 2005; Kress &

van Leeuwen, 1996, 2001; Norris, 2004a, 2004b; Norris & Joens, 2005; Peirce, 1932; Scollon, 2000, 2001; van Leeuwen, 1999; Wertsch, 1998).

Back to narrative, the study of it has been seriously limited to the theoretical arena (Chatman, 1990b; Herman, 2000). The author agrees that the identification of the functional effects of narrative is the first step towards the goal of empirically investigating the various uses of narratives (Thomas & Young, 2007). In addition, researchers have to know how to evaluate the identified effects of narrative in real learning contexts and to find the specific methods that can be used in their assessment. In other words, the study of narrative must also apply empirical studies that are carried out in real learning environments in which many system and individual factors can be considered.

Research Objectives

The investigation of the relationship between narrative and imagery is essential to the application of narrative in various situations, but most importantly, it will facilitate the interpretation of non-textual resources generally. Thus, the main objectives of this dissertation study are:

1) To examine the functional effects of narrative and mental imagery in cognition for the purpose of discovering the inner relationship between the two;
2) To examine how different sign systems (or semiotic resources) and internal and external representations are concerned in the construction

of meaning; therefore, the functional effects of narrative can be further tested from this larger picture of representation.

3) To examine the differences between a conventionally designed instructional situation and a natural learning situation in order to investigate whether narrative offers a sense of context as a natural learning situation does.

4) To examine how narrative benefits the mental activities of the individual, and what the differences are between narrative and other text types as a representational method.

5) To develop an analytical tool and a method that will empirically verify the theoretical interpretations of narrative as well as the functional effects that will be identified.

These objectives are critical to the empirical investigation of narrative. The systematic method investigating the semiotic resources also has important implications for context design, as the latter generally depends on the understanding of the functions of linguistic and visual resources, as well as their interrelations in representation.

Assumptions and Research Questions

The effort of interpreting the functions of narrative and mental imagery and their relationship is necessarily the first step to investigate the complex issues of semiotic resources. Kosslyn (1981b) once suggested, "a cognitive account of imagery is a theory about the functional capacities of the brain—the things it can do—that are invoked during

imagery" (p. 208). In this case, the investigation of the functional capacities of a representational system in narrative is a metaphor of the brain in terms of its capacity to generate imageries; it also implies a logical consequence to the brain, illustrating the effects of imageries, which, therefore, links narrative and the brain.

There are three preliminary assumptions that guided the study. First, narrative is an important tool to investigate cognition. Narrative texts throw light on the internal structures of thinking (Bruner, 1990), which is believed to be a sign of essentially non-verbal mental processes (Britton & Pellegrini, 1990; Schank & Abelson, 1995), and "in a variety of ways, narratives provide evidence for the nature of mind" (Chafe, 1990, p. 79). As Turner (1996) also contends, narrative is the root of human thought. Second, narrative has a contextual function, which might be similar to the effect that a natural learning environment provides; therefore, people extend to assume that using narrative in content design is for the purpose of seeking this function. Though to examine this assumption is the very task of the study, this assumption nevertheless points out the possible link between a narrative text and the physical and social background that a natural learning environment inherently provides. Third, the solution to find the effective representational method(s) to carry context in content design comes from the results that indicate pragmatically which type of representation actively engages the individual or optimally combines the effect of mental imagery and linguistics in the human mind. The third assumption will also be discussed in the next chapter when the review of the literature and the theoretical bases of the study are provided. Two sets of questions for the present study are:

1. The functions of external representations in instructional design:
    1a. What are the differences between a natural learning situation and a conventionally designed learning situation?
    1b. What are the factors that comprise the learning experience in an online learning environment?
    1c. How do these factors affect each other?
2. The characteristics of narrative as an external representational method:
    2a. How are the external representations mapped in narrative and non-narrative texts?
    2b. How does the mapping difference of external representations affect a reader?
    2c. What are the effects of narrative as a representational method in an online course in terms of supporting creativity?

1.3 General Theoretical Background

This study examines the functional effects of narrative and investigates whether using narrative as a representational method in instruction supports user creativity as due to narrative's relationship to mental imagery. Semiotic resources are also examined and their investigation is regarded as an ultimate goal, in which narrative and any other particular representational type could be contested in this larger frame of inquiry. The endeavor is, of necessity, multidisciplinary, and draws on research results and theories from several distinct fields: narrative theory, word and picture theory, semiotic theory,

cognitive, biological, and ecological theory, artificial intelligence (AI), information processing theory, psychology, and computational neuroscience. The theoretical approach that dominates the whole investigation, however, is a cognitive one, in which it assumes that representation reflects the exchange of the internal mind with the outside world through a process of perception, decoding, and reflection.

Picture Theory, Narrative Theory, and Semiotics

Narrative theory is heavily utilized in Chapters 3 and 8, when structures and natures of narrative are investigated. In particular, the works of Labov (1972) and Chatman (1978, 1990b) contribute to the current study. Picture theory figures prominently in Chapters 2 and 5, when representation and forms of representation are discussed. In particular, the works of Paivio (1970, 1971a, 1971b, 1976, 1978, 1986) and Kosslyn (1973, 1981, 1991) and the work of Pierce (1932) on semiotic theory have greatly influenced this study.

Cognitive, Biological, and Ecological Theory

Using authentic context to promote active learning and to encourage individual initiatives originates from constructive theory, espoused by Vygotsky, Piaget, Bruner, et al. It is an approach that can be adopted in nearly any learning situation to help learners acquire factual knowledge, problem-solving capabilities, and other meta-cognitive skills. In particular, the works of Dewey (1938a) and Vygotsky (1978, 1987) on learning and

instruction, Piaget (Piaget & Inhelder, 1971) on imagery, and Bruner (1986, 1987, 2002) on narrative contribute to the current study.

The study of human cognition has greatly benefited from the knowledge of biology. According to biologists, learning is "a continuous process of transformation of behavior through continuous change in the capacity of the system to synthesize it" (Maturana, 1980, p. 45). The autopoiesis theory allows the interpretation of biological beings such as humans from the inside as they sustain, produce, and reproduce components in the face of environmental perturbation; in this process, every human being is regarded as a system that has a "structurally plastic" nature, and this allows structural changes in interactions. Additionally, biological beings have the potential to be "structurally coupled" to undergo "a domain of perturbations that allow them to operate recurrently in their medium without disintegration" (Maturana, 1978, p. 35). The attempt to assert that external representations are the products of this structural coupling between the individual and the physical world certainly finds its origin in this biological understanding.

Learning is an action that is characterized by human cognition upon its physical world in the form of social activities. A fundamental problem for ecological and cognitive psychology is to explain how agents are situated, that is, functionally coupled to their environments, so as to facilitate adaptive actions. Gibson (1982) suggests that affordances are properties of the environment relative to animals. In comparison, the affordances of the external representations are the properties of the symbolic system to

the individual that allow one to act. This understanding is also explained in Chapter 6 when functions of external representations are discussed.

Ecological and cognitive scientists believe that individuals transform the interactions with their environment into internal regulators, and these regulators are assimilated as characteristics of the self. From the ecological perspective, the existence of internal states is regarded as "algorithmic models of perceptual phenomena" that "may provide a useful summary of the complex histories of animal-environment transactions by which the perceptual systems under study might have become attuned" (Shaw & Todd, 1980, p. 400). Current investigations of cognition have drawn many insights from biological and ecological fields, which knowledge serves as both valuable background and tools for this study when the formation of mental imagery is interpreted.

Information Processing Theory

Information processing theory is concerned with the process by which information transfers from a sender to a receiver through a media. With humans replacing machines at both sides of the information flow, the situation of the receiver becomes the dominant concern of its sender (Turner, 1962). In the later section of Chapter 2, the study uses an "information flow metaphor" to discuss and then to propose factors that likely affect the online learning experience.

Also, because working memory (also called short-term memory) is limited, sensory inputs are usually retained for only several seconds unless the individual actively works with them and connects them with what is already known. Learning can be

interpreted as either the transformation of sensory inputs into useful ones by storing them into long-term memory or the restoration of the information already stored. The way in which the information is stored affects how easily it can be retrieved later. Isolated facts are much harder to retrieve than those facts that are built with associations around them. It is indispensable to combine the principles of information processing with those of cognitive science and apply them to the investigations of effective instructional design.

Artificial Intelligence (AI)

Starting from building dynamic systems to the study of the differences between human interaction and machine operation, research field of artificial intelligence (AI) has realized the importance of internal states to the operation of these computational systems. The internal states of the agents contain the ultimate capacity that the dynamic systems strive to imitate. Emotion and intuition are adopted into the field of AI to guide reasoning (see Minsky, 1985; Picard, 1997), and to fully intimate these human cognitive functions may near to reality in the future.

The interaction between system and human is realized through an interface, which AI ultimately considers. As Turner (1962) articulates, with the human factor included in interface design, the interaction between the two entities is always a tentative process, a process of continuously testing the conception that each one has of the other. In AI, humans are often called “situated agents” as they constantly interact with their environment. This type of behavior of the agents is very difficult to program (Rosenschein & Kaelbling, 1994), and the outlook on their design is regarded to be

always wide-ranging. As Suchman (1987) suggests, machine and human interaction will be limited to the intentions of the designers and their ability to anticipate and constrain the user's actions through the representations of situations and actions. Because online system or interface design shares similar issues with context design, theories and findings of AI are inevitably implied in the study.

Psychology

Humans are primarily psychological constructs. Their emotions are combined with their dispositions in whatever they do: in perceiving, recalling, reflecting, planning, and in interacting with others. It is not only valid but also significant that these mental and emotional states can be used as explanations and predictions of their physical behaviors, but these parts of human existence, though vital, have proven to be more challenging in interpretation and have received much less attention than they deserve in history. With the increased concern of social interaction in various symbolic systems, the investigation of human emotions, which indicates the most significant individual difference, has to seek experimental psychology for explanation.

Representations in various forms are the products of the social interaction that contains the embodied entities of human emotion, cognition, and the physical world. To interact with others, people naturally communicate with the concern of the states and natures of their communicators. The act of knowledge representation, which has the very purpose of facilitating cognition through building contextual concepts, relies on psychological theories in the sense of speculation on the hypothetical meanings of these

contextual concepts related to human memory, perception, emotion, self-identification, and motivation. Psychological theories, therefore, provide valuable perspectives for the proposed investigation of representation in this study.

Computational Neuroscience

Representation is a major brain action for biological beings that constructs "proper worlds" (Uexkull, 1934). Representations as products as well as routes come from the process of recognizing patterns from environmental stimulations. In cognitive science, representations are understood as copies or reproductions of certain properties of stimuli, whereas in cognitive neuroscience, representations are not copies of the environment, but regarded as "partial recreations of it," shaped by the particular perspective of the organism (Pereira, 1999, p. 55), emphasizing the pragmatic dimension of the agent when the representations are created. This also reflects the mutual specifying effect between the agent and its environment.

Representations, therefore, build the knowledge about these "proper worlds." They include not only the facts of objects, humans, relations, and situations, but also mechanisms concerning the regulation of the organism as a whole, which incorporate emotion as an integral part. Knowledge in neuroscience supports this understanding. In general, neuroscientists believe that the limbic system in the brain deals with emotion, memory, and sense of smell. This bond between emotion and memory can provide some explanation of why emotion functions as a signifier for memory. Emotions and feelings are also believed to be "part and parcel" of the neural machinery for biological

regulation, whose core are constituted by homeostatic controls, drives, and instincts, so the state and well-being of this neural machinery directly affect the function of the brain (Damasio, 1994, 1999). Evidence also suggests that emotions and rational thinking are closely intertwined (Panksepp, 1998). Moreover, it is believed that the physiological activities of the mind are derived from the structural and functional ensemble of both the brain and the body. For example, Damasio suggests that the critical networks on which feelings rely include not only the limbic system but also the brain's prefrontal cortices and the brain sectors that integrate signals from the body (1994). As a result, the mental phenomena can be fully understood only in the context of an organism's interaction with its environment. In recent years, computational neuroscience has been regarded as an essential ingredient for a complete picture of perceptual, motor, and cognitive function.

In order to investigate the affordances of external representations, this study intends to emphasize the function of emotions in cognitive process and adopts the view that not only internal representation and external representation are interrelated, but also all representations arise with the contingent of a context in which emotions are implied, activated, and experienced.

1.4 Significance of the Study

The study adds to the existing body of knowledge of narrative, imagery, semiosis, and evaluation of learning experience and creativity with an interdisciplinary effort. Of more specific importance, this dissertation tangibly contributes in the following aspects:

(1) It identifies the functional effects of narrative and its relationship

with mental imagery. The results may lead to insights for further investigating the important questions posed by past researchers on narrative, imagery, and creativity.

(2) The study proposes a new framework and an analytical method to interpret semiotic resources, from which a more in-depth account of semiotic activity may further be explored and detailed. It may expedite the empirical investigation of multimodal representations.

(3) Using the proposed semiotic resources analytical framework, the study develops a detailed creativity assessment framework for storytelling. This narrative assessment tool is applied to the content analysis in the empirical study. This framework therefore is ready to be adopted into other content analysis with necessary and minor modification.

(4) The proposed and empirically tested structural model of learning experience as well as its constructs provides a background for further investigation of learning behaviors and outcomes of complex systems.

1.5 Structure of the Dissertation

As a study that comprises a major deductive component, the dissertation is organized according to a process of working from literature to theory, and then to the empirical studies. Chapter 2 is dedicated to general literature reviews and acts as a common background for the different components of the dissertation. Content analysis based on literature is also integrated into the reasoning of different framework chapters

on narrative, imagery, and proposing an analytical framework for semiotic resources, though some of them contain more heuristic theorization than background literature. The structure of the dissertation is as follows.

Chapter 2, Review of the Literature, is a summary of the literature surrounding various components of the research topic. It summarizes the theoretical bases of the dissertation.

Chapter 3, Functions of Narrative, examines the structures and the properties of narrative. It identifies narrative as a unique method with several functional effects.

Chapter 4, Functions of Imagery, introduces the concept of imagery. The functions of imagery are summarized. The relationship between narrative and imagery is established.

Chapter 5, A New Structure, proposes a new framework to interpret semiotic resources. Using this structure, various cognitive processes and functions are also interpreted.

Chapter 6, Functions of External Representations, clarifies the characteristics of content design and emphasizes the function of context in representation. It directly answers three research questions: What are the differences between a natural learning situation and a conventionally designed learning situation? How are the external representations mapped in narrative and non-narrative texts? And, how does the mapping difference of external representations affect a reader?

Chapter 7, Empirical Research Materials and Methods, is the empirical research design of the study. Detailed research design and data analysis methods are suggested. Reliability and validation issues are also discussed.

Chapter 8, The Development of a Theoretical Framework of Narrative Analysis for Content Analysis, introduces a creativity assessment framework for storytelling developed based on the proposed overall analytical framework for semiotic resources.

Chapter 9, Empirical Data Analysis and Discussion, discusses experimental results of the data analysis and answers three research questions: What are the factors that comprise the learning experience in an online learning environment? How do these factors affect each other? And, what are the effects of narrative as a representational method in an online course in terms of supporting creativity? Applying the proposed framework, content analysis yields a creativity score based on the participants' responses to the two essays; confirmative factor analysis (CFA), multiple regression technique, and structural equation modeling are used in detecting the actual weights of the predictor variables upon the criterion variables and the causal relationships among the constructs related to learning experience.

Chapter 10, Summary and Conclusion, is the final chapter of the dissertation. Conclusions of the study are presented, findings are summarized, and recommendations for future research are discussed.

1.6 Definition of Terms

- Cognitive Artifact

Cognitive artifacts are devices that mediate human activities. They are regarded as deeply cognitive as well as social. As a result, they can be adopted and developed in ways that can mediate certain activities within a community of practice (Bardram, 1998).

- Imagination

Imagination is the capacity of the mind to produce or reproduce several symbolic functions while in a state of consciousness, without any deliberate effort to organize these functions (Arieti, 1976, p. 37).

- Macrostructure

Macrostructure is a psychological construct of cognition, which includes beliefs, rules, emotions, desires, registered senses, and other mental activities. Macrostructure is also used to refer to a collection of mental concepts that control the form and content of a discourse. An overt macrostructure in discourse may be seen as an abstract, summary, or thematic statement supervising an extended content. Macrostructure is widely interpreted by van Dijk (1972) in discourse analysis, which does not cover all the meaning implied by the concept used in this study. His concept of macrostructure is limited to “the gist, the upshot, the theme, or the topic, of a text” (van Dijk & Kintsch, 1983, p. 15). More discussions of this concept are in Chapter 5.

- Medium/Media

Media are the materials or tools used in the production and communication of representations, such as print, graphics, photos, animation, video, audio, and film, etc.

- Metaphor

Metaphor is the use of names or descriptive terms for an object to which it is not literally applicable. Metaphors, therefore, function as natural models that leverage the knowledge of familiar, concrete objects or experiences to the understanding of abstract concepts.

- Modality

Modality indicates the truth-value claimed by a passage of representation or text. In other words, it "refers to the status, authority and reliability of a message, to its ontological status, or to its value as truth or fact" (Hodge & Kress, 1988, p. 124).

- Mode

Modes reflect the sensory channels and different media that sign systems take in form. It is concerned about symbolic reality, the textual meta-function of semiotics (Martin, 1992). The classification of modes is somewhat complex because different methods that can be used to differentiate it can actually overlay each other. For example, speech and writing are sensory channels of the linguistic mode. Speech can

be transformed through media such as film or lecturing in person, whereas writing can be transformed through prints. More interpretation of modes is given in Chapter 5.

- Narrative

Narrative is usually defined as events telling (Chatman, 1978, 1990b), or events that are presented in a sequence in a text. In other words, a narrative is a text in which one tells "a story in a particular medium, such as language, imagery, sound, buildings, or a combination thereof" (Bal, 1997, p. 5). The corpus of narrative texts includes novels, short stories, fairy tales, newspaper articles, and comic scripts (Bal, 1997). This list can extend to include films, video games, and most TV shows and advertisements. In many occasions in this study, narrative also means narrative texts, and this is particularly true in Chapter 3.

- Presence

Presence is the sense of being and realness, and the feeling of interaction and immersion in the physical and social environment. It is a mental state that is subjective to the experience of the individual (Sheridan, 1992).

- Representational Method

Representational method indicates how content is presented, whether in semantic text, picture, or audio, and if it is a semantic text, whether the text is in abstract form (mostly in plain text) or in narrative form.

- Text Type

Text type refers to a category of symbolic systems upon not only sign or coding systems, such as linguistics, image, and sound, but also based upon their grammatical differences, such as abstract, description, and dialogue. In this study, ‘texts’ is also used in the name of text types.

CHAPTER 2

REVIEW OF THE LITERATURE

2.1 Overview

This chapter gives a critical review of literature surrounding different components of the dissertation, exploring different theoretical aspects in the investigation of narrative as a representational method. The discussions are laid out in four sections.

Background of the Problems, addresses some of the key issues in the current understanding of narrative and visual resources and the relationships between narrative, mental imagery, and creativity.

Theoretical Basis of Representation and Context, is a review of issues of knowledge representation—the tasks of representation, the dimensions of context, modalities of representation as well as research trends—which situate the investigation of narrative and its functional effects in a cognitive background. Dual coding theory, multimedia learning theory, context availability view, and presence theory are introduced, and they form a theoretical base for the investigation of representations of all types, the semiotic resources.

Information Flow and Learning Experience, examines the factors that likely affect learning experience and suggests a model by which the functions of a specific representational method can be empirically investigated in real online instructional settings.

2.2 Background of the Problems

Narrative, mental imagery, and creativity have been associated to each other from one time to another, also in different contexts, though no one has put these three concepts together for a substantial investigation. This section brings these concepts together as the herald of their investigations in the later chapters.

Narrative and Mental Imagery

For centuries, human face-to-face interaction has been regarded as intimate and expressive and fully in presence, and it also has been a major mode for academic instruction. The non-verbal behavior "from physical appearance to bodily posture to the production of paralinguistic sounds, laughter, gestures and gaze" in face-to-face interaction usually gives a high degree of interaction between linguistic choices and accompanying forms of representation (Verschueren, 1999, p. 116). This high degree of interaction between the language and the body creates an expressive communication mode that allows first of all, the actualization of the speaker self. As such, the speaker is a highly dynamic entity that is being changed and formed at that particular moment of speaking. In addition, the various components within this non-verbal behavior are pervasive and function as coherence tools or contextualization cues that contribute to the communication and by bringing the listener's focus to the content. The online interaction companied by the coming and growing of online instruction, however, is devoid of this type of information. Also, without the full interaction with the instructor similar to in person showing how she or he reacts to the immediate environment, the knowledge of the

instructor is diminished drastically to the listener.

Recently, many researchers have used the investigation of narrative to approach the contextualization issue in online instruction (Dautenhahn & Numaoka, 1999; Dautenhahn, 2002; Sengers, 2000). In order to compensate for the paucity of human support and presence in the online environment, conversational narrative has been applied in the virtual world, intelligent tutor systems, and other hypertext interfaces to promote caring relationships and dialogues between the content (or system) and the user (Laurel, 1991; Schank, 1997). This comes from the belief that narrative is a method to convey emotions and to create artifacts grounded in the social world.

The grounding effect of narrative may also originate from the belief that narrative has an image-making quality. This quality of narrative can be traced back from human oral practice at least to ancient Greece, when formal communication solely depended on remembering and reciting of great amount information. As the orator tries to use various rhetorical tools to persuade and impress, the image-creating mediation over "what first, what next, what last shall I rehearse" always promises something beyond for the narrator and narratee altogether as both parties could ever imagine (*The Odysseus book IX*). Matters of order and duration of this mediation are all of great importance. In the literary world, the image-making quality of narrative has also become a familiar concept since the eighteenth century when image-making became a significant genre.

With narratives increasingly applied in various educational settings in recent years, the image-making quality of narrative has also been generously recognized. Studies suggest that narrative is important in the education of young children because of

the mental activity it encourages (Britton & Pellegrini, 1990; McCabe & Peterson, 1991). Others consider narrative as a prominent tool for people to form the concept of self and transcend the meanings of their experience through eliciting rich mental images, therefore encouraging creativity. In knowledge representation, the image-making quality of narration has also been mentioned. Minsky (1982) argues that typical story plots are image-like narrative frames or scenarios, which allow reasoning by analogy for any content there in, which help bridge gaps that logic finds hard to cross. These narrative frames are also called scripts (e.g., Shank & Ableson, 1977). The claim that the effect created by reading narratives is similar to that of creating mental imagery is therefore widely assumed. However, common practical use of storytelling emphasizing this quality has only shown in psychotherapy, in which storytelling is a method of treatment that allows patients to generate mental imagery, and in this way, deep-rooted issues can be recovered and treated in a subtle way (Blatt, Auerbach, & Levy, 1997; Singer & Singer, 1990).

Narrative study itself has also been criticized as being more art than research, and the case-by-case defined systematization can hardly be generalized (Lieblich, Tuval-Mashiach, & Zilber, 1998). Evaluation of narrative has a long tradition of focusing on the literary style, use of genres, and creativity of the author, and which are mostly narrowly defined. The calls for updating and enriching narratological theories by incorporating models and tools from discourse analysis, linguistic pragmatics, and cognitive linguistics are noticeable (Fludernik, 1996; Jahn, 1997). As Chatman (1990b) suggests, "narratology is not concerned with paraphrase—in theory or practice. It seeks, rather, a logical

construction that accounts for narrative's difference from other text-types," by which he means the two other non-narrative text-types: argumentation and description (p. 313). Herman (2000) also proposes reorganizing the study of language and narrative, altering and enlarging the horizons of linguistic research itself, and recasting it as a crucial interface between narrative and cognition.

The solutions to explain the inner relationship between narrative and mental imagery may start by investigating how to relate the interpretations of narrative to the broader human cognition. For example, how the interpretations of a narrative are integrated into the reader's existing internal mental structures (which are in the forms of inner images, concepts, and structures) should be investigated. Another solution is to fashion a method to define the levels or qualities of the reader's interpretations. Maybe these two processes can be explored at the same time.

Creativity and Mental Imagery

Creativity comes from when the individual actively assigns meanings to his or her environment. Arieti (1976) says that creativity means that the individual goes beyond the usual means of dealing with the environment or with oneself and "[t]he creative process is a way of fulfilling the longing or search for a new object or state of experience or existence that is not easily found or attained" (p. 6). However, creativity is not necessarily something extraordinary. This is because that creativity occurs not only from when fantasies suddenly or finally come into a form, but also from the proactive inferences that belong to the ordinary experience of the individual (Arieti, 1976; Maslow,

1968; Treffinger, 1987). The impact of creativity is that it allows the achievement of an enlargement of human experience.

Creativity indicates the creation of a new product or a proactive change from the past. Csikszentmihalyi (1991) regards creativity as the products from the "flow channel" of the individual between undertaxing and overtaxing and between boredom and fearfulness of growing complexity of consciousness. Others see this flow channel as an inner vision that allows new ideas to be produced from imagination, free association, and dream-like remembrance.

The action that leads to creativity is nevertheless highly influenced by the context that one is in. This is also supported by recent findings of neuroscience. Researchers in this field discovered that the number of synapses is related to environmental characteristics, and the brain can be nurtured (Diamond, 1988). Therefore, creativity can be stimulated as well as hindered by the environment. Also for the same reason, creativity is suggested to be investigated from four dimensions: characteristics of the individual, products, process, and the environment (Plucker & Renzulli, 1999).

Imagery production is believed to relate to the creativity of the individual. In view of Piaget (1952), imagery that participates in mental anticipations and transformations is necessary for the individual's other activities, like interacting with the environment, solving problems, and developing abstract principles. These functions of imageries are also found in the process of reading and composing text. For Paivio (1986), imagery provides the reader a private situational context for both inference and creative generation in discourse comprehension; as such, it frees language from its limit of associative

possibilities, allowing a reader to open up to unlimited contextual variables, and each variable can serve as a retrieval device for a large amount of associated information at any point during the flow of discourse. Bartlett (1927) also emphasizes the concreteness of imagery and suggests that invention, the generation of totally new details, is particularly prone to occur when imagery is generated. In essence, substantial discussions support the function of imagery in creative problem solving, and researchers believe that training individuals to become more actively involved in interacting with their image world can increase the individual's divergent thinking abilities (Anderson & Helstrup, 1993; Bagley, 1987; Finke, Pinker, & Farah, 1989; Paivio, 1978; Ward, Smith, & Finke, 1999).

The cognitive approach to creativity investigation emphasizes the process and knowledge structures that lead to the products of creativity, and this approach regards imagery as its ultimate concern. Gestalt theory of creativity of Kohler (1929) and Wertheimer (1945) suggests that insight is dependent on the restructuring of the perceptual field from complex cognitive structures. The four stages of a creative process suggested by Wallas (1926) are known as: preparation, incubation, illumination, and verification. Among them, the incubation stage of imagery has been a special interest to creativity research. In contrast to the illumination phase, the incubation phase (Wallas, 1926) of imagery occurs when images have not been fully formed. Fischbein (1987) suggests that internal images have two characteristics that contribute to creativity: they are not fully developed, and they are associated with intrinsic feelings about their correctness. Miller (1993) also claims that the vagueness of an image is critical to its

utility. However, scientific investigation of image use has always been challenging, and so far, limited studies conducted drew inconclusive results on the incubation effect of imagery on creativity (Perkins, 1981, 1994).

Individual difference and context are considered critical in the evaluation of creativity from the very beginning (e.g., Csikszentmihalyi, 1999; Jung, 1923; Maslow, 1968; Myers & Myers, 1980; Sternberg & Lubart, 1991, 1993). Studies of creativity and imagery found that certain characteristics of the individual influence the use of mental imagery and, therefore, creativity (see Forisha, 1983). The adoption of imagery in task, which is especially sensitive to context, directly connects to the emotions and the psychological needs of the individual. In addition, test environment is critical to the evaluation of creativity. Wallach and Kogan (1965) suggest that creative responses would be most likely to occur in game-like situations rather than test-like situations. This also implies that creativity evaluation is a compounded issue of cognition and context.

Objective tests evaluating the vividness of imagery and individual differences in creative thinking are limited, instead, self-report of imagery use has been widely suggested and adopted. In general, objective tests on imagery vividness only specify the types of imagery rather than their functions (White, Sheehan, & Ashton, 1977). Two known objective tests are the Betts Questionnaire upon Mental Imagery (1909) and the Torrance Test of Creative Thinking (1974). Verbal self-reports of imagery, which proves to be highly reliable predictors for image use, have been widely used in imagery studies (Marks, 1983; White, et al., 1977).

Creativity assessment methods have changed over time. First of all, the trend is away from assessing isolated skills and toward the performance of complex tasks in specific contexts (Starko, 2001). Secondly, in recent years, as visual resources become a primary component of learning materials, the need for constructing a new creativity evaluation method with more flexible rules becomes imperative. Thirdly, with the new social and communicational context that people are in gradually entrenched with multimodal resources, creating a reasonably persuasive and inclusive assessment tool for creativity entails a meticulous and comprehensive methodology.

Narrative, Creativity, and Mental Imagery

Mental imagery has traditionally been associated with creativity, especially during the illumination phase (Richardson, 1969); the contribution of narrative to creativity has also been suggested because of its association with mental imagery. Back to Aristotle, the notion of *anagnorisis*, which means to rediscover something, comes from the process similar as narrative mediation. However, the knowledge of how narrative mediation, mental imagery, and creativity are related is small. As Richardson (1969) argued, "little research has been undertaken to investigate the process and products of creativity under conditions associated with imagination imagery" (p. 126).

In education, though evaluation of creativity provides a method to investigate how critical thinking skills are integrated in the learning process and product, which is part of a larger concern about the role of assessment in schools (Resnick & Resnick, 1991), promoting creativity as well as validating the effort has been challenging in formal

educational contexts. Many believe that the challenge comes from the difficulty of explaining the nature and cognitive functions of mental imagery, as well as its relationships to different representational systems (Kaufmann 1980; Paivio, 1971b; Sarnoff, 1981). As such, the investigation of narrative as well as its relationship with mental imagery and creativity in this study is especially beneficial to educational assessment.

Visual Resources and Beyond

Visual resources are becoming essential tools of representation, and they bear some distinctive functions. One of the functions of visual materials comes from the belief that the value of a picture is mainly contextual (Hochberg, 1987). Visual representations bring the viewer closer to reality, positively activate mental activities, and facilitate actions (Ernest & Paivio, 1969; Paivio, 1970, 1971a, 1971b, 1976, 1978, 1986). Therefore, they are experiential and encourage the perception-action cycle of cognition (Bazin, 1967; Samuels, 1975; Tufte, 1990).

The change from using linguistics as the dominant method of communication to increasingly using diverse representational resources seems to require people to think more visually than before. With the environment that one is in most likely involves multimodal resources, our present theoretical understanding of cognition, which is limited to linguistic representations, has shown its incompetent in the interpretation of the current human experience. The call for theories of visual literacy is apparent (Arnheim, 1969; Bawden, 2001; Jörgensen, 2003). Fordor (1981) also points out that, without the

interpretation of visual representations, theories of concept formation and thought of humans have been limited to a small range of theoretical options.

Interpretations of visual thinking are also necessary for several practical reasons. First, in automatic graphic generation, more knowledge of visual representations as well as their relationship to semantics will allow machines to achieve an advanced approach that captures the underlying syntactic and pragmatic features of words, which lack in the current surface synthetic approaches applied to compose visual presentations (see Bertin, 1983; Mackinlay, 1986; Robertson, 1991; Roth & Mattis, 1991). Second, in image, video, and film classification and retrieval, an explicit theory of multimodal resources, especially visual resources, will allow search engines to consider and mimic a fuller human retrieval process and to search image and video surrogates from different levels of interactive contexts (Eakins & Graham, 1999; Greisdorf & O'Connor, 2002; Hastings, 1995; O'Connor, 1986; O'Connor & Copeland, 2003; O'Connor & Wyatt, 2004; O'Connor & Greisdorf, 2007; Panofsky, 1955, 1972; Wu & Hastings, 2005). Third, a well-defined theory and methodology for the assessment of multimodal resources will certainly advance the effort of context modeling in artificial intelligence (AI) (e.g., Guha, 1991; McCarthy, 1987; Shoham, 1991), which will increase the performance of information retrieval through specific queries and intelligent text matching (Akman & Surav, 1996; Hearst, 1994; Sperber & Wilson, 1986).

To put it briefly, theoretical and practical reasons show the importance of interpretation of visual resources in representation, which will benefit our understanding of other non-textual representations, including sound and movement. In view of a

semiotician, though every semiotic system embodies its own unique complexity, they also anchor meanings in each other as well as synchronize and co-articulate between two or more semiotic systems (Lemke, 1998).

2.3 Theoretical Basis of Representation and Context

The rises and stay of narrative and visual representation in instructional design may occur for the same fundamental reason—designing contextual concepts, which is the central task of representation. In this section, internal and external representations and several concepts of knowledge representation are introduced. Then different aspects of learning context and current research and theories of designing context are discussed. It defines the scope of the study of narrative and leads to a general cognitive approach for the current investigation of external representations.

Internal and External Representations

Representations are conceptually identified entities that are comprised of reflections and reactions to an object or other reactively identified and excerpted "passing thoughts" (Demmin, 2003, p. 144). Representations show their presence in nearly every human action: instinctive body moments, inner thoughts, imageries, emotions, and explicit reflections. They are usually put into two categories, internal representations and external representations in the research field of artificial intelligence.

Human actions, both conscious and unconscious, are constantly mediated by representations. Unconscious, instinctive, and unintentional actions like behavior routines

are response based. Even though they are functionally goal oriented, the thoughts underlying these actions do not have the property of being perceived and interpreted as they belong to the internal representations (Demmin, 2003). Searle (1998) says that intentional states function to relate us to our environment via representations that act on the environment. This interpretation identifies the mediational function of the intentional thoughts. External representations have a communicative nature in addition to an intentional nature. They are those internal representations that are articulated and contain the knowledge that is manageable and is ultimately used to guide behaviors.

To interpret representation, it is important to draw attention to the relationship between sense perceptions and conceptions. Philosophers like Plato and Descartes view sense perceptions as particulars but interpretations as the universal conceptions or the intellectual essences. This differs from Kant, who observes both sense perceptions and conceptions as particulars. According to Kant, sense perceptions are the actual particulars that involve an immediate sort of reference to objects, but conceptions involve a different kind of reference to them. He expresses, "[t]hings which are thought sensitively are representations of things as they appear, but things which are intellectual are representations of things as they are" (Kant, trans. 1965, p. 392). For Kant, both sense perceptions and the conceptions are not what things really are. Perceptions in which a person's ability to sense are reflected and conceptions in which a person's ability to interpret are reflected are both subject to the individual's faculties. Only the intellectual faculties are real. These intellectual faculties may stand for tacit knowledge and skills, such as beliefs, social and natural rules, and ideologies.

Recently, researchers from biology, ecology, and computational neuroscience propose that all conceptions are not abstract or really the universal sets of properties but are local, action-oriented, and highly dependent on context. This implies that there are no absolute rules, understandings, and even ideologies, as they all change under different social contexts. This has an important implication on how we see knowledge representation and creativity, and it also pushes us to gain a better understanding about the effect of context.

Natures of External Representation

External representations are regarded as the objective form of representations and are explicitly recognized discrete entities. The objective nature of the external representation indicates that the representations are not closely tied to the agent's immediate circumstances in causal and epistemological terms. This nature of external representations allows them to be used as communicative tools. For example, Peirce (1932) argues that language never provides the interpretant things that would individualize the meaning of its signs in a particular situation. This also reveals an autonomous and a dialectic nature of external representations. By interpretant, he means the inner senses of the individual in which the response is given to the sign.

The objective nature of the external representations also implies that they are context dependent in each of their individual applications. According to Kant, every individual application of the representations creates a syntagmatic unit of discourse "schema," which becomes the "unity in the determination of sensuousness" (Frank, 1997,

p. 14); this syntagmatic unit contains both the carrier that is the structure and the rules of the expression and the expression itself, which includes not only the content but also the context. In support of this context view of representation, Schleiermacher (see Frank, 1997) also contends that the meanings of the schema are defined horizontally by its surroundings. This means that the interpretation of any external representations has to be done with the view of how they related to others.

Knowledge Representation

The task of knowledge representation is to present objects and their relationships to others in the world. These objects can be sensory percepts including the sense of objects and aspects of them. These sensory percepts represent sensations, which comprise the internal state apprehending the qualities of an object. In many cases, sensory percepts are the products of the imagination in which the existence of the object is independent of its external presence, and the image may be intuitively formed. Contrasted to these sensory percepts are the objects of judgments, the concepts upon other objects and their relations.

When representation is achieved through certain communicative media and through one or more text types, the semantic content has to be distinguished from its vehicle of representation, which is the syntactic structure that acts as the physical realization of the representation. Since every semantic distinction is preserved syntactically, the syntactic type of the representation has a causal property for the

functions of the symbolic system (Host, 1996). The form of the representation also indicates its potential level of concreteness, flexibility, and function.

The adequacy of representation also directly relates to the quality of the representation. The issues of richness and psychological adequacy of the representations and the degree to which they create the desired results are regarded as important issues (Forbus, Gentner, Markman, & Ferguson, 1997). The adequacy of knowledge representation consists of the role of primitives and meta-representations. The former one answers the question of which primitives are appropriate to build into a representation and at what level, and latter includes the externalization and explanation of the use of structures and rules in the representations. This might be similar to the completeness or incompleteness of the representation, which also determines the degree of sophistication at which a person is required to infer the expressions in those representations (Brachman & Levesque, 1985). The role of primitives is related to the grounding issue, which we conceptualize the less clearly delineated, the nonphysical, in terms of the more clearly delineated, the physical (Lakoff & Johnson, 1980).

How to teach meta-cognitive skills is an important issue in education. Factual knowledge can be acquired quickly from direct encoding of the environment, but tacit knowledge must be gained from factual knowledge through practice (Anderson, 1993). Discernment (when learning objects are identified), self-regulation, and belief change, are different processes through which tacit knowledge is formed. The conditions, under which the tacit knowledge is formed, nevertheless, are determined by the existing factual information that is transferred through different forms of external representations.

Aspects of Learning Context

To learn something is to experience it in an environment; a process requires the meeting of the internal mind with the outside world. The external environment is the external context or background when learning happens, but the internal mind also has its own context (Johnson, 1987; Jung, 1972; Kant, 1968; Kosslyn, 1981; Lakoff, 1987). Both the external and internal contexts are social products that shape every learning experience.

Learning, in its various forms, through a symbolic system, is a process of communication that involves several dimensions of context. Communication means information transformation, which includes encoding and sending the message by someone and receiving and decoding the message by another, and each of which contains a different context. For one, if the original context of encoding is not known, the meaning of the information might not be the same when transferred.

Contexts of a Symbolic System

Learning that occurs in the physical world, which is usually called a natural learning situation, happens with two contexts: the internal context of the individual and the external context of the physical world. In contrast, learning in a symbolic system can be seen as having four contexts: the semantic content, the syntactic or structural nature of the symbolic system, the characteristics of the physical carrier of the content, and the characteristics and the situational framework of the reader. These four contexts determine both the process and the product of the study in a symbolic system.

Accordingly, when an individual interacts with a symbolic system, the process of learning is also reflected through the thought exchange between the internal representations of the individual and the external representations provided by the system. When the individual is reading a passage of sentences, an external model will be built responding to the contextual cues and the semantic meanings; an internal model will be built on those pragmatic explanations based on how the external representations relate to the context when they are uttered (see Figure 1). Johnson-Laird (1983) calls the external model the superficial propositional representation, which is structurally similar to the meanings of the semantic units, words or sentences. The mental model is a quasi-image representation of the external representations corresponding to the real world according to how the individual understands. Similar interpretations are also shown in the works of Paivio and Piaget.

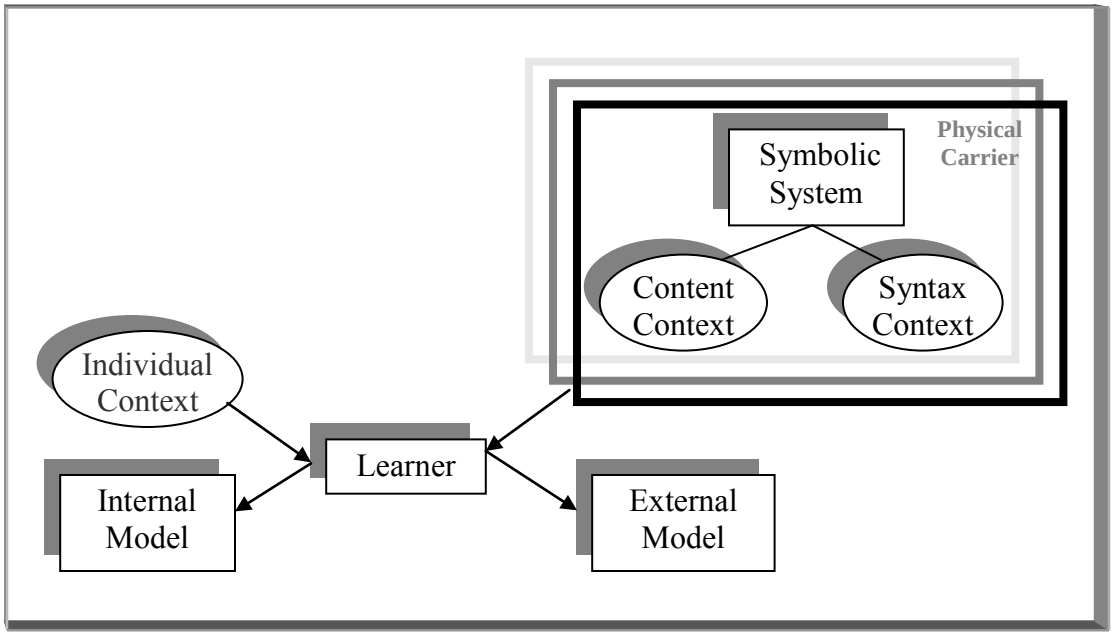


Figure 1. Four contexts in a symbolic system.

The impacts of these contexts when one interacts with a symbolic system can also be seen through different cognitive processes: discernment, self-regulation, and belief change. To interpret the functions of contexts in these different cognitive processes is in the effort of reflecting the real continuity of human cognition.

Discernment

A learning process begins with the discernment of an object. This discernment occurs either through direct sensory perception in the physical world or through indirect perception in a symbolic system, and in both situations the individual has to identify the object in its own context as well as based on his or her social and physical environment.

The central step of discernment is perception. In perception, peripheral information is separated from the main object, and a gestalt or unity of experience is then reached and registered in the mind (Neisser, 1967). In this process, stimuli are more or less categorized when the given object is distinguished from its background. To achieve this unity is the simplest form of discernment. A unity can only be achieved when enough information is available.

Because discernment involves a continuous perceptive process, the availability of information is critical. If information is more than enough, the individual may face a different challenge, and leading to other possibilities. For example, Dunbar (2001) suggests that when information is encoded in a richer way similar to a naturalistic environment, it makes possible for people to use structural features and higher order

relations. In this situation, the use of analogy in cognition is possible, and new knowledge is easy to transfer.

This may also indicate that, when more information is available, discernment requires experience and skills. For example, Dunbar (2001) contends that what make experts effective in their actions are their keen problem discernment capabilities and their strong control structures to manage unanticipated environments. Experts have more relational and structural knowledge than novices; therefore, they can make analogies based on higher-order structural relations (Faries & Reiser, 1988). Also for the same reason, how an expert perceives and engages in the environment cannot be effectively communicated if they are abstractly presented.

Self-regulation

Given the understanding of discernment, it is not a surprise that the contexts of the symbolic system or the availability of information in a learning situation also defines the nature of learning. It is essential that individuals learn to attune to the affordance of the problem by themselves, and learning happens more effectively when individuals discern the learning objects on their own. Also because of this, they gain a sense of ownership of the learning objects. In addition, an intrinsic motivational context that actively and naturally involves an individual with the subject matter enables one to build the cognitive mechanism of self-organization and encourages an analytical and creative approach to learning.

Belief Change

Another important task of learning is to revise one's beliefs through mediation. This process happens only when the individual sees self as an object of learning and sees the relationships between self and others in the environment.

Psychologists suggest that people internalize the experiences of self with others, which later serve as a basis for the construction of complex representational structures—object representations—that include conscious and unconscious schemas of self and others. These object representations then work as internal regulators that contain motives and expectations, as well as defensive processes that inhibit information processing (Freud, 1940, Horowitz, 1987, 1988). This is similar to the belief of Dewey (1916), who says that "the self and interest are two names for the same fact" and "interest means the active or moving identity of the self with a certain object" (p. 352). This identity evolves in accordance with aspects of the self in relation to the affordances within each environment. So, people make conscious references to who they are in every learning context.

Rooted in context, belief change is part of learning. Situated perspectives also address how identity is implicated in learning. Lave and Wenger (1991) argue that, "[l]earning and a sense of identity are inseparable: They are aspects of the same phenomenon" (p. 115). They further claim that learning in this holistic sense is not so much related to instruction but "occurs through centripetal participation in the learning curriculum of the ambient community" (p. 100). This agrees to the situated-distributed view about the nature of knowledge acquisition, as self is seen as a product of the

situation in which it operates. For Fodor (1975), self is this "sum and swarm of participations."

These three aspects of learning—discernment, self-regulation, and belief change—might be construed as the three modes of learning proposed by Rumelhart and Norman (1978), accretion, tuning, and restructuring. Accretion is similar to discernment in which adequate information is important, tuning implies the process of self-regulation, and restructuring is the process or result of a belief change.

These three aspects of learning are closely associated. Perception and discernment are both the necessity and purpose of self-regulation and belief change, as one's self-regulation mechanism and beliefs directly supervise the internalization of what is and can be perceived. Building a self-regulatory mechanism directly affects a belief change and vice versa, which suggests that the constant internalization of what is perceived updates the momentary mental schemata, reflecting the cognitive structure as well as the belief system of the individual. This also implies that every learning context reflects, tests, and reconstructs self through these activities of meaning-making. Therefore, creating rich context and deep modes of interaction will promote this constant creation and realization of self.

Branches of Research of Context Design

The investigation of context design can be seen from three broad branches of research. A sequence that is applied here, as these theories are discussed one after another implies that the later ones reach or hold a more advanced view towards the evaluation of

representation, and in which the complexity of the context issue around representation has been increasingly emphasized.

The first branch of research investigates how one interacts with a text and sees the act as a contending process between internal and external representations that includes these steps: how people perceive information, process the information in the working memory, associate the information with their immediate physical and social worlds, retrieve related information from the long-term memory, and finally integrate and store the information. This branch of research is an extension of early conventional theories of selective attention in vision in which researchers hold a belief that a communication channel has a limited capacity (e.g., Broadbent, 1958; Johnson-Laird, 1983; Kahneman, 1973; Neisser, 1967). Individual difference also shows important implications in the cognitive mechanism because each individual's motivation, experience, skills, and goals differ, as does the intensity when one interacts with a system, and in every cognitive process, time and the self-relevance of the information together influence the perceived level of interaction. However, actual empirical investigations conducted in this area have seldom taken individual difference as a factor due to the diverse issues involved.

The second branch of research is the modality issue of representation, which comes along with the drastic increase of visual representations. The complexity of the context design issue can be multiplied when stimuli in different formats are involved. The functions of different representational modalities are important concerns of representation. This is because human memory is extremely sensitive to the symbolic modality of the representation of event information (Madigan, 1983). The superior

impact of a pictorial representation in memory is well acknowledged in history. Conclusions on the concreteness of pictorial and object representations as compared to verbal ones are consistent (Paivio, 1971a; Paivio & Csapo, 1973). Pictorial representations are believed to be superior to the verbal representations for recall, recognition, and associative learning across a number of tasks because of the picture effect (or concrete effect). The evidence of this concrete effect, however, depends upon whether there is a demand for verbal or pictorial response to tasks in experimental settings (Paivio, 1971b).

The problem also lies in the fact that though pictorial representation has been proven to be beneficial to human cognition in general because it gives some sort of concreteness and therefore transfers a sense of reality, there are results indicating that picture limits the extent of semantic processing (Durso & Johnson, 1980). Words have also been found to have different concreteness or image levels (Paivio, 1971b; Richardson, 1975). Studies show that words do not necessarily create less sensory-perceptual experiences than pictures do. A word with a high image level and abstract words presented with context proved to motivate readers more than pictures do. For readers, content knowledge represented with vivid descriptions has proven as memorable as when it is presented in pictures.

Other researchers also provide different views looking at the concrete effect. Kaufmann (1980) describes the concrete effect as those imagery systems bringing together previously unrelated pieces of information that can be examined together in a unified image. Therefore, similar pictorial representations have advantages over linguistic

representations only when the task is novel. This functional association between imagery and the novelty of the task has been demonstrated in many studies, but other functions of pictorial representation have not been clearly identified.

Nevertheless, researchers who proposed using multimodal resources in knowledge representation pursued more empirical studies. The assumption of using multimodal resources in knowledge representation is that they benefit cognition in the way that humans' cognitive process that may involve both pictorial-based and verbal-based information in different stages can be better employed, which leads to the dual coding theory.

Dual Coding Theory

How information is represented affects how individuals perceive and use information. Researchers like Paivio (1986) and Baddeley (1986) who propose dual coding theory argue that combining linguistics and images and/or combining visual and auditory representations may serve to increase the individual's capacity for working memory because of the coding redundancy effect. This assumption has been supported by many studies. Educators found that using a combination of text and images in instruction actually increase students' understanding of the content (Ainsworth & Loizou, 2003; Lai, 1998). Based on dual coding theory, Mayer (2003) and Baggett and colleagues (Baggett, 1984, 1989; Baggett & Ehrenfeucht, 1983) conducted several investigations on combining narrative and multimedia representations. The results of their research suggested that combining narrative with animation or with other technologies is more

effective than combining text with animation or with other technologies, though a background theory about why narrative is more effective than plain text is apparently lacking in their studies. In general, the dual coding theory is intuitively persuasive; however, it also has limitations, and the limitations also lead to the studies conducted in the next area.

The third branch of research concerns the quality of representation in which the manner that the information is presented also influences the ability of the symbolic system to transfer a sense of presence, which affects the quality of a learning experience. In a word, the suggestion is that the semantic meanings that the stimuli transformed may have more impact than those created by the modalities of the representation. The quality issue is both an intra- and an inter-modality issue depending on if a text uses one text type and one modality or more. A considerable amount of research has been conducted around the context availability theory and presence theory, which forms the two prominent subsidiary research branches, context availability theory and presence theory.

Context Availability Theory

In this vein, researchers propose that in order to benefit cognition, the availability of context in representation alone is more important than other considerations. They contend that the dual coding theory is not applicable to the following situations. Words do not necessarily create a less sensory-perceptual experience than pictures. Studies show that the processing of concrete verbal materials is not always faster and better than the processing of abstract materials when supportive contexts are presented (Schwanenflugel

& Shoben, 1983; Schwanenfluge, Harnishfeger, & Stowe, 1988). Therefore, these researchers suggest that the availability of any contextual information is more important than the difference in modalities of the representation and point out that the focus is to describe the concrete effect based on context availability, the prior knowledge available for the individual (Wattenmaker & Shoben, 1987). These arguments lead to the need to further investigate which kinds of representational methods favorably support context representation.

Presence Theory

Originally, researchers proposed that when people interact with high-resolution information displayed in a symbolic system, the sense of presence increases. It became a conventional view that visual images are attended to more readily than language; therefore, visual images should be easier in making an impression (Argyle, Alkema, & Gilmour, 1971). Steuer (1992) also suggests that presence depends on two aspects: "the ability of a technology to produce a sensorially rich mediated environment" when vividness is felt and "the degree to which users of a medium can influence the form or content of the mediated environment" when interactivity occurs (p. 41). Steuer's interpretations largely reflect the early understandings of presence. Among them, system content is only peripherally mentioned, and the focus is clearly on technology's ability to transfer graphics or to provide users a certain control by allowing them to manually modify the environment. This is similar to what Biocca (2003) later called "the two-pole model" dilemma, which has only considered the virtual and the physical spaces but not

the mental imagery space (or the cognitive aspect). As Biocca suggested, the two-pole model could be useful in the initial engineering research on telepresence, but it was erroneously generalized to all media and became a cognitive theory of presence.

Recent investigations clearly show more perspectives on the study of presence. Researchers found that simply increasing sensory input fidelity does not automatically imply greater presence (Slater, 2003), and content that allows readers to relate to self influences intimacy levels even more than media differences do (Tidwell & Walther, 2000). Identifying presence as a complex phenomenon, researchers eagerly call for broader investigation of it. Witmer and Singer (1998) emphasize that a valid measure of presence should address factors that influence involvement as well as those that affect immersion. These concerns indicate that presence is a multi-dimensional construct, and explanation of it might require the study of other fundamental issues in human cognition. In a recent article, experts in presence research suggest that "presence science [PS] belongs to a wider class of research fields studying how cognitive systems build models of their environment and interact with it" (p. 9), and they call for experiential studies from cognitive and psychological fields in the investigation of presence (Ruffini, 2006). Moreover, recent researchers (e.g., Schubert et al., 2001; Rey, Alcaniz, Lozano, et al., 2004, Wu, 2007b) especially call to extend the presence studies from merely focusing on manipulations of media form to media content.

In presence studies, narrative has also been suggested as a method of creating artifacts grounded in the social world and structural coupling to the environment, and narrative is regarded as at the heart of a persistent virtual community (Slater & van de

Velde, 2005). In Biocca's (2003) three-pole model, narrative is said to achieve a level of presence by making use of the imagery space. This assumption itself, however, needs testing and a theory to support.

To summarize, this section implies that knowledge representation needs to be studied from two aspects. The first aspect is the representation of the object, which includes the situational parameters of the object and the relations between its parameters and other objects, indicating the association of the object with its particular context. The second aspect is the functions of these representations on perception, memory, and knowledge creation. Concerning the latter, the study concurs more with Madigan (1983) who sees that the real problem for concrete effect (or picture effect) is to identify those encoding dimensions and conditions of the representation that may give rise to lasting information about scenes, events, and objects. Therefore, in what manner the information is presented should be treated as priority in the investigation of representation. In addition, since surface structures of symbols cannot give all the explanations to their functions in information transformation, the investigation of them must comprise the consideration of the pragmatics of the individual when the quality of representation is tested. The syntax and the semantic values of representations have to be interpreted based on the cognitive processes that they exert. Therefore, theories of representation have to be completed by the results or systematic delineations that explain which kind of representation actively engages the individual or, optimally combines the effect of imagery and linguistics in the human mind.

2.4 Information Flow and Learning Experience

From system design to the evaluation of interactivities, the online learning experience has become an important research branch. Online user behaviors suddenly are the focus of examinations in many fields, but the lack of consideration of user beliefs and attitudes toward system use have been widely acknowledged (Visser, Plomp, Arimault, & Kuiper, 2002). With new resources and technologies increasingly applied into system design, the analysis of online interactivities has to take users' cognitive, affective, and physical behaviors into consideration and allows the interpretations of user experience with a much broader view. This might mean to adopt new variables and to apply a more interdisciplinary method in its investigation.

In order to define how information flows within an online learning environment, this section discusses the factors that affect the process and the product of individual learning in an online instructional environment. Affect, which includes emotion and motivation, and representational method are the two factors that are additionally introduced. These factors are expounded upon in a proposed model. Staged actions that one performs to interact with the content during learning are also suggested.

Functions of Online Interactivity

With the maturity of the Internet in the past decade, online interactivity has extended both the dimension and the meaning of information acquisition. Online interactivity has also become one of the critical constructs in the research of computer-

mediated communication (CMC). Information-seeking modes and strategy models related to the functions of the online interactivities as well as factors that affect the interactivity have been widely investigated.

Compared to the original face-to-face instruction, online instruction creates a new environment that makes the individual apply a multi-dimensional learning approach. The asynchronous and synchronous modes of interaction in the online learning environment provide the individual the freedom to explore and ultimately engage in a high level of collaboration. They can conveniently shift learning modes from reading and writing to discussing, teaching, and listening according to their needs. Also, under the new environment, educational transactions may involve giving and receiving information, performing certain skills, constructing knowledge, social interaction, and self-expression (Dillon & Prosser, 2003). Many believe that the change to online education shifts its focus from traditional knowledge transference to constructive knowledge building (Harasim, 1996). This transformation nevertheless creates a significant impact on individual and social development.

The increasingly active role that an individual takes in an online environment suggests that the evaluation of the online interactivities must consider factors coming from two sources, the individual context and the system context. Gilbert (1978) suggests that turning information into knowledge is like information flow, and he suggests using two functions, direction and confirmation, to improve the information presented to the users and to ensure that it supports users' activities and thus satisfies their goals. Using this metaphor, the evaluation of the online learning experience becomes the evaluation of

how these two functions of information flow are supported by the two aspects of contexts during the process of learning and task performance.

Dimensions of Learning Experience

Although past studies provide some practical methods on how to evaluate learning experience, the existing literature is limited: more variables have to be considered, and variables that were tested before might have already phased out. For example, because using new ways and resources to transfer instructional content become possible, representational method deserves great attention. Accordingly, with user experience becoming the focus for many, usability must extend its examination to embrace richer human sensations as well as emotions beyond traditional tasks.

With the above understanding, the evaluation of the learning experience should be carried out heuristically by considering the following two contexts: the system context and the individual context as shown in Figure 2. The system context focuses on representational method, whereas the individual context takes individual differences into consideration that include individual characteristics, constraints, and emotions (and motivations) of the individual. This especially brings the affect factors of the individual as well as system context into the study, which reflects the real complexity that is inherent in the online learning experience evaluation. A beneficial learning environment therefore has to come from both the individual context and the designed system: individual awareness of tasks, useful system constraints depicted by the external

representations, manageable individual constraints, and favorable learner traits, such as motivation, enthusiasm, time management skills.

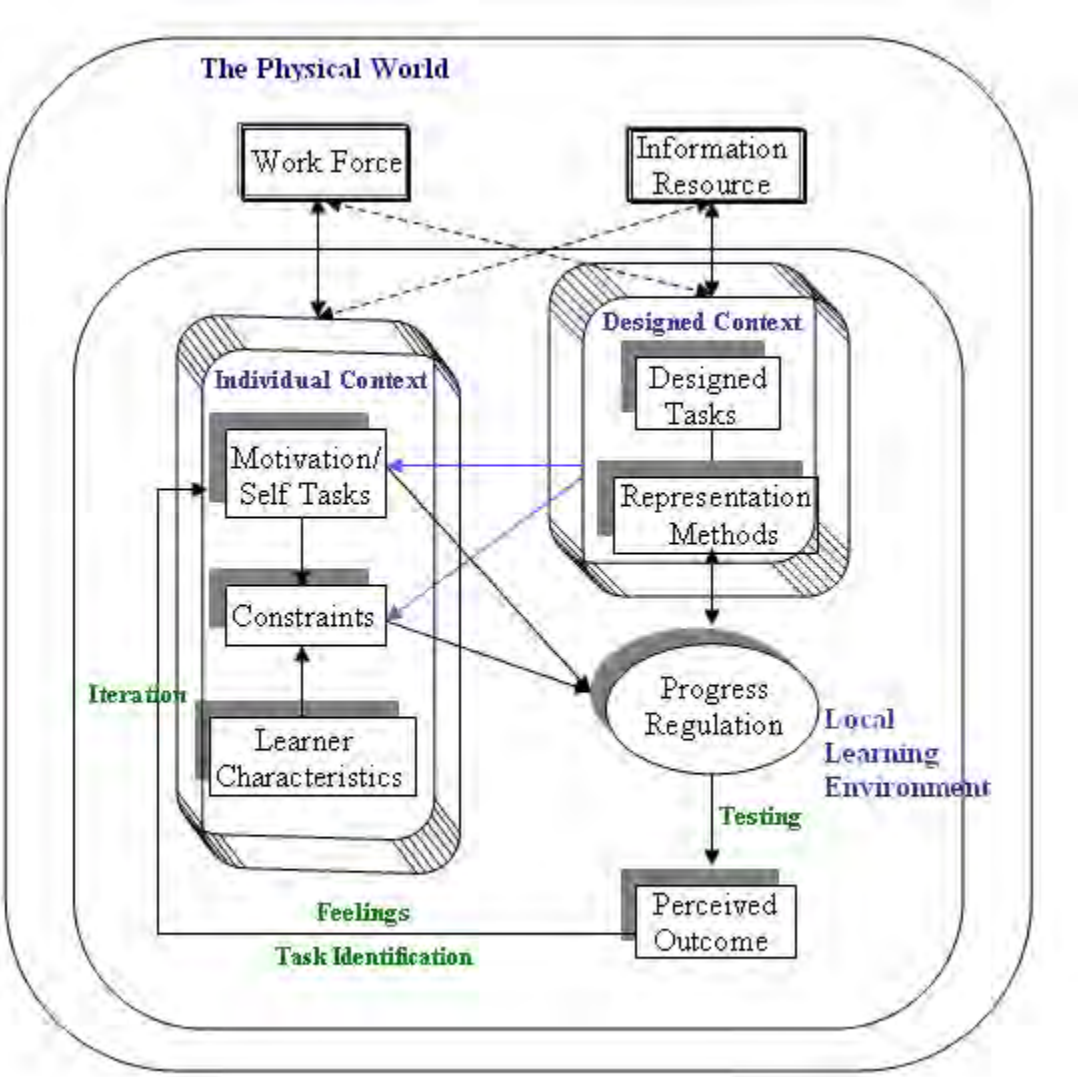


Figure 2. Factors affect the self-regulated learning process.

Individual differences include various aspects: gender, age, experience, characters, emotion, motivation, and physical constraints. Studies on online marketing

found that time and effort spent by the users for interactions are related to several aspects, personal characteristics, the nature of the product or service, the reason for the online information seeking, and the nature of the information sources (Hauser, et al., 1993; Putsis & Srinivasan, 1994). Researchers also believe that under a comparably more autonomous environment in which the individual has more opportunities to express self, personalities of the student come through more clearly in the written medium during online learning (Harasim, Hiltz, Teles, & Turoff, 1995). Moreover, researchers contend that because online learning environments have a high involvement of technologies, self-directive skills including motivation, self-reliance, self-confidence, and risk tolerance, all of which are individually oriented, directly influence learning outcomes. In order to establish individual differences as a construct in the evaluation of online interactivity, social style theory, constraints, emotion, and motivation are discussed as follows.

The Social Style Theory

Individual difference in communication style can be one important factor that affects online interaction. The social style theory identifies two scales, assertiveness and responsiveness, which indicate the different styles of human communicational behavior (Merrill & Reid, 1981). Assertiveness is defined as the effort that a person makes to influence the thinking and actions of others. It is a horizontal scale that measures whether one tends to ask or to tell (see Figure 3). Responsiveness is a vertical scale, referring to the extent to which a person tends to control or tends to express emotions. This social style indicator represents the patterns of the observable behaviors of the communicator.

The two scales imply four social types of observable behaviors. These four social types are analytical, amiable, driving, and expressive. Each of these types works as a normal tendency or driving force ("driver") of the individual interacting with others. For example, the "analyticals" want to draw opinions based on data. The "amiables" want to be friendly and supportive. The "drivers" are power-seeking and fast-moving people; their task is to influence others. Finally, the "expressives" are quick with words and want to be recognized. This theory has been used in a variety of skill-training programs related to communication, sales, and team dynamics to improve interaction (Bolton & Bolton, 1996). Applying the social style theory may help in understanding the individual's online behavior.

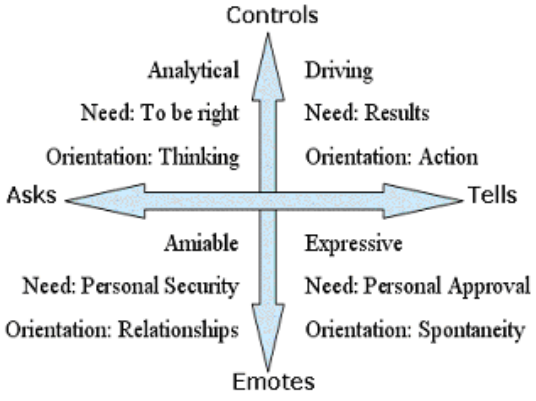


Figure 3. Social style model (adopted from Bolton & Bolton, 1996).

Constraints

Constraints are important factors that can directly threaten the online learning process and outcome if the individual does not effectively compensate for them.

Constraints come from several sources: limitation of access to computers while taking an online course, disadvantaged physical status, lack of technical skills while taking the course, and time limitations. In most online learning studies, constraints are rarely considered.

Among these constraints, the lack of technical skills while the individual is conducting an online study can be seen as a persistent issue. Alavi and Leidner (2001) suggest that research in technology-mediated learning must look at how technology influences learning, which involves an "explicit consideration of relationships among technology capabilities, instructional strategy, psychological processes, and contextual factors involved in learning" (p. 1).

Emotion and Motivation

More researchers have acknowledged that user satisfaction involves more dimensions than the usefulness and ease of use of the system. Eccles and Wigfield (1985) suggest that subjective value to perform a task has three major components: (1) attainment value, the importance of succeeding in the task in order to affirm an individual's self-concept or fulfill one's needs for achievement, power, or prestige; (2) intrinsic or interest value, the enjoyment that an individual gets from engaging in the task; and (3) utility value, the role that engaging in the task may play in advancing one's career or helping one reach other larger goals. Shackel (1991) also defines three major dimensions of human factors using the Internet—utility, usability, and likeability—and he emphasizes that likeability is a critical factor to user adoption of a technology. They

therefore emphasize the effect of emotion and motivation of the individual upon experience.

More specifically, emotion and motivation directly affect behaviors and therefore influence the online learning performance. Researchers suggest that pervasive and attention-provoking emotions are heuristics that limit search space and prompt classes of action when no fully rational solutions are available to the individual (Oatley & Johson-Laird, 1987, 1995), and the feelings of the individual are assumed to play a causal role in affecting the regulation of cognitive processes and behaviors (Nelson, 1996). A study conducted by Turner (1983) also indicates that the anxiety level, which shows how individuals generally feel, directly influences their performance on visual concept acquisition. In a word, emotion is regarded as acting like an important cognitive artifact in task performance and plays a valuable role in sense-making that impacts how users interpret, explore, and appraise a user interface (Cole, Field, & Harris, 2004; Rafaeli & Vilnai-Yavetz, 2005). The factors that influence the motivation of individuals may include interest in the topic, the perceived relevance of the content, and whether the individuals can apply the content to their daily life and work (Adler, Milne, & Stablein, 2001; Benbunan-Fich & Starr, 2003).

Actions in Learning

With increasingly more multimodal resources used in the online system design, exploring the dynamic interaction between the individual and the system becomes more challenging. The process of learning shows in on how the individual perceives, interprets,

and makes use of what has been taught. The primary sense-making actions are to recognize the tasks through "perceiving" and "decoding" the external representations using the individual's own frame of reference, prior experiences, feelings, expectations, and priorities, and then, "testing" the interpretations by exerting his or her own representations (see Figure 4).

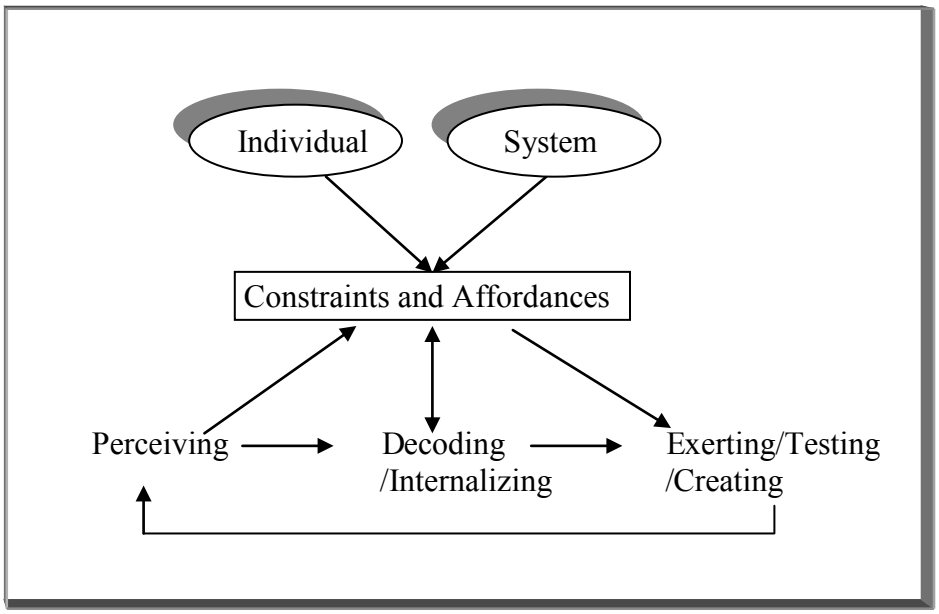


Figure 4. Learning actions under constraints and affordances.

In addition, the engagement with the content should be a recurring process with more than one access to the content. A developing, coherent, and persistent learning process depends on extensive interactions with the content, the recognition of constraints and affordances of the system, the increased inferences on the information resource, and the identification of new tasks. An individual's ability to reason and to solve problems is highly influenced by how the problems or tasks are presented. The design of instructional

material should focus on motivating and leading the individuals to involve themselves with the material in a salient, self-directed process with staged learning activities.

System tasks and constraints are necessary. Researchers like Suchman (1987) regards tasks as special representations and efficient formulations of situated actions. She expresses that the function of tasks is "not to serve as specifications for the local interactions, but rather to orient or position us in a way that will allow us, through local interactions, to exploit some contingencies of our environment, and to avoid others" (p. 188). In this, Suchman suggests treating tasks not as controlling actions but as merely a type of resource for interaction. In addition, she emphasizes that situated actions are outside of the plan's scope. This implies that the evaluation of learning experience and result should adopt a situated view of learning.

To summarize the chapter, the review of the literature implies that selecting representational method for system design depends on several constituted factors: the human cognitive mechanisms in information processing, context, modality of representation, and the pedagogical implications of using the specific representational method(s), which supports a further investigation into the inner relationship between narrative and mental imagery as well as the contentions between internal and external representations. The difference between one modality and another, as well as one representational method and another, such as between narrative and another non-narrative text type, has to be investigated in a larger context when semiotic resources are explained. However, the investigation of semiotic resources has been discursive rather than systematic, as it will also be discussed in chapter 5, and the lack of empirical theory

and methodology is especially severe. Therefore, this study also attempts to fill this gap and assists in the efforts to develop such a framework for the systematic analysis of semiotic resources, and at the same time, creating a methodology in the interpretation of narrative text.

CHAPTER 3

FUNCTIONS OF NARRATIVE

3.1 Overview

Narrative is known as one of the most primitive and familiar representational methods. Beneath its seemingly simplistic nature is a complexity of structures that people usually fail to see. These structures reveal a network of relations that each story bears, and from which even a simple story might foresee depth of meaning. This chapter explores the structures and natures of narrative, and by determining these qualities, it shows how narrative functions as a unique method to communicate meaning and affect a reader. Taking a critical perspective, the author also explores the functional effects of narrative based on various theories of contemporary narratology rather than dwells in one theory or another. The content analysis based on the literature therefore, creates a background for the further contrast between narrative texts and non-narrative texts discussed in the later chapters. The structure of the chapter is as follows: Narrative, gives a general introduction to narrative; Structures of Narrative, shows the different dimensions of structures of narrative as a discourse method; Natures of Narrative, gives a detailed examination of various properties of narrative and how these properties affect a reader; Conversational Narrative, examines how conversational narrative maps external representations and affects a reader.

3.2 Narrative

Storytelling or comprehending a story is a natural and social activity to everyone. People can easily find a biological reason for it. The biological form, which each individual resides in, itself represents a process, containing a beginning, middle, and end, ensuring that a linear process is in tune with our body system at the first place. As a result, people adopt the ability to comprehend and to tell stories at a very young age. Children learn to comprehend and employ stories even before they can read, and when people age, they continue to tell stories though they are not sure about their origins. People use narratives in nearly every activity: in memory, persuasion, planning future actions, and dreams. As social beings, people remember stories as well as live them. A story, first and most of all, is a social and culture product, ready to be interpreted in its social context; it therefore has an affordance to inform and change one's beliefs and actions. The authenticity of a narrative, however, does not mean mere truth, but the verisimilitude of both the physical and mental world created for the individual through the interpretation and reinterpretation of the story (Bruner, 1987).

Linguists, especially those who hold an interactional socio-linguistic view, endorse pragmatics in the interpretation of narrative. Reading a story implies a proactive process from which the reader fills gaps through discerning, deciphering the contextual cues, and drawing inferences. Suspense, unspoken words, unexplained situations, and covert symbols are temporary gaps that one encounters reading a narrative. To fill these gaps, the individual needs to actively apply his or her world knowledge and to build links between what is expressed and what is implied. Therefore, to comprehend a story is a

constructive process that requires the individual to not only listen to what has been told but also to create new experiential instances of the implicated objects and live in the emotional state generated. Also through this process, beliefs and future actions of the individual can change. In Tan's (1996) words, a story in the film allocates its viewers not only their physical views of scenes but also ideological positions with respect to the reality being portrayed. Battersby (2006) also calls this narrative comprehension process an episodic approach to self-experience. As such, appreciating a story is not only a method to gain new knowledge about reality but also a means to experience it.

Narratologists regard narrative as events in sequence with causal links between them. The concept of narratology was first suggested in *Grammaire du Décaméron* (1969) by Tzvetan Todorov. He argues that the defining characteristic of narration is not its discourse but its content that must have a temporal structure and a change of state. Chatman (1978) also contends that the difference between narrative genres from other texts is that narratives describe actions rather than a state of being, which an action comprises the change from one state to another. These definitions of narrative also give a glimpse of the structures of a narrative.

3.3 Structures of Narrative

The study of narrative structure is called narratology or narrativity. Its task is to investigate how various kinds of narrative elements are arranged and function in different narrative genres. The structure of narrative can be interpreted through several dimensions. The first dimension is the conventional structure, which consists of events,

scenes, settings, protagonists, supporting characters, plots, and outcomes. The second dimension is usually regarded as the pragmatic structure of narrative, which consists of thematic sentences, explicit explanations (describing events), implicit stances (about the characters or events), and concluding remarks (from the narrator). For example, Labov (1972) suggests that the evaluative devices that are usually strung throughout the narrative actually create a secondary structure for narrative. The third dimension is the narrator-audience interactive structure. This structure is comprised of the general devices or markers that indicate the shifts between the story world and the actual world used by the narrator, such as phases like, *once upon a time*, *what happened next*, *finally*, indicating the author's intention, plan, and reflections. Overall, these dimensions show a hierarchical structure of narrative elements. In support of this structured view of narrative, Barthes (1975) also contends that, "[t]o understand a narrative is not only to follow the unfolding of the story but also to recognize in it a number of strata" (p. 243), interpreting the story from one level to the next. An individual simultaneously engages with the levels of structure of the narrative and its content; the study of narrative structure, therefore, is the investigation of both the latent structure of narrative and the surface textual realization of it.

The structure of narrative is believed consists of knowledge structures that people have accumulated and generalized over time. Symbolic systems that are used to attune human perceptual capabilities can themselves trigger associations and inferences from their syntactic structures, and activation of these structures results in top-down processes that generate extensive expectations and inferences (Bruner, 1987). Narrative is one of

these symbolic systems that contain rich syntactic values, which can create a great amount of background information for narrative comprehension. Also for the same reason, Bruner also suggests that the structure of narrative provides a key both to a wider culture and to individual lives.

The elements that make a story are usually treated as the analysis units of narrative. Among them, sentence is generally regarded as the smallest unit of discourse (Martinet, 1962). However, the interpretation of a narrative is usually seen as beyond its syntax value. Barthes (1975) argues that the narrative unit is not the linguistic word or sentence but only its connotative value. The unit is a content unit "independent of linguistic units with regard to substance" (p. 246). Therefore Barthes treats the elements that belong to the traditional concept of *nuclei*, which directly control the continuity of the story, as the functional units of narrative, and regards other complementary elements (catalyses in narrative) as *indices*. The relationship between the functional units and their correlative indices is not only distributional but also integrative. As he states, "in order to understand what purpose an index [indice] or indicator serves, one must pass on to a higher level (actions of the character or narration), for only there can the 'index' be clarified" (p. 247). This also indicates that the interpretation of narrative is actually a process of relating the parts to the whole.

Following this functional method, Labov (1972) suggests that fully formed narratives have six distinct elements: the abstract, the orientation, the complicating action, the evaluation, the result or resolution, and lastly, the coda. According to Labov, a complete narrative "begins with an orientation, proceeds to the complicating action, is

suspended at the focus of evaluation before the resolution, concludes with the resolution, and returns the listener to the present time with the coda" (p. 369). Other researchers found this structural analysis of narrative rather rigid and suggested more flexible methods to investigate narratives. Nonetheless, no matter what the units are suggested, the general rule of defining them should come from the heuristic process in which an individual pragmatically interprets and reconfigures a story.

3.4 Natures of Narrative

As a discourse method, narrative contains rich properties and offers multiple effects for the spectator. These properties can be classified into four main categories: the contextual effect, the associative effect, the constructive effect, and the adoptive effect. These properties are not exclusive of each other, and they make narrative a flexible but very powerful tool.

Contextual Nature

Meaning has to be transferred through context. With a strong intention to persuade, narrative innately has a strong propensity to depict vivid backgrounds, whether they are physical environments or mental states. These backgrounds work as frames that oversee other entities such as characters and plots within. Context also makes the interpretation of a story become an active process, which meanings may also become immediately applicable.

The contextual nature of narrative also shows in its innate ability to initiate a very broad structural effect. Context in narrative contains various components such as settings, scenes, participants, ends, topics, tones, channels, codes, norms, and genres (Hymes, 1967). Context has a holistic nature that mirrors the actual coupling of humans and the physical world; it is also specific and subject-directed, therefore, has both subjective and cultural values. The structures overseen by the context give a broader range of associations and references for a spectator.

Furthermore, telling a story is often about skillfully mapping the context and makes the intended subject matter distinctive. What gives significance to a story is one's ability to create ideas through depicting potent and intriguing circumstances. Authors like Kame, Newman, and Hawthorne all emphasize using vivid depictions, and they believe a clear image will make the deepest impression on a reader's mind. In view of Hawthorne, distinctness is an attribute of reality that needs concreteness to give clarity (Fogle, 1969). In his romantic conceptions, the emphasis on the distinctness of the *figures* or their *minute visibility* is one method of maintaining reality and individuality. Hawthorne uses the technique of decoration to make the objects stand out and "set them off from their surroundings in a splendid isolation, and pushes the reader toward interest in their meaning instead of their reality" (Becker, 1971, p. 26). Fillmore (1977) also contends that meanings are related to scenes in that the viewer's perspective can differ, depending on the saliency of such aspects as agent or object in the setting.

The make-believe capability of narrative also creates possible worlds that provide an extended playground for the imagination of a reader (Bruner, 1986). This make-

believe capability comes directly from the vivid and intensive depiction of the event background, and there is no need that the description is upon something that really exists. However, the effects created by these virtual worlds are no less real than the physical ones. “In Hawthorne the reality of thought, idea, and imagination continually interpenetrates physical reality to such an extent that ideas, thought, supersensual things, and even chimeras can exert influence just like real, palpable things” (Brumm, 1970, p. 116).

Associative Nature

Narrative is rich in causal and associative links. The associative effect of narrative is the results of both the connotative meanings of the narrative discourse and the structures of the narrative. As a product of unity itself, everything in narrative is given either a causal effect or an associative effect. The causal effect can be seen as a special case of the associative effect, when either a causal relation or time sequence occurs between events or other entities. Narrative gives a full temporal sense to the spectator by the changing of scene, setting, goal-failure plotting, etc. Therefore, it is diachronically story-lined, containing a beginning, a body, and an end. As such, all aspects in narrative are integrated in the process of building a holistic structure.

In another situation, the associative effect takes off when a reader responds intimately to narratives. This happens when the spectator’s imagination transfers from the process of narrative inference to the projection of his or her own personal existence. Ponder (1990) discusses two themes on the association theory proposed by two different

groups of theorists from the eighteenth century. One group focused on the psychological process of association and emphasized that the writer is an artist who uses techniques to engender similar responses in the imagination of the reader (e.g., Hamilton, 1971). The other group focused on the associative effect of aesthetic qualities such as beauty, sublimity, and novelty on human perception and acknowledged that a sublime object sets off the associative process of the beholder, affects the mind with emotion, and evokes numerous images (e.g., Alison, 1854; Blair, 1965). These interpretations of the associative effect of narrative can be seen as two different approaches for generating an associative effect. One approach is to allow a reader to achieve a coherent interpretation over a narrative text. The other approach is to exert a broader emotion from a reader out of the narrative text and to allow the descriptions of the writer to give new and unexpected perspectives of ordinary objects and to fill the reader's imagination with sublime images.

Constructive Nature

Narrative is the ultimate embodiment of contrast. Light and dark, strong and fragile, noble and mean, real and false, usual and unusual—all achieve a balance and neutrality as a symbol in narration. This neutrality affords narrative the qualities of harmony, objectivity, sense of past and distance, and therefore, an aesthetic value, from which appreciation by the full senses of the individual becomes possible. In Hawthorne's narratives, he "frequently reaches out toward synthesis and totality, but the gesture is always tentative" (Fogle, 1969, p. 4), and the consummate whole is only ideally

attainable. According to Hawthorne, this is "where the Actual and Imagery may meet, and each imbues itself with the nature of the other" (p. 19). This exactly expresses the power of narratology, in which narrative represents both the parts and the whole but ultimately its symbolic entirety. In a word, presenting contrast is the ultimate method by which narrative creates the constructive effect.

This constructiveness of narrative also shows in several dimensions, and each dimension is composed by two distinct orientations. The first dimension can be explained by a contrast between objectivity and subjectivity; the second dimension is demonstrated by a contrast between linearity and non-linearity; the third dimension is demonstrated by a contrast between mimesis and non-mimesis, whereas mimesis itself also contains a binary contrast between realism and symbolism or between the literal and the metaphorical methods.

These contrasts imply the techniques of narrative as well as the perceptions and effects that they create for a spectator. Using emerging symbols, such as an expanding fictional world, clever suspense, shocking surprises, and ambiguities, a writer can create an effect that the continuity of the narration is temporarily broken. These conditional dissonances and tensions in narratives initiate the thought process of a reader from which the mental world of the reader begins to join the fictional world of the narration. Given this, these contrasts highlight the dynamics of narrative and have the ability to generate streams of consciousness that provide great potential for creative inferences, and also because of these contrasts, narratives create distinctive objects, interesting situations, and

memorable moments for the reader and engages one in a continuous creative thinking process.

The coherence of narrative discourse has a great impact on memory. The mental imageries triggered by a story are proven as a mnemonic tool for organizing information (Bower, 1970, 1972; Paivio, 1970; Steingart & Glock, 1979). Researchers find that the only sufficient condition for text coherence is when the text elicits an envisioned world through the imagination of the reader (Enkvist, 1978; Fillmore, 1977; Fillmore & Kay, 1983). Imagery, therefore, plays a key role in comprehension and memory by acting as a symbolic link between texts and their meanings. As the contrasts made by the narrative discourse ensure the generation of images of its spectator, the coherence is achieved with ease in narrative compared to other texts.

The constructive nature of narrative is also indicated through its power of enlightenment in organizing personal memories, adopting social interactions, and enhancing the mechanisms for motivational and emotional controls. The activities that are imagined during reading a narrative are supposed to have an evolved function of organizing and elaborating computational adaptations that contain decision and evaluation rules that are initially triggered by actual exposure to biologically meaningful situations (Tooby & Cosmides, 1990). Given this background, a story heard is a story lived, and by reading a story, a lesson sensed is a lesson learned.

Objectivity and Subjectivity

Narrative is believed to be a literature of self (Bruner, 1986, 1990, 2002, 2004; Foucault, 1997). The subjective sense of self and the experience or existence of it in the imagination of narration is both mentally and biologically undeniable. Self and identity are highly context-dependent phenomena. Modern metaphysics regards the essence of self as reflection. Shakespeare observes that, "[l]earning is but an adjunct to ourself, and where we are our learning likewise is …" (*Love's Labour's Lost* IV, iii). Kant and his predecessors interpreted self as becoming both the subject and the result in the activity of representing, "which is originally related to objects, is turned back on itself and in this way produces the unique case of an identity between the activity and the result of the activity" (Von Schelling, 1994, p. 42). As a highly reflective text, narrative has the utmost capability in self-depiction.

However, this only reflects one side of the story. The key to the concept of identity is that it is both individual and collective. Researchers suggest that self is constructed through interaction with the world, and it is a product of transaction and discourse (Bruner, 1986; Goodwin & Duranti, 1992). Moreover, self is believed to be constructed in retrospect and meta-cognitively in which the subjectivity is subsided and merged with the collective consciousness and unconscious. In this sense, most importantly, narrative is able to bridge the gap between the local selves with remote and historical minds of as their peers.

Narrative represents a specific use of metaphor that transfers personal mode of meanings through projection of the other. Holland (1985) contends that it is neither the author nor the text but the readers who determine the story through expectations of the text based on their prior experiences. The mental model is established and transformed through the defensive mechanisms of the reader, which include identification, projection, and repression. From this, Holland claims that the literary work is re-created by the reader's personal identity, and personal identity is re-created by the literary experience. Narrative, therefore, can be regarded as a "technology of self," providing tools that support analysis of identity construction through the telling and re-telling of stories in a social group (Sack, 1997).

The Contrast

Narrative creates temporal, spatial, and causal distance to self from its physical and emotional background or other possible risks. In this way, narrative essentially establishes a different, less personalized framework within which one may explore alternatives (Bruner, 1986). From this, narrative facilitates the shared resonance of experiences that allows one to open to others' experiences, which is important to human social understanding. The objective effect of narrative creates a safe environment that allows a storyteller the possibilities to openly communicate the content that can be complicated in nature; it also provides an open space that allows the reader to interpret the narrative without much of the resistance, which is inherent in human nature. For example, a narrator in a story can act as a character with beliefs and values who

articulates strong perceptions with less danger of being opposed; unlike they were expressed through other methods. Complex ideas can also be easily conveyed in narrative. For example, the inner thinking process of the character can become more sensitive to a reader and be understood with more tolerance in storytelling. This gives a reader an objective outlook in all the inferences and allows one to achieve understandings both consciously and unconsciously.

In another aspect, narrative comprehension is a process of conscious thinking through which one gives structure and significance to his or her own individual experiences. According to Aristotle, this comprehension is inevitably partial, situated, and subjective because the conscious state of humans has to be individualized. In narrative comprehension, the individual sees every character as a transformed "I" in other possible contexts and the experiences of the characters become the experiences of self. The personal orientation of narratives is critical to their role of getting emotional responses from the individual reflecting his or her internal structures of thinking. Readers understand a story when they bring their own relevant experiences into reflection (Seifert, Abelson, & McKoon, 1986). This subjective stance makes an individual readily see both retrospectively and prospectively the self taking similar roles and facing similar life situations and from these reflections, the pragmatic and heuristic principles of narrative comprehension become really evident.

The contrast between the senses of objectivity and subjectivity comprehended during reading a narrative is also able to create a special effect of enchantment and disenchantment for a reader. The enchantment is generated by the lure of the other,

whether it is the natural environment or another individual. The disenchantment is the coming back of self's immediate existence—the very sense in which self exists. Narrative, as a natural form of expression, originates from the individuals' desire for social contact and their innate need to relate to others. The acts of enchantment and disenchantment, therefore, are the complex faculties of human cognition working as balancing mechanisms that guarantee the well being of the individual in fulfilling the needs of social contact.

In addition, these enchantment and disenchantment mechanisms function more than those simple acts of opening and closing because the latter activities represent more of the results of an action, whereas enchantment and disenchantment each describes more of a mediation state or an extended mediation process similar to play. This difference is important because enchantment and disenchantment ensure more changes for one as a result in which desire of self and possible rules are fully explored during these states or processes. Also for the same reason, narrative is an especially effective means to creating an impact compared to other types of art, for instance, expository text, poem, and painting.

Linearity and Non-linearity

A linear nature is intrinsic to human biological and physical existence such as in inner thought process, the experience of time, nature, and social development, and in both real and fictional character building. The contention here is that narrative is the fundamental tool that takes into account all kinds of human physical and social

experiences, and from which a linear quality is inevitably adopted. Also because of the same reason, it becomes more of a function than a necessity that a reader will put whatever events presented into a line of sequence. Early authors and literary critics in the eighteenth century, like Lord Kames and Edmund Burke, are among the firsts who brought up the theory of narrative's capability to take advantage of the temporal reading process of the reader. They argued that this capability of narrative allow narratives involve a reader interiorly and allow one to imagine, and it shows the accumulative power of narrative in which a series of images instead of a single static image can be formed. Because of this nature, narrative is able to increase the intensity of the impression of its description to a reader.

On the other hand, as for narrative, a break from what is called canonical pattern is also necessary, and from this break, the intention of the speaker becomes important to the reader, and the context of the actions merits detecting. This deviation from linearity also opens several opportunities for encounters of different human existences, and as a result, the conformity and the inconformity both become the rules for social experience. In other words, there are other methods to make an impression for a reader, such as through creating unique situations, a new or a difficult situation, something beautiful or sublime, or something in great scale.

Linearity

Narrative discloses themes and instructs concepts through a succession of scenes and events along with the passage of time. This linear process assigns an innate narrative

structure for the reader, and from this linear structure narrative shows several advantages as a discourse over non-narrative texts.

The fact is that any kind of learning needs a process, and this process necessarily combines cultural and social conditions that also evolve with a temporal continuity. As Dewey (1938b) argues, "[t]he process of inquiry reflects and embodies the experiential continuum which is established by both biological and cultural conditions" (p. 245). This continuity ensures a connection to the original condition from which new understandings can be integrated.

Without exception, reading itself is a temporal process, and in order to understand something, a reader needs to progressively engage in the text. This process includes initiating the internal and external mental models, comparing the differences, and combining the two. Consistent with this perspective, narrative is the best method to take advantage of this temporal process of interpretation. In contrast, paintings can only make a reader attentive to one event because they most likely portray only one moment or state, whereas narratives usually depict a series of scenes and events that show an increase in intensity in terms of transferring the events with the passage of time. This intensity that can be created by narratives is believed as quite significant. For example, Kames (1883) suggested that a series of impressions is stronger than a single impression, and a series of impressions that grow in intensity over time create the strongest impact on the reader. The linear narrative process, therefore, is the best method for manipulating the expectations from a reader.

Moreover, a linear process is good at depicting actions such as the interior mental processes of the characters, therefore, reinforces narrative's power of building or delineating characters. This is because the complex construct of human thoughts and feelings requires a gradual unfolding of images. Literature gurus know a lot about it. Kames (1883) suggested that a passion is seldom being raised to any height in an instant; passions, especially the sympathetic type, require a succession of impressions, and the accumulation of feeling affects a reader the most. Aristotle regarded the representations of the development of characters through the depicting of actions as the most important objects that all art seeks to imitate from real life. He furthermore suggested that tragedy has the most favorable distinct qualities over other genres of art, for example comedy and epic poem on the seriousness, completeness, and magnitude of their imitation of actions (Butcher, 1951). In brief, the linearity in narrative allows the emotional preparation of the reader to further appreciate what would be presented next.

The linearity in narrative also provides a spine-like structure that gives potential for rich associations. For a narrator, "[t]he sequential forward movement of the narrative can be intersected by vertical associative movements of the mind which resulted in literary works of greater intensity and complexity" (Ponder, 1990, p. 6). For a reader, however, the intersection means the opportunity to create images. The dense association creates image-like effects for a reader, which makes an inductive process of interpretation possible.

Non-linearity

Narrative comprehension nevertheless represents a complex cognitive process, and a reader has to implicitly and explicitly extract meanings from a narrative text. This complexity comes from the diverse depiction methods inherent in a narrative text and a writer's flexibility in the selection of objects for event depiction. In narration, every tool that makes a linear effect can be employed to create a non-linear effect (see Table 1). For example, the meta-narrations, the perspectives of the narrator, might be used to create a tension between events and give heightened causations, making the story more coherent, but in an opposite situation, the narratorial perspectives might lead to a certain circumstance that breaks the link between events and states, keeping the reader in suspense. This technique is also called branching technique in interactive narrative generation, highly regarded by the game industry. Different branching structures can be applied, such as tree structure, parallel path, network structure, and so on.

Table 1

The Linear and Non-linear Effects of Narration

Narrative Tools	Linear Effect	Non-linear Effect
Narrator	Meta-narrations, interpretive statements, and references that build tension between states or events.	Narratorial perspectives
Plotting	Main plot	Sub-plots, intriguing vacillations of the subject matter, and suggestions of alternatives.
Character	Depict a train of acts and character development	Elicit the perspectives of thoughts, provide options of actions, and create contrasts.
Description	Vivid description, which follows natural sequence.	Use of bold symbols and symbolic juxtaposition
Context	It is presented along with plotting and fits in the thematic atmospheres in which characters are depicted. The context gives the overall impression of the events.	It is presented with potent details with the purpose of creating symbolic images and indicates the juxtaposition of concepts.

The Contrast

The contrast between linearity and non-linearity of narration can be explained by the dramatic unities discussed by Aristotle. For Aristotle, unity "is manifested mainly in two ways. First, in the causal connection that binds together the several parts of a play, thoughts, emotions, decisions of the will, and external events are inextricably interwoven.

Second, because the whole series of events, with the entire moral forces that are brought into collision, are directed to a single end" (Butcher, 1951, p. 284). Aristotle expressed that the events are directly related to the development of characters, and "[t]he sequence of the parts is more inevitable—morally more inevitable—than in a story where the external facts and events have an independent value of their own" (p. 286). In this situation, the succession of scenes and the development of actions and characters follow the natural linear causal effect, with the subordinate parts arbitrarily contributing to the inevitable dramatic end. Similarly, the rich context cues and metaphor-like symbols make both logical and holist narrative interpretation possible.

The multiple possibilities and methods that allow a reader to derive meanings identify the constructive nature of narrative, and this nature of narrative calls for a holistic approach to analyze. Bruner (2002) calls this nature of narrative as containing "hermeneutic composability." Hermeneutic implies that there is a text trying to tell and from which there is somebody trying to extract a meaning. Hermeneutic method of interpretation is necessary when "there is neither a rational method of assuring the truth of a meaning assigned to the text as a whole, nor an empirical method for determining the verifiability of the constituent elements that make up the text" (p. 47). The interpretation of narrative therefore depends on the interdependence between parts and wholes (Ricoeur, 1986).

Subsequently, the central linear process of state change combining with the character development creates different contextual background that makes logical computation possible when interpretations of subparts are conducted. The structure of

narrative, implicitly and explicitly given, forms a domain of knowledge and provides contextual cues for the interpretation of the individual components of that narration. This understanding is also true of Foder (1983), who recommends a distinction between a central logical process and modularized perceptual systems in any narrative text.

The Mimesis and Non-mimesis

Narrative includes a contrast between the mimetic and the non-mimetic methods of description, which is similar to the contrast between the literal and the metaphorical methods. In literal mode, narrative assumes a causal link through describing reality as it is, whereas in the metaphorical mode, causality is necessarily ambiguous, creating an imaginational world supporting potential abstract meanings.

The mimetic methodology includes two types of mimesis. Realism or literalism is one type, which portrays reality as it is seen, and fantasy or symbolism is another type, which treats a deliberated fictional world as a truthful representation. Aiming at generating vivid images from a reader, the mimetic method illustrates the verisimilitudes of the reality in what it is representing, whether it is reality or fiction. It is used not only in linguistics but also in visual, musical, behavioral, and philosophical senses. For example, mimesis can be found in paintings, movies, music, and other human experiences through the image-like effect that each is able to create.

The non-mimetic methodology focuses on creating and using symbols or emotions in narrative with the purpose of not only making the objects more apparent but also enriching the interpretations and meanings through initiating a series of imagined

images. Emotions, intentionalities, and inner thoughts are unique objects of narrative, and they are both omnipotent and evasive in narrative texts. Also as a special kind of reality that can be described in detail with vivacity, those objects could be abstract and elusive concepts that are open to indefinite interpretations. Therefore, both mimetic and non-mimetic methods can be used in the depictions of them.

Realism and Symbolism in Mimesis

Mimesis can be either in realism or in symbolism. Realism assumes a causal link through describing reality as it is, whereas, in the symbolism mode, the idealized reality superimposes what is real, ensuring an imaginative world.

The literal aspect of narrative is indicated by its vivid and detailed depiction of objects. These objects can be either contexts or concepts. For the latter, the aim of a depiction is to create structure-like images for the abstract concept for a reader. Authors like Joseph Addison are regarded as masters of applying the method of giving visible forms to their abstract ideas functioning as a means of persuasion (Wasserman, 1950). As Ponder (1990) says, through these illustrative visual images, Addison gives "color and shape" to the "truth of the understanding" and "demonstrates the central role of the imagination in facilitating the moral and intellectual growth of his readers" (p. 23). In another case, authors can also break through the fictional surface to give explicit interpretations of their symbols (Becker, 1971). For example, Edgar Allan Poe is known skilled at depicting the consciousness of his characters. To use symbols as well as the

interpretations of them is also regarded as a method of context creation—metaphysical context, which Dante also called "allusional subtext."

The creative act of imitation in narrative mostly includes realism and symbolism of literal depiction at the same time. Art is not mere reflection of reality but beyond it, mostly, a correction or revision. As Aristotle said:

> It is the expression of the concrete thing under an image which answers to its true idea. To seize the universal, and to reproduce it in simple and sensuous form is not to reflect a reality already familiar through sense perceptions; rather it is a rivalry of nature, a completion of her unfulfilled purposes, a correction of her failures. (Butcher, 1951, p. 154)

Extending to this belief, Aristotle pointed out the difference between art and nature, therefore the necessity of art. According to him, art originates from the ideal image of the artist, and it embraces all the senses. Nature, in which real life is situated, is prone to mistakes. Therefore, nature is not adequate for this ideal world that leads to the creation of art. In essence, realism follows the rule of possibility; conversely, symbolism follows the rule of impossibility. Both of them are pragmatic in their own spheres of reason, and if we accept that there is a continuity as well as contention between physical body and spiritual world, we are sure that realism and symbolism always coming back to human authenticity and verisimilitude.

The Symbolic and the Metaphorical Methods in Non-mimesis

In non-mimic symbolic mode, allegory, metaphor, simile, and satire are tools in narratives. They use the concrete facts of the fiction as well as their suggested

conceptualizations to restore the physical world. In order to break the consistency of the mimetic fiction surface, allegory is frequently used as a non-mimetic technique for authors like Nathaniel Hawthorne and Edgar Allen Poe. As such, they alert their readers and force them to actively impose meanings in the imagined reality rather than merely accept the meanings assigned by the literal narration. Subsequently, in the imagined world where reality is ambiguous, the principle of causality is also necessarily ambiguous, which leads to multiple meanings; in this way, the symbolic method of narrative creates distance between the text and the reader, which gives an extra aesthetic value in narrative interpretation.

Moralities, Emotions, Inner Thoughts, and Intentions

Moral qualities, emotions, and inner thoughts are regarded as the actual objects of aesthetic imitation in narrative discourse. For example, in view of Aristotle, the actual objects of aesthetic imitation in narrative are threefold: first, the moral qualities, "the permanent dispositions of the mind, which reveal a certain condition of the will"; second, the transient emotions, "the passing moods of feelings"; and third, the actions "in their proper and inward sense." Accordingly, "everything that expresses the mental life, that reveals a rational personality, will fall within this larger sense of action" (p. 123). Consistent with this perspective, and concurring with former Greek artists, Aristotle considered the imitation of nature, landscape, animals, and so on, as the background of human actions and they do not belong to the fundamental objects of what art imitates. Instead, he emphasized the imitation of actions, moralities, and emotions as the basic task

for narration. This belief is also well-accepted among later scholars, as the portrayal of inner thoughts was regarded as a highly artistic methodology employed by many well-known writers in the nineteenth and the twentieth centuries.

Likewise, emotions, intentions, moralities, and inner thoughts in narratives are the very objects of interpretation of a reader. Predicting the behaviors of others is regarded as a critical intelligence of an individual. Kames (1883) argued that intention, as an invisible capital circumstance in human actions, requires reflection to discover, and "[e]motions are raised in us, not only by the qualities and actions of others, but also by their feelings" (p. 39). Intension and emotion is mostly the same thing.

Detecting the intentions of the narrator and the inner thoughts of the characters are therefore also critical to achieving coherence over a narrative content, as these intentions and inner thoughts that portrait the inner state of the characters also draw the interest of the reader. In support of this, Bruner (2002) contends that narrative is fundamental to the understanding of the intentions of human behaviors. During this inferring process, powerful associations can evoke a great number of images that increase the individual's emotions of sublimity and beauty (Alison, 1854). As such, narrative is the most effective representation in terms of achieving cohesion in its appreciation, as suggested by several empirical studies mentioned before.

Adaptive Nature

The adaptive nature of narrative is shown in humans' capability to imagine, to sense, and to express, which is for the very purpose of sharing similar assumptions with

other individuals in the society, which these assumptions are hold as certain social norms, or at least for the purpose of coming to one's own sense, even in the face of that something is completely odd that has just happened. Indeed, narrative and imagination share a close connection, and one arises from the other, both belong to human consciousness. Imagination is the pinnacle of human consciousness, which differentiates the role of individuality from that of the revolutionary gene, the biological and physical self. However, human psyche also depends on as well as realizes through the physical self, in which the individual has to self-organize and connect these two spheres through the constant sense-making. On the top of this, culture also bears a significant burden to carry the history of the collective self—the mentalities of humankind and the evolution of it, companioning to the biological gene. Because narrative has the most capacity to express mentalities, it contributes to the evolution of both mankind and the environment.

The mechanism of imagination in narrative is shown from both the storyteller and the listener's sides. For a novelist, the adaptive nature of narrative resides in its power to illustrate and to transform, and because we are what we learn or hear, novelists carry a heavy responsibility to educate. Masters of different types of narrative arts proposing different genres, who depict distinctive and memorable human natures and characters and the conditions from which they arise, are those who eventually make literary history. The process of narrative creation is nevertheless an arduous practice as it assumes a task to make the depicted characters as well as their accompanied conditions accessible to the audience, a process that is far from without an anticipation of the author to generate certain responses from the audience. As such, narrative creation emphasizes both

expressiveness and the mentality of the individual(s). In fact, masters of narrative inform not only conventional knowledge, but also the reality of life that is able to revive readers' senses and through which allow readers themselves to express their own deeper emotions in life, a skill that is crucial to everyone in terms of coping one's own existence in reality.

For an audience, the adaptive nature of narrative resides in a narrative's capacity of being interpreted, or more precisely, to be able to claim as private to oneself. This process of narrative interpretation truly displays individual difference in three dimensions: individual's inner psyche, standing for individual mind; the bio-physical self, the body; and how these two dimensions interact, the reality of human existence. Social and physical backgrounds of a reader directly affect how one interprets the world. In addition, people only learn from what they biologically and psychological incline to believe. For example, sociobiologists and psychologists believe that individuals inherit and develop certain neurobiological traits that predispose them to see the world in a particular way and choose certain behaviors in preference over others (Wilson, 1998). As such, narrative comprehension inevitably inherits a sense of individuality, in which certain experiences are treasured individually and cannot be passed into another. Because imagination and a sense of individuality are involved, narrative is able to transfer a sense of qualia[1] like real experience does.

Note. Qualia are sensory states with a particular qualitative character as distinct from informational content, which can vary by degree and intensity, such as in pain and color experiences (Rollins, 1989). In contrast, authors like Tye (2000) refuse qualia as a philosophical concept that others use it to refer to the introspectively accessible properties of experiences. The debate over the concept is not a topic in this study, but using this concept brings a focus to an existing human phenomenon or situation.

Nothing is a more powerful reason in narrative imagination compared to seeking the content of one's heart or desire, a response to a remote sense or emotion, either due to a biological or psychological reason. The content of narrative imagination, however, is universally sharable, and is the result of evolution (Wilson, 1998). According to Wilson, culture evolution, which appears to co-develop with human biology, is only a special extension of natural evolution, an instrument of human biological development. Nevertheless, this content of narrative imagination should be the focus of those who dare to take power in their own hands of their well-beings instead of external natural forces and biological evaluation. In words of Catherine (2006), "imagination gives rise to narrative," and fiction is regarded as an effect of imagination, "the by-product of adaptations" (p. 117).

Summary of Narrative Natures

Compared to other narrative components, context in narration is also a unit of description same as event, character, and theme. This context can be local or to a larger extend. It binds characters together and links one event to other events, implying one or multiple themes. Like those effects created by a camera, context creates visual objects and visual frames through the mimetic method of representation and gives close-ups of them by zeroing in when necessary, building iconographies that transcend between seeing and knowing. Therefore, context gives life and power for character building as well as event depiction, which both contribute to making significant themes.

The constructive nature of narrative contains several dimensions (as summarized in Table 2), and among them, the linear effect bears a special significance. However, the linearity is signified by its own detour, comprised by the incidences and the breakings of normal scenes, like the ritual of life itself, from born to death of a human being. This linearity in narrative therefore demands an active mental model of a reader to trace the changing referent over an extended text, whether the referent is a character, a symbol, or a motif. Each with a life circle over a stretch of time, a reader has to keep parallel tracks for each of the referents until its end. The linearity in narrative also provides a natural structure supporting for associations, so that an expansive imagination will not impair the integrity of the whole narrative understanding.

Table 2

Constructive Nature of Narrative

Contrast		Unique Object
Objectivity	Subjectivity	Morality Emotions Inner thoughts Intentions
Linearity	Non-linearity	
Mimic (literal)	Non-mimic (Metaphorical)	
Realism vs. Symbolism/Fantasy	Symbolic/Metaphorical Allegory, metaphor, simile and satire	

Contextual nature, associative nature, constructive nature, and adaptive nature are four main qualities of narrative. They give narrative the power to put not only narrative

events but also the real experiences of a reader into perspectives, leading to a broader comprehension of both. Moreover, rendering redundant units of events that are so dense and closely connected, these properties of narrative almost warrant a continuous nature for a narrative comprehension. Thus the process of narrative comprehension is where new stories are being interlaced into the existing ones. As such, they indicate narrative a highly complex and flexible tool of representation, which is critical to self-construction.

3.5 Conversational Narrative

As a commonly used embedded text for narrative, and in the form of direct speech, conversational narrative conveys the content through exchanging points of views between the characters rather than through a primary narrator. It contains a majority of dialogues between characters rather than indirect discourses for event description. Classic narrative theories regard speech and inner thoughts as central to narratology, and they recognize direct speech as the locus of interaction between the narrative discourse and event description (Genette, 1980). Conversational narrative is therefore regarded as natural narrative itself or the most mimetic narrative form because the presentation of events is conducted through the perceptional experiences of the characters in dialogues. Also for the same reason, conversational narrative is also regarded as a more complex and subtle interaction between the author and the reader compared to indirect speech because in direct speech, implications of meaning are embedded through the description of characters, whereas in indirect speech, the unfoldment of plot as well as perspectives of characters is shown through talks. Narrative discourse and event description are

considered as two focuses of the study of narratives, as such, conversational narrative deserves special investigations (Wu, 2007a).

Inner thoughts and emotions are both the basic objects and the features of conversational narrative. In conversational narrative, direct speech and inner thoughts are part of the narrative plot. Like most other genres, event description arises from intentionality, but the representations are considered more situational. Authenticity, verisimilitude, and verbatim faithfulness are characteristics of direct speech representations, and the mimetic effect re-establishes a similitude of individuality through figural voices (Fludernick, 1993). Emotions are transferred directly through the expressiveness of the characters. The dramatic nature of the direct speech that draws rich cognitive and emotional responses of the reader makes conversational narrative the most dynamic genre in discourse.

Context description and creating structural/syntactical contexts are believed to be powerful methods applied by narrative, and conversational narrative preserves and expands these abilities. The structure of conversational narrative is believed more complex than the general narrative genre, and this complexity in structure creates a special context for the reader. Heritage (1984) says, "the production of talk is doubly contextual," and the "contextualization of utterances is a major, and unavoidable, procedure which hearers use and rely on to interpret conversational contributions and it is also something which speakers pervasively attend to in the design of what they say" (p. 242).

Bakhtin (1981) also suggests treating dialogue as a metaphor that underscores the heterogeneity of discourse. Early researchers (e.g., Ruesch, 1957) used action-oriented perspective to investigate conversational discourse and regarded conversation as a pairing of stimulus and response, whereas later researchers (e.g., Sacks, Schegloff, & Jefferson, 1974) used the Turn-Taking method to investigate speech exchange. Within these analytical frames, narrative theory includes both linguistic and socialinguistic approaches in the study of discourse, and discourse is regarded as "a type of event, in which human agents engage in a verbal exchange" (Roberts, 1996). With a linguistic view, Hopper (1979) proposed an overt distinction between the main story line and the supportive language in narrative discourse. In his contention, those related to events or state changes that form the skeletal structure of the narrative are called foreground, and those comments, explanations, and evaluations working as supporting materials are called background. This, nevertheless, can suggest a method of separation between descriptions and dialogues in conversational narrative. Others holding much broader views on conversational narrative suggest that narrative conversation itself gives more clues on events and settings. The dialogues embedded in a narrative text necessarily share characteristics with the dramatic text (Bal, 1997), and the dramatic nature cannot be different because either narrative description or narrative dialogue can be the carrier for the content.

The content within the dialogues of conversational narrative is regarded as doubly packaged logics, and its context also has more features. In conversational narrative, characters are the carriers of the content of narration, and these carriers contain the ability

to transfer meanings beyond the surface structure of any texts. In addition, the conversations between the characters are embodied text in which both the internal organization and the surface structure of the narration are affected by a social and cultural context that are in relation to larger events and sequences of talk. Moreover, the logics assigned by time and the original presentations of events are doubly coded in dialogue. Consistent with this perspective, Aristotle even suggested that the logic and rules of persuasion make arguments the only things that properly belong to the art, but everything else is merely accessory (Morris, 1938). The figural voice or the style of words of the characters might become another focus of context for conversational narrative. The unit of analysis in narrative conversation is thus the entire discourse rather than an isolated concept.

The constructive nature of conversational narrative has almost the same dimensions as the general genre of narration. This constructive nature transcends contrasts between objectivity and subjectivity, the logic and the illogic, and abstract symbols and concrete objects, creating dynamic and open environments for its interpretations. Self is doubly anchored in conversational narrative in which the past and the present come into a union in the discourse, and self is reflected in the relationships with others in different contexts. Miller (1993) says that the temporal, causal, evaluative, and conversational natures of the discourse converge in narrative genre, providing a rationale for treating personal storytelling as an important locus for self-construction. In conversational narrative, the focus of telling transfers from event description to showing how the character has made the event into something in his or her life. The higher-order

repackaging in conversational narrative conveys multiple perspectives on events and cross-culture conditions and provides yet another resource for creative personal meanings. Additionally, the evaluative component that is usually regarded as critical to narrative texts is even more extensively employed in direct speeches. Consequently, this also has a greater impact on how self is reflected and molded in conversational narrative.

Moreover, coherence is comparably easier to attain in direct speech because additional rules of conversation and the turn-taking structure of the direct speech make occasional misinterpretations tolerable. Direct speech is believed to be able to invite participation through its cooperative principle (Grice, 1975). Sack (1971) also observes that in conversation, change of topic becomes imperceptible. As Lakoff and Johnson (1980) also contend, conversations generally serve the purpose of social interaction. Most importantly, this coherence of direct speech is reflected not only through the connection between one sentence and another or one topic and another, but also through the overall consistency and integrity of representation of the content and their associate contexts in the conversation. According to Lakoff and Johnson, "understanding a conversation as being an argument involves being able to superimpose the multidimensional structure of part of the concept," and such "multidimensional structures characterize experiential gestalts, which are ways of organizing experiences into structured wholes," that make our experience coherent (p. 81).

CHAPTER 4

FUNCTIONS OF IMAGERY

4.1 Overview

Individuals construct meanings through both behavioral actions and cognitive reflections. The coherence of meaning is primarily a function of what the individual is doing or trying to do in that particular physical and cultural context. Mental imagery has been positively associated with creative thinking of the individual, and the cognitive activities involved in narrative appreciation are suggested as having similar functions as those of imagery. In order to investigate the functional relationship between imagery and narrative, this chapter surveys the concept of imagery, its natures, functions, and empirical orientations.

4.2 Definition of Imagery

The experience of mental imagery has nonpropositional structures. According to Kosslyn (1981b), there are two types of imagery activities: "those based on processing of depictive images and those based on appeal to the influence of demand characteristics, task demands, and use of tacit knowledge" (p. 208). To define the concept of imagery, it is better to discuss it from two dimensions: One is the dimension of representation, which is related to both the conception and the state of being in imagery, showing how things exist in the form of imagery, as in mental image, sound, taste, movement and so on. The other is the dimension of embodiment, which is related to the process of imagery that contains state changes, such as how imagery is formed and functions in cognitive

processes, such as in perception, decoding, memory, and recall. This method of interpretation is also inherited from the belief that imagery either as a phenomenon or behavior is, however, irreducible to its parts. The embodiment dimension of imagery is subject to real experience, which means that it can only be manifested through human responses in which meanings are transferred through their behavioral manifestations.

4.3 Natures of Imagery

Imagery has multiple modalities and always connects to emotion. Different from pictures, which have full or certain features of texture, color, brightness, shape, contour, and object, imagery is independent of these physical features. An experience of imagery, however, does have some of the same effects that a picture creates, as some qualia are felt. Qualia are a concept concerning how we experience certain sensory states. For example, in imagery, one still can experience the color of red. In other words, imagery carries sensory properties that might provide diverse experiential effects.

Imageries are often amorphous; however, they contain rich information values. Most importantly, no matter how unstructured or indescribable imagery is, an experience of it has a nature of wholeness in itself, which is biological. In another way to interpret it, imagery is a response of million nerves of the individual, and this wholeness is irreducible. Moreover, an imagery experience usually involves multiple senses of one. From the experience of imagery, an integrated general sense of meaning of the subject matter is usually transferred, and what is relevant is considered easier to detect. This holistic nature of imagery, therefore, promotes flexibility and speed in its functional

action and as a mediating process (Kaufmann 1980; Paivio, 1971b).

For example, someone can immediately create an image of a friend, with a foot and a flight of stairs, if one were told that the friend broke his or her small toe while walking down the stairs and has been treated in the hospital. As the matter seems to be quite serious to the listener, an image of a small toe of the friend might also appear. In his or her mind's ear one almost hears his or her own voice saying, "she/he has broken her/his small toe." Then the other senses come up, which might include sorrow and the need to find a reason for the incident. The person might somehow also have a full snapshot of a typical clinical office with a noxious smell, as if she or he were walking into the hospital. It is almost impossible to separate the detailed images and those vague imaginations and associated emotions. The images also linger for an extended period of time.

This episode shows that imagery is shown in multiple modalities, and imagery and emotion are somehow very close to the individual's reasoning as well as how one responds to the external incident. As a result, it is reasonable to conclude that emotions and bodily senses are the trigger of imagery. This also implies the idiosyncratic nature of imagery. Gendlin (1978) also suggests that the elaboration of the meaning of an event in words or images might often be preceded by the physical sense of the event.

Another incidence of imagery is this: One fell into sleep and dreamed of traversing over the lush grassland with several acquaintances, and coming to the Highland Sea, carried by a small boat and with the sight of the magnificent mirage-like pavilion sticking out in the middle of the sea and coming near. Landing on a nearby

island and seeking a place to settle, they walk through a passage of earthy road with green shrubs far at each side, giving enough open space on the ground. They also spot drops of clean water on the leathered seat under a tree. The sky is bright, though it is not sunny. When woke up, one finally realized that it was just a dream and found out that before falling into sleep, one had became aware of the dryness in mouth unnoticed earlier in the evening due to the exhaustive night at work and wished had drunk more. Then there is the greenish and watered voyage in the dream. Indeed, an act of imagery or a train of imageries is simply a response of million nerves of one, far and near. It is far because it carries the very remote nature and desire of one, it is near because it just tells what one's immediate bodily needs.

These activities of imagery also inform that details and locality in imagery are the indication of emotion and meaning. Focus is the action of information pick-up, which is controlled by both internal cognitive mechanism and the situational emotional response. As such, an experience of imagery can alter the meaning of an original internal state when the imagery starts. For example, Kuiken (1980) contends that the self-directed attention toward bodily kinesthetic events "may serve as a source of imagery that is perceived to representationally fit, intensify, and sometimes change those bodily feelings" (p. 231). This also implies an adaptive function of imagery. The effect of details and locality in imagery that associates with affects transfers a sense of realness. Neisser (1976) says that in perception "[t]he information must be specific enough in most cases to ensure that the constructed percept is true to the real object" (p. 18). Though imagery is different from direct perception of a picture or a real object, it inherits the quality of

specificity and a sense of realness that all pictorial representations have.

In contrast, the ambiguity and the extensiveness of imagery indicate an autonomic and dynamic nature of imagery, indicating imagery is beyond consciousness. Emphasizing the extensiveness of imagery, Kant suggested that individuals build "schemata" in the process of imagination as they put different representations together and grasp what is manifold in them in one act of knowledge. Jung (1923) contends that every image is after all composed of the "most varied material coming from the most varied sources" (p. 554), which has an intrinsic and holism nature. Historically, humans must have adopted imagery as a mechanism into their general cognition.

Even though imageries are most of all, volatile in nature, they reside in materiality and are beyond time and space. This can be clarified from at least two aspects. First, it is the interpretation of the collective unconscious. Jung believes that the collective unconscious is the accumulated "mnemonic deposits" of human experience (1960), which is the broad image base all humankind shares and which has an eternal quality. This belief epitomizes his interpretation of the unconscious. However, rather than seeing unconscious, action, and thinking as interactively formed, he postulates that unconscious factors alone motivated actions of the ancestors, and reasons attached to actions only at a rather later time. This reflects a trace of the non-material view of Plato. The limitation is that he didn't establish a direct link between imagery and material reality, and this lack is shown in numerous works of his. A brief review of sciences like modern physics and biology would easily explain this shortcoming. Findings from these modern sciences as well as the impacts that their findings brought to social development support the

assumption that the physical world affords rules and meanings regardless of our capabilities to interpret them. For the same reason, it is safe to conclude that actions, thoughts, and imageries are undeniably originated from and based on the physical world.

Second, the modality of imagery is also a reflection that imagery is the embodiment of humans' cognition with the environment. Neisser (1976) argues that imagery is the interplay between situation and schema and suggests that neither of them alone determines the course of perception. Johnson (1987) interprets image schema as existing in a continuous analog fashion in human learning so that they constantly operate in our perception and bodily movement through space and physical manipulation of objects.

Individual differences and context are major factors that affect the modality and intensity of the generation of imagery. Imagery as embodied schema is tied to perception and motor programs; they can be modified by experience but also define perception in return. In another aspect, emotion is highly context driven and self-directed, as a part of the nervous system (Neisser, 1976). This is particularly true that what an individual reports of imagery activities may depend on what are demanded at that situation. With this understanding, imagery is reflected through the response to some stimulation and is always conditional. The individual differences of using imagery have been established by many studies (Costello, 1956, 1957).

Most importantly, imagery may be counter to logic thoughts and unexplainable; much is consigned to the unconscious. Dreams, reveries, as so on, may come without explanation, and they also show us things beyond reasoning. This is evolutionarily

advantageous to humankind, as vast information can be explored, overcoming the temporal and physical limitations. Imagery is the ephemeral interface between the conscious and the unconscious worlds, and the activities of imagery likely to occur when something bothered one physically or mentally. The ephemeral nature of imagery ensures an infinite possibility of thoughts or meaning. Imagery is actually a function of million nerves of one. Also for the same reason, imagery provides enormous discriminating capacities upon one individual across times, as well as across the individuals.

4.4 Functions of Imagery

This section identifies different functions of imagery. They are symbolic function, referential function, literal function, associative function, constructive function, and adaptive function.

Symbolic Function

Cognitive aid is the most important function of imagery. This mnemonic effect is reflected through a scale of concreteness-abstractness function of imagery. According to Gordon (1972), this function of imagery is both biological and psychological. It ranges from how individuals get a sense of time to how they select and classify information and preserve their experience, and as such, experience retains "some of the original vivacity and effect" in the form of imagery (p. 75). Nessier also suggests that images function as perceptual anticipations by loosely combining various sources of past knowledge and objective experimental procedures and contends that "the experience of having an image

is just the inner aspect of a readiness to perceive the imagined object" (p. 130). Piaget and Inhelder (1971) suggest that reproductive images contain three categories—static, moving, and transformational images, and especially the static ones, mark the beginning of the symbolic functioning appear in children; the anticipatory images which involve only those of movements and transformation are established at a later age and allow for the use of a dynamic symbolic process. Imageries function as markers and artifacts to separate human consciousness from the unconscious and allow individuals to become independent of sensations, and because of this, thinking in abstraction becomes possible because of imagery.

Referential Function

Imagery also functions as the background material and springboard for imagination and reflection associated to memory, the same way as the sensory percept does. Sensory referent is an important feature of imagery, and details and vivid features make the presence of imagery essential to every imagination. However, the impact of symbolic reference may be even greater than that of a clear image, a solid object or a vivid scene. In fact, as soon as sense-images become percepts and memories, they are already being symbolized through the embodiment of the interpreter. According to Gordon, imagery expresses "a coordinated meaning of both the sensuous and the inner mental perceptions" (p. 75). Therefore, Gordon associates imagery with the human need to make art. By using imagery to create art, individuals embody their existence and

validate the inner world of self. In this sense, meaning and detail facts as well as emotions are embodied in most imagery.

Literal Function

Empirical studies of imagery can be categorized by the investigation of the literal function and the associative function of imagery, which are what Marks (1972) named as the literal role and the associative role of imagery. Interpreting several studies from Sheehan (1966, 1967), Marks suggests that imagery functions literally when a person is supposed to remember a stimulus pattern by forming an exact mental image of the pattern. This should happen no matter how the stimulus is encoded, as some features of the original stimulus are expected to be retrieved by the person using imagery. Some of the findings from Sheehan's studies indicate that the accuracy of recall is correlated within subjects with vivid imagery ratings, but it is not consistent between subjects with different ratings on vividness. In addition, there is some evidence suggesting vivid and poor imagers use different coding strategies during perception.

Associative Function

The associative function of imagery is the major concern for many studies. In these studies, participants use imagery to form an association between a current and a previous stimulus. One branch of this research investigated imagery employment when individuals used different stimuli defined by their image-arousing values or level of concreteness. The results strongly suggested that the ability of the individual to use

imagery is influenced by context (Ernest & Paivio, 1969). For imagery studies, the concerns for context, however, are multiple. One understanding suggested by Ernest and Paivio is that imagery can be primed by contextual cues in natural language situations more quickly than when only concrete words are available. Other contexts suggested are individual differences, the context while the task or test is done, and the environmental context of the system.

The associative function of imagery has also been explained with the concept of synesthesia, which implies an unusual form of mental imagery that occurs among any sense modalities. Marks (1975, 1978) proposes an information-processing theory of synesthesia summarizing works of several investigators. He suggests a distinction between "seers," who have more varied means for information processing, and those "nonseers," who have fewer tools at their disposal. As a result, seers may encode more sensory information that is dense in informational content. Polzella and Kuna (1981) explored a particular type of synesthesia in which color images (or photisms) are evoked by musical stimuli in the individuals, and they found that visual and auditory factors together produce heightened aesthetic experience.

The associative function of imagery also concerns whether a representational system is built in a way that promotes the image generation of the user. Paivio (1971b) calls this the priming effect of imagery, in which the method is to use "experimental manipulations, such as instructions designed, to prime (or increase) the availability of imagery" (p. 9). This is also what Kosslyn and his colleagues (Kosslyn, Pinker, Smith, & Shwartz, 1981) called the issue of capacity, which they believe is the function that a

representational system can do. They also propose that if the representational system has more capacity, researchers should investigate the theory or theories of imagery that have to account for this capacity. This observation seems to agree with what Paivio (1976) later suggested, who says that the picture effect in recognition is largely an input or encoding effect and he argues strongly against explanations of picture superiority in recognition in terms of attention to isolated picture details or partial recognition at the time of a recognition test. Though researchers regard this research branch as ultimately important, empirical results on the issue of capacities have not been established in the literature.

Constructive Function

Similar to the associative function is the constructive function of imagery from which unique representations are formed and transformed from their original representations through synesthesia. Imaginational imagery is regarded as the vehicle that transfers new knowledge; conversely, imagery of memory serves as the direct contact with the object by recreating the experience of sensing it. Both types of imageries are prominent in their associative and constructive functions, which is productive in nature. As widely recognized in the literature, the constructive effect of imagery can be verified in problem-solving situations where imagery is used for the aid of comparisons and divergent thinking. In particular, the constructive function of imagery is verified by studies on the individual's use of imagery when creativity is tested (e.g., Schmeidler, 1965). Imagery activities of imagination that lead to creativity have also been

investigated as incubation effect by researchers such as Guilford (1976) and Sarnoff (1981).

Tomasulo (1981) contends that an image shows a mediational nature when the image's constituted elementary components and their thematic or relational quality undergo a change that eventually makes the original image change as well. This extends the explanation for the mnemonic potential of imagery hypothesized by Paivio from concerning only the imagery-arousing quality of the stimuli, which is the literal function of imagery identified above, to having the constructive function of imagery.

Individual differences in the modality and intensity of imagery creation are adopted into the empirical studies at the very beginning of the imagery studies. Studies on the constructive function of imagery suggest that creativity of the individual and use of imagery are closely interwoven with other personality factors (Forisha, 1985). In order to emphasize it, Paivio (1971b) even suggests individual differences as one of the dimensions of imagery studies.

Adaptive Function

Last, but not the least, is the adaptive function of imagery, which is shown in all types of imagination. This function of imagery shows an individual's ability to integrate ambiguous stimuli into a single cognitive experience, which Segal (1971) called as "the iconic processing of sensory stimuli" (p. 6). Horowitz (1972) once said that the adaptive function of imagery allows disguises and shifts of meanings, which if they were expressed by words, might evoke anxiety. Freud's theory of dreams in psychoanalysis

certainly has an impact on the understanding of the adaptive function of imagery, though his over-emphasis of using mother-child relationship on dream analysis might limit his interpretation of this very function of imagery.

In each type of cognition, such as imitation, when external information is internalized, and projection, when one kind of information is transformed into another, the act of mental imagery displays this adaptive function. This adaptive function primarily shows that activities of imagery depend on culture as well as individual factors in which the conceptual world of a particular individual is being reproduced and transformed and are based on his or her meta-cognitive skills. As such, imagery activities are reflections of self, mostly, the former self. Adaptive function of imagery also implies the distinction between superficial perception and inner thoughts, or between what are mere seen and what are being picked-up or believed.

In summary, imagery has several cognitive functions, but no one has clearly identified all of them as to the author's knowledge. This section therefore was dedicated to this task, though the functions of imagery identified may be still not exhaustive. The natures and functions of imagery discussed are a start of this effort and are summarized in the following tables.

Table 3

Natures of Imagery

Imagery has multiple modalities and connects directly to emotion

1. Imagery carries sensory properties but is independent to them.
2. Imagery has a nature of wholeness that is biological in nature and irreducible; this holism nature promotes speed and flexibility in mediation; the biological nature implies the idiosyncratic nature of imagery.
3. The effect of details and locality in imagery indicates emotion and meaning.
4. Imagery transfers a sense of real experience.
5. Imagery is autonomic (or dynamic) and is beyond consciousness.
6. Imagery resides in materiality and is beyond time and space.
7. Imagery may be counter to logic thoughts; much is consigned to the unconscious.

Imagery is the embodiment of human cognition with the environment

1. Imagery is interplay between situation and schema.
2. Imagery exists in continuous analog fashion.
3. Imagery shows individual differences.
4. Contexts are major factors that affect the modality and intensity of the generation of imagery.
5. Imagery is the reflection of the material force and reflects through it.

Table 4

Functions of Imagery

Symbolic Function
Referential Function
Literal Function
Associative Function
Constructive Function
Adaptive Function

4.5 Narrative and Imagery

From the examination of narrative in Chapter 3 to the examination of imagery in the current chapter, several similar functions of narrative and imagery in cognition are disclosed. They are the literal function, associative function, constructive function, adaptive function, and their innate associations with emotions and self. Because narrative and imagery share these important functions in cognition, the examinations of them in this study might validate the untested assumption that narrative is image-making and promotes mental activities. Empirical studies should follow in order to test their relationship identified.

In addition to the discussion on the functions of narrative and imagery, an additional discussion about their symbolic function is given here. This is the most basic function of all material that has a communicative function. Both narrative and imagery therefore has a symbolic nature that allows them to convey meanings that transcend the surface structure of their representations. For example, the information presented in an image is not confined to the spatial realm but includes the abstract or affective properties of the objects (Holyoak & Walter, 1976; Paivio, 1978). This abstract and affective nature also shares a similar function with what said before the wholeness nature of imagery. Therefore, narrative and imagery are subject to private interpretations, in which one's understandings are based seemingly on an implicit perception of the whole issue. Also because of this symbolic function, meanings from these two types of representation might be attained intuitively and faster compared to those from logical cognition. As Nehaniv (1999) argues, narrative provides a means for agents to escape from the pure reactivity to

the sensory data. In fact, the symbolic function of narrative and imagery blurs the border between the pure reactivity and the sensory data, and with the sense of emotion, they truly become one and connotatively so allowing the individuals to broaden their horizons.

4.6 Summary

Imagery is a complex construct. The investigation of the functions of imagery in the current chapter further explains that mental imagery associates with not only the concreteness of the representation itself, but also the availability of other contextual cues that are broadly extensive.

This study finds that narrative and imagery share similar heuristic effects on cognition, in which they indicate the internal links between imagery and narrative. Mental activities of imagery and appreciation of narratives both not only provide one with classic qualia as experience, as one could totally interact with the sensory data as in the physical world, but they can also function as qualitative features and experiences, through providing one with emotions or connect to one's own emotions. Therefore, indeed, there are reasons to believe that narrative creates experiences that are image-making. However, more issues have to be explored. For example, how would the individual create imageries while the content is represented with narrative? And, can we empirically prove that narrative and imagery share the literal, the associative, the constructive, and the adaptive effects? Certainly, the investigations that answer these questions will explain the major questions on imagery capacities of the symbolic systems posed by Kosslyn and other researchers.

CHAPTER 5

A NEW STRUCTURE

5.1 Overview

It is well assumed that there is something distinctive about mental imagery as a form of cognition that cannot be duplicated by verbal processes. Understanding the functions of mental imagery is also critical to the interpretation of other types of cognition, especially perception and creativity. In order to further develop what this study has discussed in the previous chapter about mental imagery, this chapter combines the interpretation of internal and external representations, and the investigation of both linguistic and nonlinguistic resources, as these resources communicate differently with an audience and exert different mental activities. In this case, the task of understanding the effects of imagery becomes a larger part of interpreting the functions of different representational materials, i.e. the semiotic resources.

This chapter first identifies the need for the reinterpretation of multiple modes of resources, which leads to the discussion of semiotic resources and semiotic theory. Then, it introduces a new structure with four cognitive artifacts: micro-object, macro-object, macrostructure, and raw data. Theorization of each artifact is presented. Functions and forms of these artifacts, as well as their relationships, are described. Later, faculties of human learning and the processes of learning are addressed.

5.2 Semiotic Resources

Learning is a cognitive-affective embodied encoding-decoding circle of representation, though the circle might not necessarily be a complete one. The concept of learning informs that learning outcome relies on the quality of the interactions between the two different worlds of human existence: the world of consciousness, where self and society (or others) coexist, and the world of social and physical existence, where material properties and interactions between self and body and self and others are perceived as phenomena, or having factual concreteness. Semiotic resources are materials (or material signs) that describe these phenomena within these two worlds and have the function of communication between these two different spheres of existence. The various social discourses are pragmatically formed patterns of semiotic resources.

The need for an explicit theory and analytical framework about multimodal texts or discourses is well acknowledged. The need for the analysis of semiotic resources is comprised of two integrated orientations. First, the exploration of the grammar within the individual semiotic resource is necessary. For example, rules and methodologies have been emphasized within each academic field, e.g., linguistics, mathematics, physical sciences, art history, musicology, etc. The second orientation is to interpret how different semiotic resources and modes are integrated in one text or texts (see Iedema, 2003; Stöckl, 2004). These two orientations of social discourse are the historical tasks of semiotic(s) analysis, though the second orientation has never been as evident and essential to us as it is now.

Recently, the increasing multimedia resources that people utilize in their social

activities urges scholars to re-examine the general functions of the semiotic resources. Researchers believe that the inter-semiotic functions between linguistics and other semiotic resources, which can be complementary and reinforcing in nature, might have been ignored as we have almost exclusively focused on linguistics in its utility for social communication. Perhaps, even more, with the development of science, and with people using new tools and methods to perceive things and to interact with others in a rather rapid speed, new social values and rules also arise. In order to explain the various texts that people increasingly encounter, a systematic exploration of the theory of cohesion of multimodal texts might be particularly desirable (Halliday & Hasan, 1985; Martin, 1992; van Leeuwen, 2005), a theory that allows an adequate dissection of an ostensibly homogeneous text that is actually multimodal in nature.

The interpretation of different types and modes of texts, or the semiotic resources, needs a broad account of cognitive tasks, processes, corresponding level changes, and especially the natures of mental mechanisms. The internal dialectics of mental mechanism, which are pragmatic in nature, require a comprehensive and analogical methodology for interpretation, which this study emphasizes. In addition, social understanding is critical in the interpretation of discourses, especially for their formation and application. However, this study has to limit itself to the cognitive interpretation of semiotic resources.

The structure of semiotic analysis proposed in this study, which includes both theoretical and empirical methods, attends to the relationships between discourse, materiality, culture, and social action, thereby reflecting the genuine cohesion among

multimodal texts in the process of human communication. The tenets of this study emerge from the determination of the systematic understanding of our social environment at large. In the words of Einstein (1923), "the object[ive] of all science, whether it is natural science or psychology, is to coordinate our experiences and to bring them into a logical system" (p. 2). The structure, however, is inevitably brief and incomplete in itself.

5.3 The Four Cognitive Artifacts

Like all other actions, thinking depends on the presence of an object to fully engage the mind. According to Vygotsky (1987), the objects of the study of the higher mental functions are two sets of stimuli. "One set of stimuli fulfills the function of the object on which the subject's activity is directed. The second function as a sign that facilitates the organization of this activity" (p. 127). Throughout his works, Vygotsky also emphasizes the dialogue between thought and word. He suggests that the continuous discovery of meaning from using symbolic systems also contributes to the theories of their use. He assumes that all conventional signs, languages, mnemonic techniques, works of art, diagrams, schemes, and maps are artificial "psychological tools", and as such are different from those materials which are "organic" or "individual" (1981). He, therefore, suggests a tension between the socially accepted mediational means, *the signifiers,* and a particular mediated action or object, *the referent*, and the registrations around it created through real practice. This belief does, however, show his concern about assigning social values to artifacts and how to take context, even the psychological state of the individual, into consideration.

Nevertheless, the idea of distancing social concepts from the self is always problematic. As a matter of fact, the attribute of 'individual' is only valid through its counter part of 'social'; the things that are most important to the self are those that are most affected by social ideology. Therefore, the point is that when we claim that a thing has a greater social value, it is only so at one particular time historically. Distinguishing the degree of social value of artifacts, in any way, is a good method by which to interpret human communication.

Though both Vygotsky and earlier semioticians acknowledge a dual focus on investigating stimuli and social action, recent semioticians, who regard other semiotic means such as material objects and nonverbal behaviors as social tools functioning no less than linguistics, emphasize social practice and propose shifting from using stimuli (as proposed by Vygotsky) to using social action as the locus of concern for discourse analysis to better accommodate the analysis of non-textual signs (Norris, 2004; Scollon, 2001; Wertsch, 1998). This proposal seems to be an intuitive resolution explaining the functions of the ever-enlarging social tools, but for several reasons, the concept of mediated action has its own complications. Most of all, as many researchers (e.g., Piaget & Inhelder, 1971) have suggested, it would be misleading to ignore the central role of an object in any action but to chase the registration of it instead. In fact, researchers who examined a process in addition to an object usually treated the process as a product in the past. As suggested by Koffka (Vygotsky, 1978), psychologists who examine a process usually focus on the components that comprise the process and treat the components as stable and fixed objects. Similar to this methodology is that we commonly use a

metaphor to seize a familiar concept and apply it to something stable as a tool to transfer unfamiliar content. This is how new meanings are communicated. Action simply does not fit into this formula as a tool.

For this reason, in the following, a framework is proposed that uses objects as its foundation of investigation. Since cognition is in the form of initiating, building, and activating a primary frame of understanding upon an object, a thought or an action upon it can be presented in this basic form:

{Object; (parameters of context, theme)} Formula 1

When an individual interacts with the though or action, the formula becomes as this:

{Object; [parameters of context (given context, current context), theme]}

The assumption is that every cognition or action has context, and context defines theme. The given context is the original or designed environment of the object under study, and the current context is the activated mental state of the individual. These two contexts are combined as a coherent immediate (or local) context for the learner. The local context is constantly changing because every time a memory is activated, the meaning has already been remolded—this is how human memory works. Consequently, cognition is actually an interactive process between these four components: the object (or referent), the given context, the current context, and the theme aroused. These four components are further explainable by these non-exclusive aspects: the referent, the representational text, the ideological world of human consciousness (as well as the social and physical context of the individual), and the meanings thereof.

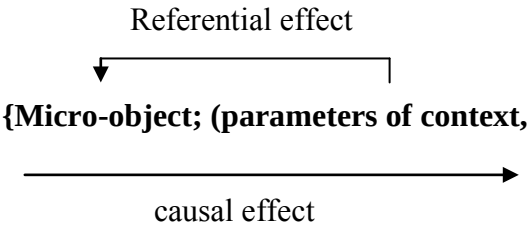
Four artifacts—micro-object, macro-object, macrostructure, and raw data—are introduced to explain these aspects as well as their functions in cognition. These artifacts may overlap in function for any cognitive process. Micro-objects and macro-objects stand for representations, raw data for referents, and macrostructures for human consciousness. In contrast to micro-objects, macro-objects represent abstract social meanings.

Micro-object

The signs that simply stand for or directly describe other objects, events, and actions are called micro-objects. Micro-objects are either the referents (the objects) themselves or their perceptual attributes. These objects and events, however, are not restricted to material things or their physical properties only. Metaphysical materials, such as senses of color and feeling, that are perceivable to the individual, regardless of the intrinsic natures of the materials, are also micro-objects. This means that micro-objects include both physical materials and metaphysical materials that are in perceptive forms. Physical materials are ones that contain spatial-temporal qualities such as size, shape, position, and motion, which are independent of the individual experience. Metaphysical materials are colors, scents, feelings, and so on, which are perceivable phenomena, such as when an individual senses or observes them from nature or from another individual. Nature embodies these physical and metaphysical materials, or phenomena, though it also contains certain parts that remain unperceived or unperceivable to us, so that we are unable to represent them cognitively.

Small units of micro-objects are basic elements for a sign system, such as characters, words, and phrases in linguistics, dots, curves, and lines in drawings, and sound-notes, tones, and pitches in music. Large units of micro-objects are congregations of small units that form abstract meanings. For example, a paragraph of linguistic text is a large unit of words. A performance of dance is an organized group of bodily movements. Micro-objects, as social artifacts that are immediately associated to an individual's perceptional world, mimic the empirical sphere of human existence in social and cultural contexts. They are related to the application and registration of meanings in cognition.

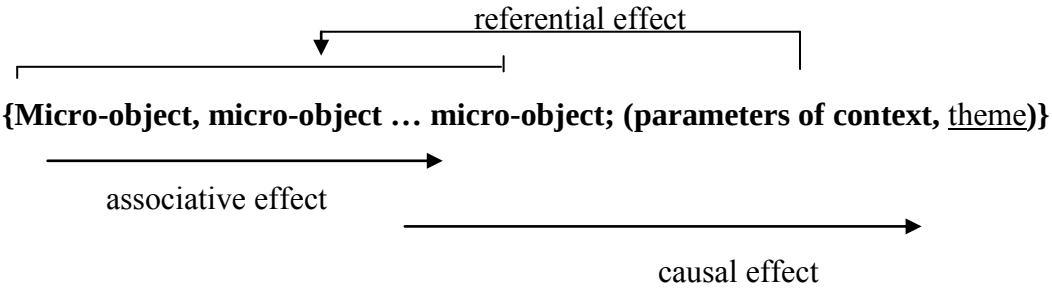
Micro-objects have a high informational value because of their relation to the perceptual world. They are informational signs, which are represented in Formula 2.



Formula 2

or **{Micro-object; (Micro-object, …, Micro-object; theme)}**

or



The micro-object here, with the parameters of its context, has a "causal effect" on its theme; the parameters of the context have a "referential effect" on the micro-object. These two effects give coherence for the representation of a micro-object. Theme is attainable but not necessary in the representation of micro-objects. Theme is available when the nature and structure of the micro-object are explicable in science, or the sense experience of which is a part of has a socially established meaning.

The degree of the causal effect within a micro-object depends on *what* the micro-object is and *what* the context is, which are similar to the significance of the object in the ideological hierarchy and the image index of the object, respectively. In addition, *how* the context is being presented, which is the modality of the representation, also contributes to the image index of the object. As such, the importance of the micro-object also necessarily depends on its position in the applicable domain of any particular user, as well as its relevance to the task, which is something extraneous to the micro-object itself.

The function of representing context is obvious to micro-objects because of their imminence to the perceptual world. In essence, micro-objects stand for the indexical actions and conditions of the individuals. Though theme is mainly derived computationally at the micro-object level, based on common sense and sciences, theme can also be the mere subjective sense of the sum of the objects and their parameters of contexts when no reason can be given. The computation and interpretation can be supervised by conventional beliefs, such as genre, style, and social understandings. The subjectivity that dominates the meaning abstraction process also depends on individual

needs and situational factors. The contextual functions of micro-objects in representational systems are distinctive in four nonexclusive aspects:

1 Relation to referent: micro-objects give a sense of grounding through linking the subject matters to their referred objects in different but more direct manners.

2 Representation of context: micro-objects provide possible continuity of information from which a unity exists or can be achieved, and context or a sense of context is perceived.

3 Motivation of mood: because micro-objects are close to the perceptible world, they give a sense of familiarity and extensiveness, a freedom of discovery and interpretation, therefore, a promise of desire, which is almost an affirmation of self. Most importantly, the material quality transferred by the micro-objects has an intrinsic function of conveying ideological meanings and affects. The detailed descriptions of nature also alert the mind and heighten the attention of the individual. This characteristic of micro-objects also implies that ideology and nature as well as mind and body are unified.

4 Exercising of application: the representation of micro-objects allows a continuous interpretation and generation of the themes of social life and the rules and structures of nature without interruption.

These contextual functions of micro-objects imply the basic level of the activities of which they reside in the ladder of representation. In the following, detailed explanations of each of the four functions of micro-objects are further discussed.

Relation to referent

As basic representations, micro-objects relate to the referent in different but direct manners: they are (or stand for) objects such as icons, they are (or describe) the properties of an object, reflecting the detectable senses and in various modalities (color, sound, taste, and so on), they are almost like symbols in their physical forms, and they could be seen as various phenomena. How micro-objects relate to the referent indicates the style of that representation. Conversely, in order to make a representation achieve a certain type of relation with its referent, a designer usually has to select a sign system suitable to obtain it. Arts of various kinds are typical sign systems that employ an oblique representational relationship between the subject matter and the intended referent. An oblique relationship with the referent is a necessity for aesthetic as well as political and historical reasons.

The physical world on which all living things depend contains certain qualities that necessitate it as the locus of cognition. This hypothesis seems fairly uncontroversial. It might start with how our vision works and how our physical body functions in relation to other types of cognition. As Aristotle said, the primal unity of the visible world, or the *material cause* in which the substance contains within itself the cause of motion and change, is spiritual, soul-like, and eternal. He suggested, therefore, a connection between the perceptual world and the human spirit. More exactly, as Lakoff and Johnson (1980)

put it, the physical world is the ground of our conceptualization, and "most of our fundamental concepts are organized in terms of one or more spatialization metaphors" (p. 17). Thus, a spectator of any representational system might always depend on the delineation of the physical environment and its material components as the start of his or her sense making. In the words of Pinker (2007), human thoughts are rooted in substance, space, time and causation; the latter itself is rooted in force, and metaphor allows the minds to use basic sources to understand more abstract domains.

This may also imply that a thought inevitably has origin from the physical world. Though referents can also be found in the collective unconscious, we still believe that these referents can be traced back to the physical world. And it is quite plausible that "whatever goes on within an interpreted and organized stream of activity draws on material that comes from the world and in some traceable continuation of substance must go back into the world" (Goffman, 1974, p. 287). This implies again, paradoxically, that the physical world and the spiritual world are somehow unified, and their separation is only historical and cognitively so, or more precisely, socially so. This is also true of the belief that though emotion might not be regarded as a physical force, it inevitably originates from it, and once the emotion has been expressed, it already has a registered or implied referent as well as an externalized form. This understanding has been proved by neuroscience and widely accepted in psychoanalysis, which traces back to Freud. As such, in order to cognize, to discover, and to live, people have to constantly connect these two spheres of human existence, and the flow from one sphere to another is constant.

Micro-objects have both literal and abstract meanings. For example, signs and concepts can have the material properties if they take the form of real objects, such as icons. Assigning abstract concepts to perceptual qualities is not unusual, which is another important function of micro-objects. For example, in image, a red color transfers certain abstract meanings such as warmness, importance, and urgency, whereas a black color usually gives meanings such as solemn, reservation, and sadness.

The information value, which is the sum of the referential value of the representation, is also defined by the style of the representation. Some sign systems are highly self-referent within the systems; therefore their representations have a different type of information value. For example, art works of certain genres are usually deliberately constructed in such a way that their representations are far removed from realism. As a result, the referents are only clear to the artists and someone who has acknowledged the structures and the values of the system.

Representation of context

The function of physical context is primeval to the activities of all mammals. Piaget (1954) found that infants must use a representation of the object's location to guide their first search trial to make it successful. This type of application of contextual cues is also common to other animals. However, advanced use of context is not manifested in infants. This is because infants are considered incapable of deliberation, as the selection of alternatives requires the conscious representation of a rule linking conditions to actions (or inferences). These conditions include location, time, and space

that usually inform the action in which the individual is involved. The contextual cues that function as the presence of the referent play a central role for the individual to frame the action in which a participant is engaged. Therefore, through providing contextual cues, a representation relatively stabilizes an action perceptually, allowing the individual to identify a fairly unified picture of the whole action.

Micro-objects represent certain properties of objects, i.e. the spatial, the temporal, and the intermodal continuities of the real objects, which support an extended perceiving process. Riffaterre (1978) says that the linguistic mimesis creates a continuously changing semantic sequence, and thus stands for variation and multiplicity that inevitably achieve an acceptable likeness to reality. This continuity of perspective over the object under study can be memorized and provides credibility and foundations for further understandings of a spectator. Similarly, neuroscientists found that neurons that "fire" together connect together (Harnish, 2002). People remember how things are associated with others, and by doing so they could be better predicators. Also because people think in sequence, the combination of connections strengthens neurons. This understanding may even confirm the biological base of why people need concrete objects to think.

Again, the ability to provide this continuity to a spectator is nonetheless related to the style of the representation. In linguistics, micro-objects are signs that are dominated by descriptions of physical space, characters, and manners that allow a reader easily to form an image or an experiential gestalt of the subject matter. The style of these representations defines their ability to provide a sense of realness.

In addition, the material quality of the representation, such as which sign system is being used, is also responsible for creating a concrete effect. Human perceptual process involves attending to information from linguistic, visual, auditory, and tactile perspectives, regardless of modality. Visual representation is a prominent tool in giving a sense of reality. For example, Peirce (1935, 1958) says that a picture is like an image of the object in its simple quality. The simplicity is due to a picture's capability of depicting one or more continuities of the properties of the real objects. Many researchers regard images as icons, which icons mean "images, pictures, or likenesses" (Mitchell, 1942, p. 1). Barthes (1977) even suggests that an image is the *perfect analogon*, the highest possible level of iconicity or mimesis of the object. For Peirce, icons, including diagrams, even when they have no sensuous resemblance for what they represent, still bear an analogy between the relations of the parts of each. In many of their assumptions, icons stand for a certain entirety of the real objects.

Regardless of which sign system is used, achieving a unity of senses is a priority as well as the task of context description in any representations. However, difference in sign systems also brings different effects in achieving this task. For example, micro-objects that are represented by pictorial components, pixel, color, etc., are more easily browsed as compared to those that are represented by words (O'Connor, 1984). This difference between continuous data and discrete data is also the reason for the different characteristics held by visual and verbal signs. In one sense, it is easier and quicker for a spectator to realize a unity in what is represented when a visual sign is used than when a verbal sign is used in most cases. This difference in speed of appreciation might be one of

the critical reasons that visual representations and musics are more effective than words in changing or elevating mood, with a few exceptions.

In other words, because of the quickness that people can apprehend a visual or musical product, an individual finds somehow these artifacts can match the biological and emotional rhythms underlying and potential to oneself, and through touching and connecting his or her million nerves, knocking one after another, therefore linking them all, and the multitude nerves that are activated eventually could flow with this rhythm. This flow also extends into the memory and exerts more remote emotions from the individual. The immediate response of this effect is the widely opened senses, as feeling that something is floating in one's eyes, or tones are swelling in one's voice cord, and they are all unmistakably and eventually trenching one's heart. This flow, which is formed by graduated and small differences of and among the notes of the music, is critical. For a simple example, if one's ears are only hit by a single note and even worse, repeatedly so, and within a very short period of time, the sound of the note will make this particular nerve of his or her become strenuous, eventually annoys the person and put all other nerves of him or her into dismay. This is because the note actually only touches on a single nerve of the person, and the repeated single note is simply no music but a noise. The opposite situation is a drastic change of style of notes within a very short time, in terms of tone, pitch, and length and speed, total lacking of repetition and tender graduation. This will also easily upset one's total nerves in no time. It might be a surprise to know that how much this connection and flow among the nerves actually means to one's body. It seems that one is easy to aware the connections and flows among these

nerves when they are being disturbed. From this, it is reasonable to conclude that continuity and variation of the underlying structure of the artifacts, which allow forming a flow in the physical body and which is the physical base of emotion, also are able to touch one's memory.

Besides the physical context, there are two other important concepts of context, which are beyond the functions of micro-objects. One is social-ideological context, and the other is semantic context. Sometimes, social-ideological context can be tied to physical context, but usually it is represented differently as an individual sphere. Semantic context is attained by the accumulation of meanings from within the representation, in which case one text also functions as the context for other texts.

Motivation of mood

Human perception is sensitive to the continuity of the representation. In most cases, as just mentioned above, concreteness simply implies this continuity, from which dense interpretive options are projected. This continuity and concreteness may give a feeling of sensuousness and credibility to the individual even though it might not be true. For example, the relationship between image and sensuousness is widely accepted. Peirce (1935, 1958) accredits the sensuous and resembling qualities of image as the origin of its nature of simplicity. This simplicity means a direct reflection of the physical space and materials in the world to which humans find that they intimately response. Burke (1757) even categorized genres and differentiated text and image according to the structures of sensations: vision and hearing, feeling of imitation and sympathy, and the aesthetic mode

of the beautiful and the sublime. Barthes (1977), however, suggests that image has two iconic meanings: *coded iconic*, from which a reader can see a deliberate and obvious meaning, and *non-coded iconic*, from which non-discursive and emotional meaning can arise from its totality. He says that the non-coded iconic is "emotional" and "obtuse" (p. 55). This non-coded iconic meaning belongs to a higher-level of representation beyond micro-objects. Therefore, elevation of mood and sensuousness do not necessarily mean simplicity. Nevertheless, a pictorial representation may depend highly on the intense and systematic application of micro-objects, the coded icons, allowing an image to associate with a person's senses by its totality and sensuality. For example, in a picture, though physical space and objects are being displaced and are reconnected in a way different from reality, the original continuity within each component as seen from eyes is not all lost.

This sensuous quality can be true of music as well. It is obvious that music can elevate or reinforce the mood, but this is true only when the tones are dense and continuous enough to form a flow of melody. The high density of small units of micro-objects in the form of sound-notes, scores, and codes in music are therefore critical. This density gives intimacy and simplicity that ease the mind, which also allows music, more often than not, to be understood intuitively (Warfield, 1976). Again, this simplicity felt does not necessarily mean that the representation is connotatively so, but rather how flexible one can response to. The intuitiveness might be because of that a piece of music has a potential to be in tune to one's millions of nerves. As a matter of fact, arts of different forms, novels, poems, paintings, and music that imitate life and signify the

structures of life and human nature are able to resonate similar semantic as well as emotional responses from the individual. So, the easiness and comprehensibility of the representation highly depend on the individual. In addition, the material quality of representation, indicating which sign system is used, is also responsible for its ability to create an aesthetic effect. Materials such as paper, wood, and so on have their own aesthetic value in addition to the representational text.

Exercising of application

When regarding an individual and his or her actions as ideological instruments that function as signs, the function of micro-objects is apparent to all social development—that of social application. Every sign system is a small world of its own and has a unique way of imitating the real world. Thus we face multiple worlds with multiple rules. It is in the process of interactively applying these rules both within and across these systems that individuals are allowed to create new meanings for the real world they live. Without a necessity to reach a meaning, the basic functional processes of these applications are micro-level representations.

Again, when we regard each individual as a sign, we can conclude that everything belongs to the sphere of representational actions. The participation of events and daily activities of the individuals are applications of meanings and social rules, either intentionally or unintentionally; they have many abstract meanings. The nature that we see and encounter everyday, and the music that we enjoy, have more utility for our body and soul than we often think; they are all part of representations, ideology, and concepts.

In the words of Arbib and Hess (1986), ideology is a coherent cluster of schemata through which we interact with reality, which is in the form of interaction with and application of the micro-level representations. According to Goffman (1979) and many semioticians, "the divisions and hierarchies of social structure are depicted microecologically" (p. 89). Truth can only be interpreted in a specific situation, so these fundamental activities of daily life are meaningful themselves, and individually so. It is only a matter of how we see them. In applying knowledge as well as seeking truth, the activities of individuals become both the process and the method of representation. Because of this, social meanings must be continuously assessed from this decentralized microecological world, regardless of what guides this assessment, and regardless of whether it is for a political or an artistic purpose.

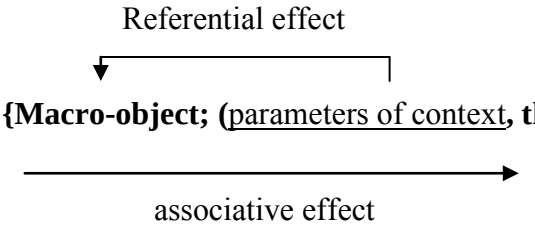
Given this background, micro-level objects contain potential meanings that could be pulled out and deemed as constant. In addition, micro-level objects allow the re-creation of meaning through deviant performances in the process of application. In biology, Charles Darwin talks about the modification of genes in evolution. Genes copy and transfer, and when they do not copy exactly, a shift occurs, and the new genes bear a new piece of information. This type of variation, though, is not necessarily significant in a short period of time, like a breakthrough is; its accumulative function implies transformation, shown in the evolutional progress. In other words, evolution reflects through accumulations as well as breakthroughs. In linguistics, Riffaterre (1978) talks about three types of indirect signs or ungrammaticalities in semantics, those that threaten or depart from the literary representation of reality or mimesis: one *displaces*, when the

sign shifts meanings and stands for another, such as metaphor and metonymy; another *distorts*, when ambiguity or contradiction occurs using one sign; and the last *creates*, when the textual organization signifies the meaning to a sign that does not have meaning otherwise. These ungrammaticalities create variants. In literature, gifted observers of human nature like novelists and scriptwriters describe and create characters that transcend the mutations of human behaviors, which function as basic unique genotypes or elements of traits of humankind. As such, the evolution of human nature is formed and shown through this accumulative literary exegesis in combination with the biological evolution of humans, which depends on both physical and social developments. In sociology, Goffman (1979) introduces the concept of deviant performances of individuals and emphasizes their utilities in social development. He believes that using remedies made with these deviances can restore social order. Though whether social development really depends on these deviances as he suggests needs to be further contested by sociologists, it does imply one additional function of the micro-object level of representation, namely, the meaning-making function, and most importantly, with the presence of referent.

Macro-object

The relationships among micro-objects that attain a higher or broader social recognition are macro-objects that are represented in Formula 3. They indicate higher-order relationships that might not be as distinct in the representations from which they arise. A macro-object has an associative effect on theme; the parameters of the context, if

available, have a referential effect on the macro-object. These two effects give coherence to the representation of the macro-object. The associative effect indicates the autonomous function of the macro-object; the referential effect indicates the informational function of the macro-object.



Formula 3

Since macro-objects represent things at the thematic level in a symbolic system, macro-objects represent and contain the implicit meta-level knowledge or the ideological understanding of the content. The parameters of the context are defined by both the pragmatic function of the medium structure and the pragmatic structure of the representation. The degree of the associative effect is called the "associative power," and its power depends on *what* the macro-objects are and *how* the relations of the macro-objects are associated. Explicit context is not a must for macro-objects, as they can be implicitly indicated through conventional understandings or the syntaxes representing them. Themes are given at the presence of a macro-object.

Also, because macro-objects represent the relations of objects and events, they exemplify human beliefs and patterns of social behaviors. Though each system deals with a different subject matter, the creation of macro-objects is similar to the formation of iconographical meanings, the establishment of stock of images or motifs, or at least the recognition of patterns and properties of a text, hence stabilizing the connotations thereof.

They become the major knowledge base of a society, and some of them become further condensed and developed into methods and tools of abstract thinking. Macro-object representation is abstract in nature. The level of abstraction, however, differs from one system or situation to another. For example, all sciences that function as general tools and laws, such as mathematics and physics, are typically high in abstraction.

Genre and style, which indicate the structures and other distinct natures of micro-objects, are macro-objects indicating abstract meanings. According to Barthes (1977), "[F]raming, distance, lighting, focus, [and] speed" are "photogenia" that have corresponding signified connotations (p. 44). Genres and social rules have a great impact on the representation of micro-objects. The use and creation of macro-objects reinforce and institutionalize other genres and social conventions at the macro-object level and beyond. Genres of any type exemplify the concept of macro-object. Genre here means style of representation.

How a macro-object is represented depends on the method of expression that defines its text, the pragmatic structure of the description, and the quality of the representation. A macro-object can be dissected and represented by this formula:

{Macro-object; micro-object…micro-object, ……theme}
and
{Macro-object; [micro-object; (parameters o f cont ext, theme)], [micro-object; (parameters of context, theme)], ……theme}
or
{Macro-object, macro-object … macro-object, …} Formula 4

In the former case, the macro-object has an explicit context, of which the context of each micro-object is a part. Therefore, the micro-objects might afford a new semantic function to the macro-object. In the latter case, there is no particular context for the macro-object. This indicates that the pragmatic structure of the representation can have a greater effect on the associative power of the macro-object(s).

The functions of macro-objects in representational systems are distinctive in four aspects, or, more precisely, in four proactive processes. Each of these aspects shows how macro-objects interact with other artifacts, and that they are all related to the transformation of information. So, macro-objects show their functions through their connections with other levels of representation. These four transformational functions of macro-objects in representational systems are also nonexclusive to each other:

1. Linking to the collective unconscious: macro-objects integrate with macrostructures to assign meanings to the representation, which indicate their ability to build themes, assign structures, and allow scattered ideologies and social rules to take form again at the macro-object and micro-object levels of representation. Macro-objects therefore have a nature of spiritual transcendence. The way in which they facilitate a connection with the collective unconscious is also a way to allow emotion to take control of memory.
2. Detaching from the referent: at a conceptual level, macro-objects are those distinctive characteristics of any extended text (the congregation of micro-objects), which indicate their supervisory effect and condensed nature.

3. Autonomous representation: macro-objects have an autonomous function, indicating their mobility, flexibility, and transformability between sign systems and genres, but mostly their self-contained nature. They differ from micro-objects in that they are rule-governed and non-mimic in any sense.
4. Giving structure: macro-objects form structures for representations, especially to micro-objects, through giving distinct functional characteristics and certain sensibility and interpretability to an extend text of micro-objects.

These transformational functions of macro-objects imply a higher level of activities of which they reside in the ladder of representation, and this higher level means greater social acceptations, which might also be interpreted as to require a longer time to achieve. In the following, explanations of each of the four functions of macro-objects are detailed.

Linking to the collective unconscious

People live in a world that is pre-occupied with cultural values, rules, and ideologies that are established by their ancestors. These values, rules, and ideologies were once the core knowledge (or macro-objects) of one society or another at any given time in history. They lost their functional momentum due to the change of context and social development. They disappeared, subsided, and scattered among the collective unconscious of all humankind, but they can be revived and retrieved when similar contexts come into existence again. Micro-objects embody experiential consciousness,

but it is the active use of macro-objects that allows them to proactively link back to the subsided consciousness.

Detaching from the referent

Macro-objects take a material form when they stand for the thematic and perspective argumentations in a representational text. Linguistics is a widely used method to represent macro-objects. How individuals identify macro-objects in a text, especially unconventional types of representations such as in visual materials, is affected by knowledge and the social and physical contexts that they are in.

Autonomous representation

Macro-objects are also autonomous signs, as they can form fully functional systems by themselves like micro-objects. The sciences, like mathematics and physics, are good examples of the autonomous nature of macro-objects. These autonomous systems, though highly abstract in nature, can communicate with other systems and are thus transformed at a higher level, which can be more efficient. For example, one genre of music can adopt some characteristics from another branch of music different from its own.

Context is possible within the macro-object level of representation. Highly abstract in form and meaning, the sense of context and beauty only arises from the macro-object level of representation when certain unity is achieved. In other words, the "progressive sublimation of the image reaches its logical culmination" when the entire

text is regarded "as [an] image or verbal icon," and this image appears not as a "pictorial likeness or impression, but as a synchronic structure in some metaphorical space—'that which' (in Pound's words) 'presents an intellectual and emotional complex in an instant of time'" (Mitchell, 1986, p. 111). This is one of the other two contexts mentioned before, the semantic context.

Compared to micro-objects, macro-objects are matured social products, which become more or less stabilized and definite, and which might seem somewhat lifeless due to their established recognition. The meanings of these macro-objects, if stabilized, hardly suggest any emotional or conceptual potentialities. This is also the reason why real artists emphasize improvisation in their performances or come back to focusing on representing the detailed facts of life in their works where time difference among the objects emerges.

Giving structure

The representational functions of macro-objects are more than creating meanings or giving a theme to a text; they provide a structure that is comprised of the distinctly marked functional characters of the whole representational text. This representational function of giving a form ranges from satisfying the needs of an individual or a small group to those of a broad social group, such as a generation of people. This function of macro-objects is also the most diverse in nature; it creates a sense of aesthetic feelings, conveys certain emotions, emphasizes issues, and creates an identity. The methods for analyzing the functions of macro-objects are therefore also diverse and should be

individually constructed. For example, Goffman (1974) once suggested using frame analysis to give one a vocabulary and a perspective for discussing how personal experiences are transformed into moral categories and religiously meaningful actions. Overlapping of frames and functions must be normal because ideological concepts, social values, and emotions are usually richly integrated.

The constant transformation created by macro-objects is necessary and critical for evolution. As our environment changes with time, the old sign systems will become obsolete, and new sign systems will emerge. New functions and interpretations of social practice are constantly being generated and evaluated. Moreover, with the increased development of humanities and sciences, the sensitivity to individual differences will intensify thus enlarging the diversity and the perspectives of the individuals, which in return will affect their view of the world, and so can they be perceived.

Genre formation as a macro-object is an important structure for any text. Medvedev (Bakhtin & Medvedev, 1978) sees genre as a specific way of visualizing a reality represented by the micro-objects. It is "the typical form of the whole work, the whole utterance" (p. 129). For example, Medvedev expresses that the difference in length of narrative genres is itself usually a consequence of a difference in vision. Macro-objects can function as the integration of different levels of artifacts. As a composite sign system that contains different levels of sign elements, narrative might be the best tool to investigate the creative activities of macro-object representations.

Macrostructure

Myths, beliefs, rules, emotions, desires, inner thoughts, and other felt percepts that are held by an individual, as well as by the congregated human unconscious, are macrostructures. Macrostructures are the hidden context of all cognition. They indicate that an individual is a situated organism, inherited with certain capabilities, as well as intentionality and needs. The main function of macrostructures is to supervise all other cognitive artifacts. In other words, macrostructures include the implicit knowledge that controls the representation of macro-objects and micro-objects; they go beyond culture, and most certainly, any signs.

Compared to the two other types of artifacts, micro-objects and macro-objects, which describe and demonstrate the attributes or structural relationships of the objects/events in the world, macrostructures are usually embedded in these representations, though they could be independent as external entities. An overt macrostructure in linguistic discourse may be seen as a companion to an abstract, summary, or thematic statement which supervises an extended content, or belongs to "shifters" (inherit from Jakobson, 1971; Silverstein, 1976), indexical symbols, "such as personal pronouns and other deictic expressions, aspect, tense, mood, modality and evidential" (Verschueren, 1999, p. 189). In non-linguistic modes, an overt macrostructure can be in the form of a gesture, which brings focus to the content, or in the form of background music that decorates the mood of a filmic scene. These linguistic and non-linguistic components are quite pervasive and diverse in form.

Macrostructures function as coherence tools or contextualization cues that give a sense of salience for the spectator. Rarely, does an overt macrostructure run into an extended length, but this does occur, such as in novels, when the inner thoughts of the characters are treated as the objects of description. When this happens, these macrostructures become the social and emotional context of the story. Overt macrostructures can have the same basic functions—the informational and the autonomous function—as the other levels of artifacts, though these functions are not the major functions of them.

Macrostructure is a broad psychological construct that consists of the registrations of all the external objects and their representations and unrepresentations (or things that are unrepresentable) that an individual experiences. This construct indicates the embodiment of a human's body and mind, which are both the cause of all cognitions and the result of them. The body connects with its physical existence, and the mind connects with its spiritual experience. These two concepts also epitomize each other in each level of artifact. Macrostructure is the central system of cognition that supervises all human experiences. In order to further explain macrostructure, a categorization between consciousness and unconscious is necessary.

Macrostructure in Consciousness and Unconscious

The part of macrostructures that is consciously formed includes the rules and structures that supervise the representation of the micro and macro-levels of objects and how macro-objects are derived from micro-objects, as well as how referents are

projected. This part of macrostructures belongs to conscious human reflections from its origin. Part of it turns out to be in the form of unconscious in reality, which might be due to the reason that cognitive mechanisms force the habitual part of human behaviors to subside, while remaining highly accessible to consciousness (see Freud). The resided macrostructure is considered neutral in emotion. The other part of macrostructure that belongs to unconscious is the un-interpreted part of human experience in the form of sensory inputs (refer to Figure 5).

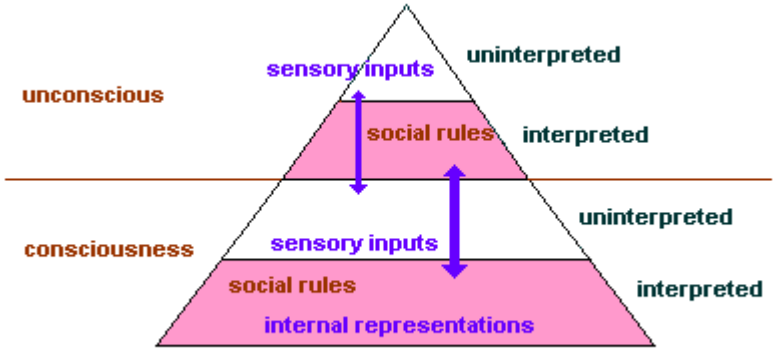


Figure 5. Structure of macrostructure.

The conscious part of macrostructure includes both the interpreted information that is in the form of internal representations and the un-interpreted part in the form of sensory inputs. The internal representations may be the antecedents of the external representations. The hierarchical and triangle form in which the two parts are displayed, however, does not imply that the conscious part occupies a larger place or located at a more significant position in cognition than the unconscious part.

Unconscious information can become conscious, and things that have been conscious can subside into an unconscious state (e.g., Shiffrin & Schneider, 1977). Psychotherapists (Craik & Lockhart, 1972; Kantor, 1980) believe that critical identity images, which are stored in macrostructures, are formed by taking in information through a variety of channels during the foundation experiences and have made decisions about the self or others and constructs about the world and how to behave to express and confirm the meanings of these experiences. In most cases, these identity images are extremely well retained in memory and are hard to change, especially in the environment where communication is mostly in linguistics. Changing the original images needs the experiences to overpower the constraints of both deep-seated images of beliefs and the lack of links to the original micro-objects, raw data, and their companion emotions.

Symbolic images that represent the tacit knowledge of macrostructure in human long-term memory must be distinguished from those with depictive nature that are similar to real pictures. The symbolic images are usually well processed and retained, but pictures are usually unprocessed and kept separate from the symbolic images. Their functions in cognition are a far cry from one another. Symbolic images are powerful in their flexibility and abstract nature, whereas the others are computational and analogical in nature. Though both types of images appeal to human pleasure or pain as well as desire, symbolic images are more narcissism, whereas static pictures appeal objectiveness or allow one to diverge from it.

Following Chafe's summary (1979, 1980, 1987, 1994), information flow among people is believed facilitated by four types of control: rhetorical management, referential

management, thematic management, and focus management. The supervisory functions of macrostructures can be seen in these four aspects:

1. Referential management: macrostructures give a framework of the subject matter so that assumptions can arise from an audience. This also allows memory to actively participate.
2. Focus management: macrostructures bring focus to the individual. They alert and heighten the attention of the audience.
3. Thematic management: macrostructures give intentions, themes, and framings through metaphorical statements.
4. Rhetoric management: macrostructures use techniques and emotional appeals for the purpose of organization, persuasion, and validation.

These functions of macrostructures imply the control mechanisms of representational activities. In the following, detailed explanations of each of the four functions of macrostructures are further discussed.

Referential management

Differing from the grounding effect created by micro-objects that depends on the vivid imitation of the immediate settings from the social and physical world or being as the actual objects or contexts, macrostructures are responsible for the global level of framing through overt declaration or implication of structures provided by a stylistic representation, such as linguistic features (Gumperz, 1982) or lexical forms (Duranti,

1992). Similar to Goffman's understanding, simple words that clearly declare a state of being or frame of action could signal what is expected in the interaction at any stage. Macrostructures are capable of supervising content that is beyond a local text or immediate settings. Macrostructures activate the memory of the audience. Emotions also function as organizers in memory.

Focus management

Macrostructures can also function as indicators that direct to the targets in which a passage of text intends to describe. Saliency can be used to replace the word "focus" used by Chafe because the former more precisely expresses that the effect is created by the representation in the first place. The attention control mechanism is probably the most important function of macrostructure. Neuroscientists believe that focus activates a group of neurons and turns on their plasticity, which leads to real change in thinking.

Thematic management

Macrostructures, like metaphorical statements, give intention and thematic frames to the text. Differing from macro-objects that directly represent the structures and perspectives, macrostructures transfer meanings with a subtle manner but with flexible styles, and with an evaluative nature. Emotions usually participate in this function of macrostructure. As Oatley (2002) contends, emotion is the product of an agent's evaluations of his or her success in terms of a particular goal. When there is an evaluative unit in a text, emotion is involved.

Rhetoric management

Rhetoric is usually regarded as being concerned with persuasion only, not truth. This belief should be tested; however, it is beyond the scope of this study to give a detailed discussion on this subject. Following this belief, rhetoric is an audience-oriented tool for the person who uses it. The focus of rhetoric analysis is only on the means of rhetoric itself, the urgings of the text in Aristotle's words, or on what has been done, not about the result of whether the efforts are a success or a failure for the persuasion (Chatman, 1990a). Rhetoric addresses all aspects of textual construction (Perelman, 1969), "the overall construction and logic of texts, their strategies as well as their local tactics" (Chatman, 1990a, p. 185).

Bordwell (1989) suggests that rhetoric is an instrument, and it belongs to the structure and style of critical discourse that renders the conclusions of reasoning to an audience. He describes three types of rhetorical activity: *invention*, *disposition*, and *elocution*. Invention, "the crafting of critical arguments," includes three sorts of proofs: the *ethical proof* that appeals to the virtues of the speaker, the *pathetic proof* that relies on emotional appeals to the audience, and the *logical proof* that depends on the quality of examples and deductive arguments (p. 37). Disposition is about the organization of the arguments, whereas elocution concerns the style of the articulation.

Rhetoric is related to the perceived validity of the information; it is concerned with how the negotiation of social relationships among participants is realized through the action of representation. Tone, mood, modalization, and attitudinal systems are called tenors that mediate semiotic relationships along three dimensions: *status*, *contact*, and

affect (Martin, 1992). *Status* refers to "the relative position of interlocutors in a culture's social hierarchy," whereas *contact* refers to "their degree of institutional involvement with each other" (p. 525). *Affect* refers to "degree of emotional charge" (Halliday, 1978, p. 33). In linguistics, modality is conveyed through markers such as the auxiliary verbs *may*, *will*, and *must* (Halliday, 1985). In visual communication, modality evaluation depends on what is considered real in the current society and the use of markers like color saturation, color modulation, and contextualization, etc., to verify the value of truth (Kress & van Leeuwen, 1996).

Raw Data

The physical world in which individuals reside contains various kinds of objects: natural objects and materials, purely artificial objects (i.e. those machine produced products that are without any ideological significance, regardless of the nature of continuity in their physical and temporal existence), and those objects that signify or carry some significations for certain groups of people with rich ideological meanings, but in their physical forms only. Individuals' interaction with the physical world also constructs products such as physiological processes of bodily experiences and tangible and intangible forms of social phenomena. These bodily and social experiences are also the origins and the referents of representation.

Raw data are the most concrete artifacts reside in cognition, and they allow as many types of sense experience as possible: vision, taste, smell, touch, and hearing, etc. Though raw data are usually missing in some of the highly developed sign systems, they

are embodied in cognition and representation. In rare situations, raw data are directly used in teaching. This happens when a teacher brings real objects, such as an apple, a picture, or a football into a language classroom. In this case micro-objects and raw data overlap, representing the same object. This, however, may become less uncommon in the near future because more artificial contexts are generalized with multimodal resources, the distinction between raw data and micro-objects will become less clear.

Micro-objects, with the presence of the referents (or raw data), represent more directly, but macro-objects do not necessarily specify the referents. There are two methods to link the macro-objects to their referents in representation: one method is to combine micro-objects with the macro-objects, and the other is to use overt macrostructures to point directly to the referents in the macro-object representations.

The relationships between macrostructures and raw data (or micro-objects) have important practical implications in behavioral and psychological research. The use of internal mental imagery in psychotherapy has made use of the image as a symbolic representation of a behavioral pattern. Without necessarily knowing the referent of the image representation, the manipulation of the symbolic image gives implicit suggestions for behavior change in the individual.

5.4 A Structure

Human cognition involves the experiences of objects in the mode of 1) macrostructures, the bodily senses, percepts, inner monologues, thoughts, desires, imageries, feelings, and social conventions in ideological form, which are almost

emblematically intangible, 2) external representations, the micro-objects, the macro-objects, and the overt macrostructures, and 3) raw data in the material and experiential world, or the referents. These artifacts form a structure that denotes the different cognitive functions of the mediational means in every cognitive action and process. The mediational means include symbolic signs and real and imagined materials as signifiers or signified meanings in each social action (Figure 6). The structure, therefore, demonstrates how people cognize in an environment through deploying mediational means at different conceptual levels, reflecting the dialectic between mental activities and external actions in social and physical contexts.

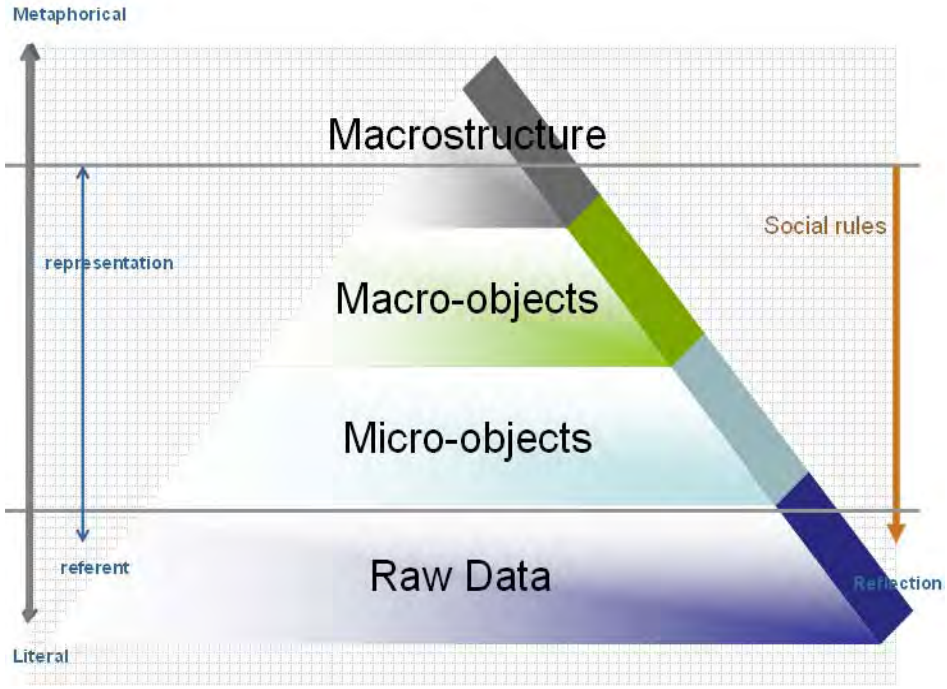


Figure 6. Cognitive artifacts of human learning.

As the level of abstraction increases, micro-objects, macro-objects, and the interpreted part of macrostructures are affected by an increasing degree of social influence as well as significance to the individual, but each group of artifacts also contains a higher functional flexibility and malleability. In particular, the depictions of the macro-objects are symbolic rather than literal, so they are referred poetically and metaphorically to the necessities of endurance and the continuity of their meanings. In the form of macrostructure, internal thoughts are independent from the restraints of the physical contexts, making free association of thoughts possible. This self-governing nature therefore, shows macrostructure as the central reference for cognition. These artifacts or at least micro-objects and macro-objects, pervade the whole social communication space and operate necessarily between modalities and genres. The sensory inputs in macrostructure that are not interpreted are similar to the raw data at the bottom of the hierarchy, which are affected least by social rules.

Comparably, macro-objects are exemplars and invariants, which have significant meanings, whereas micro-objects are comprised of latent variants and connect directly to referents. Macrostructures contain both potent invariants and active variants. The invariants in macrostructures are internalized beliefs, rules, conventions, and utility; the variants come from unexplained territory. These variants of macrostructures are most likely ‘potent,’ ‘active,’ and deeply ‘personal’.

Context is also a contrastively defined entity. Human focus allows the separation between foreground and background interchangeably when attention is applied. Similarly, sense of salience never belongs to content or mental states alone but is subject

to both variation and negotiation between them. Foreground and background can be either concrete or abstract in form. For example, when dense macro-objects form a new coherent entity, they also form a semantic context, from which new invariants can be extracted, or more precisely, hypothesized. Therefore, there are different types of context. Concreteness means the easiness of generating a single image of the subject matter, and absolute information value means the closeness to the original referent. In a symbolic system, and with a view of relativism, micro-objects depict the context of the macro-objects, as they are the background of the thematic content; macro-objects imply or illustrate the structures and relationships among the objects at a thematic level. If micro-objects are missing in the representation, macro-objects may become the context for other macro-objects.

The integration of signs, applications, meanings, and materials has been limited in two ways. First, the interpretation of cognition has been disproportionately focused on the use of certain types of external signs, such as linguistics and icons, and also for the same reasons, has generally ignored a dialogic relationship between these signs and human consciousness, which they actually mirror and transform. As a result, the understanding of the utility of these external signs has been limited. How non-linguistic resources complement and permeate linguistics cognitively, especially in the process when social values are constructed, is subsequently obscured for most. What are the ranges of meanings that these non-linguistic resources could reach if they are independently used as a system? How are semiotic resources functionally interrelated? Do they functionally expand the meaning of each other? Also, how are one or more semiotic systems activated

in a specific social context? At what level of cognition does one type of semiotic resource permeate into another or override another? The delay in answering these questions can be due to the lack of an explicit interpretation of consciousness and to include it in the investigation of the use of signs, as different sign systems truly unite at the metaphorical plane. The proposed framework is expected to overcome this limit.

With this unifying framework, computations can be done for content design by distinguishing the micro-objects from the macro-objects. Objects that are presented with 'absolute' contexts, the micro-objects, can be distinguished from those that are not. The level of complexity of the content therefore can be determined by the contrast of the availability of micro-objects to the macro-objects. Representations that have overt macrostructures, and those without, can be identified. In addition, representations can also be analyzed in a more systematic manner according to syntactic characteristics. This framework therefore does not only suggest creating external representations using an appropriate grounding methodology, but also proposes to evaluate the application of meta-level knowledge in representation.

Flexibility

Macrostructures, macro-objects, micro-objects, and raw data are temporal objects in cognition that can be in a tangible or intangible form; for instance, a macro-object cannot have a referent outside the specific cognition of a particular individual. This indicates the flexibility of the interpretations over the division of the artifacts. As a matter of fact, the categorization of artifacts is necessarily actualized according to a specific

context. This must be particularly true in the categorization of micro-objects and macro-objects in a non-linguistic sign system. Only when the genre-related question is answered, can the categorization be clearly identified with certainty. As such, detailed rules for their separation have to be established in each case accordingly to which sign system or systems are concerned.

The distinction between the proposed artifacts is less arbitrary in certain sign systems such as in sound or in image than in linguistics because the relationships between the two types of artifacts are less conventionally defined. Additionally, in many artistic objects like paintings or songs, the distinction between referents and macrostructures is the least apparent. Typically true, people may usually find that all levels of artifact in these representations have hidden connotations, and are dynamic and intend to transfer certain meanings altogether. An audience of these arts, therefore, may find herself or himself easily captivated in an upward-spiral rash of emotions. This dynamic involvement of the audience is nevertheless constrained to the individual, contingent on the individual's character, as well as the social context which one is in. When this kind of effect is created, these representations might be seen as containing an aesthetic value and having functions in cognitive experience that differ from those mostly provided by linguistic representations. The differentiation among the four artifacts has to be assessed primarily using a macro analysis first over an extended content and in view of type and genre of representation.

Mode

Culture and history construct different communication systems with different meaning-making capabilities, called modes. The concept of mode differs from medium in that medium is the physical form of a communication method, whereas mode is a broader concept and is also considerably less defined. For example, linguistics can be applied to narrative, expository text, poem, music, film, advertisement, or even drawing. Each is a mode for a linguistic sign. The recognition for mode is limited to our senses and is contingent on cultural development as capabilities of a mode are continuously formed, identified, confirmed, and transformed through social communication.

Modal Density

Modal density indicates the complexity of the representation in terms of how meaning can be derived from the foreground objects as well as from the background objects. Modal density is defined through several aspects: 1) the quantity of the micro-objects compared to the macro-objects, 2) the quality of micro-objects and macro-objects, which relates to the genre issue, and 3) the availability of macrostructures, including those explicitly given and those embedded in other objects. Mode density, which shows how different modes of representation are used, also affects the model density. The analyses of both, therefore, require the knowledge of multimodal discourse analysis.

5.5 Relationships among the Four Cognitive Artifacts

The relationships between these four cognitive artifacts explain the main types of cognition. They impact both direct perception and indirect perception.

Micro-objects (or Raw Data) and Macro-objects

In direct perception, such as in a naturalistic environment, the micro-objects (or the raw data) and the macro-objects are inseparable; the macro-objects are simply the affordances of the micro-objects. In indirect perception, the micro-objects and the macro-objects are assigned in the representations when necessary. Some sign systems, such as in image and sound, if were applied into one content design, will somehow blur the border between direct and indirect perception, making the content a complex multimodal text.

One can distinguish micro-objects from macro-objects by their functions and natures. Macro-objects portray the thematic meanings and functional traits, whereas the micro-objects link to the referents. In other words, macro-objects contain symbolic meanings and genre distinctiveness that are supervised by a higher degree of social rules. Deriving meanings from micro-objects to macro-objects is a process of modulization, a process of encoding relations of objects and events with different methods and criteria that are affected by conventions and genres.

In reality, units of micro-objects can be potential macro-objects if they become distinctive in certain functions. For example, in biology, a gene is a material gene, which is a micro-object that can be replicated in the view of Charles Darwin, but for Dawkins (1976), who talks about genetic evolution in biosociology in his book *The Selfish Gene*, a

gene is a macro-object, an exemplar; as such, the selfish gene bears a particular trait, which has an autonomous function. In addition, macro-objects might not achieve their full functions for certain spectators, as they might be mistaken as micro-objects instead. For example, an adult can easily decode certain meanings from a drawing by abstracting visual features, whereas a young child can usually only identify its physical manifestation, such as color and figure in the picture. In this case, the drawing can be a macro-object with significant social value to an adult, whereas it has only basic functional meanings to a child. This also leads to the possibility of putting micro-objects and macro-objects into a continuous scale in some situations. In this case, they have the potential to take into account the gradational nature of visual meaning systems. Therefore, it can be interpreted that the separation between micro-objects and macro-objects is less distinct in certain text types than others.

Thinking from micro-objects or raw data to macro-objects is a process of abstraction, which transfers the literal presence of the objects into the state in which the relations of the objects become the subject. Some rules of the abstraction can be presented in the macrostructures. Vygotsky (1978) emphasizes the role of teaching in particular for guiding the development of abstract thinking. From which he means a transformational skill from micro-objects to macro-objects and a depictive and abstract reflective skill over the macro-objects, especially the latter, which is only achievable through abstract signs. Depicting the abstraction process from micro-objects to macro-objects can serve as a pedagogical scaffold to help the individual identify and assign object responsibilities in creating a problem domain model. However, signs only mean

languages to Vygotsky, which leads to his limited view that separates speech as higher functions of the individual from those practical non-linguistic activities originated from the social context. This view of his, therefore, belittles the role of micro-objects and the relativism relationship between micro-objects and macro-objects.

Macro-objects and Macrostructures

Thinking from mere macro-objects to macrostructures without the presence of micro-objects is a process of pure abstractive reflection. It is an internalization process. Frye (1957) says that using macrostructures to explain a macro-object or a micro-object is how allegory is believed to work, depending on whether one treats examples and percepts as macro-objects or micro-objects respectively. Allegory happens when "a poet explicitly indicates the relationships of his images to examples and precepts, and so tries to indicate how a commentary on this should proceed" (p. 90). In fact, allegory can be used at and among all levels of artifacts when new meanings are introduced to the individual.

Micro-objects (or Raw Data) and Macrostructures

The direct achievement from raw data or micro-objects to macrostructures is a thinking process like symbolism. Aesthetic objects in the form of micro-objects (or raw data) can evoke strong emotions from certain individuals without them clearly identifying the connotative meanings in the objects. The transformation between these two kinds of artifacts belongs to the most original forms of human thinking, more so than language and other symbolic systems. Nature evokes emotions and aesthetic feelings that further

activate long-term memory from one, using its rhythms constructed by continuity and nice variation.

Micro-objects (or Raw Data), Macro-objects, and Macrostructures

Deriving new macro-objects or macrostructures from micro-objects (or raw data) indicates the discovery or internalization of meanings. However, the maturity of meanings needs the alignment of the four artifacts. Only after they have become mature, can they become useful rules and instinctive knowledge, which subside in the macrostructure, and which are more readily accessible for the individual.

5.6 Unit of Analysis

Constructing methodologies to analyze the linguistic and non-linguistic mediational means and how they interplay, as they likely share boundaries and complement each other in situated social interaction, are critical issues in contemporary discourse analysis or semiotic analysis (Kress & van Leeuwen, 1996; Norris, 2004a, 2004b; Norris & Joens, 2005; Scollon, 2000, 2001; van Leeuwen, 1999). In general, a text may apply to more than one mode, and modes may overlap and are interdependent on one another. How these modes are connected and interplay with each other in representing meanings is also contingent on social and cultural differences, which creates complexity in their interpretations among texts. The best solution is to define fields or units of analysis.

Directions of Epistemological Methodology

The methods and instrumentalities of representation consist of two orientations: the metaphorical orientation (also as dialectic) and the analogical orientation (also as analytical). The metaphorical methodology involves a "broad comparison on the ground of characters of a formal and highly abstract kind", which has heuristic, autonomous, and imaginative functions (Peirce, 1932, p. 497). The analogical methodology represents the cognitive rationality that has two significantly distinguishable aspects: *the experiential*, the "substantive or probative rationality in relation to the utilization of evidence," and *the logical*, the "inferential rationality in relation to the interconnections among beliefs in point of their consistency and their mutual implications" (Rescher, 1977, p. 220). These two orientations are shown in both the representational (encoding) and the interpretational (decoding) processes (see Figure 7).

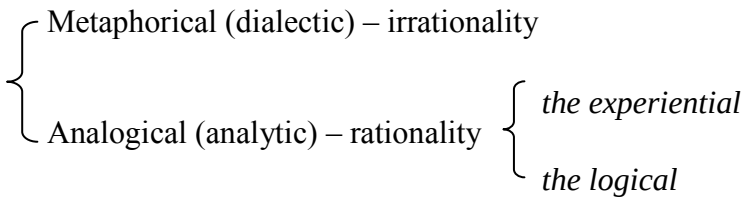


Figure 7. Orientations of epistemological methodology.

For example, a text can be seen as containing the metaphorical and analogical components. These two different components can therefore be analyzed either autonomously or interdependently using the two orientations. When a text involves using

dialectic and analytic methods of analysis, the symbolic meaning of the metaphorical component may function as a motivational power reflecting the relevance of the representation for which part can be rationally analyzed. In that case, the two types of decoding mechanisms work in parallel and influence each other.

Before choosing which method(s) to use to analyze a text, components and their natures have to be identified from the text. Therefore, it is natural to combine the two orientations of representational method with the three cognitive artifacts (micro-object, macro-object, and macrostructure), as they constitute a logical method to divide a text into components. Everything is self-explainable, as both micro-object and macro-object resort to either one or both orientations; one particular question that might arise is whether macrostructure ever applies analogical method as it is usually applied to an extended text (see Table 5).

Table 5

Levels of Cognitive Artifacts and Their Realization

Orientation	Metaphorical (Metaphor, Emblem & Icon)	Analogical (Context & Syntax & Structure)
Macrostructure	X	X
Macro-object	X	X
Micro-object	X	X

For example, a piece of music accompanying a section of film, which uses conversational narrative as foreground, actually functions as a mood setting macrostructure, so this passage of music is not apt to analogical analysis. Though

macrostructure might take various overt forms in its applications to oversee the use of other representations because of its top-down fashion or functional nature, analogical method is seldom necessary when it is used in linguistics. The exception is, however, when inner thoughts and emotions are treated as the subject of description, such as in narration.

Functional Realizations

Assuming language use as a cognitively and socially anchored form of behavior, Halliday (1973, 1978, 1985) introduces a systematic functional linguistic theory and proposes that all linguistic representations perform three functions (or meta-functions) at the same time: the ideational function, which represents things in the world; the interpersonal function, which indicates mood, modality, and person in the symbolic act as a speech function; and the textual function, which regards the coherence between one part of the text and the other parts. This has pragmatic implications. This classification of functions can be shared by other semiotic systems because all kinds of representation are for the purpose of conducting certain types of social communication. For example, later researchers explain the three meta-functions introduced by Halliday as representational, interactive, and compositional functions realized in image analysis (Kress & van Leeuwen, 1996). However, this does not mean that the meta-functional systems between semiotic resources are identical. This difference can be demonstrated through several interrelated layers of concerns.

The cognitive stage is an indicator of the provision of different meta-functions. Accordingly, it is natural to posit a correlation between the meta-functions and the levels of artifacts based on the obvious dependencies between them (see Table 6). So, each field shows the intersection of a type of artifact and a type of meta-function that is capable of achieving certain meanings. Again, a doubt might arise as to whether macrostructure independently transfers an ideational function. The supervising mechanism of macrostructure assigns ideational meanings contingent on other artifacts. However, the answer also seems positive if we see that inner thoughts are the subject matter of the description, such as in narration.

Table 6

A Functional Matrix for the Artifacts

Function	Ideational (ID)	Interpersonal (IT)	Textual (TX)
Macrostructure	X_{11}	X_{12}	X_{13}
Macro-object	X_{21}	X_{22}	X_{23}
Micro-object	X_{31}	X_{32}	X_{33}

The components in each field can be further categorized into symbols and logical syntaxes, which define their method of meaning-making as well as the epistemological method of interpretation. This results in a 3 x 2 x 3 matrix, in which each of the three artifacts is described as having an ideational function, an interpersonal function, and a textual function; each of the dimensions can be analyzed by the use of either of the metaphorical or the analogical method (see Table 7). Each field transfers a unique significance for the constellation of descriptions, and consists of three constituent aspects:

the level of the artifact, the representational methodology, and the function of the representation.

Table 7

A Matrix of Artifacts, Meta-functions, and Realization

Function	Ideational (ID)	Interpersonal (IT)	Textual (TX)
Macrostructure Metaphorical $_1$ Analogical $_2$	 X_{111} X_{121}	 X_{112} X_{122}	 X_{113} X_{123}
Macro-object Metaphorical $_1$ Analogical $_2$	 X_{211} X_{221}	 X_{212} X_{222}	 X_{213} X_{223}
Micro-object Metaphorical $_1$ Analogical $_2$	 X_{311} X_{321}	 X_{312} X_{322}	 X_{313} X_{323}

Finally, the genre, mode, and sign system of the representation also need to be considered in the application of this model. Different types of representation have to use different methods to identify and dissect the analyzable components, the key signifiers in the text, and then to recognize the connotations and social codes to which the signified are relating. In order to do this, genre character and mode of the representation have to be identified first.

For example, Menezes (1995) suggests that visual poems have three methods to combine the visual and the linguistic components: collage, package, and montage. The collage-poem emphasizes the meaning-making that comes from the part of the image. It "privileges the texture of the graphic forms of signs, taking 'figurality' as a dominant,

reducing the net of significations, the semantic aspect of the work" (p. 114). Also, "the arbitrariness of the position of each sign within the poem does not search for justification in the virtually recreated signified, but does in the visual-plasticity of the work." In this case, the ideational function at the macro-level field (or unit X_{21}) would be dependent more on the analysis of the visual component than on the words, and the textual function (X_{23}) and the interpersonal function (X_{22}) at the macro-level would be less dependent on words than on the visual components. In package-poem, the verbal sign is the driving force that determines the articulation between the visual components and the verbal components; in montage-poem, clear juxtaposition of elements is evident, and the syntax of images becomes important. According to how meanings are created, investigation of these visual-poems allows the analysis to focus on different fields and on different semiotic resources.

The analysis of multi-semiotic texts necessitates the formulation of a topological grammar, which embraces the analysis of texts in terms of the level of abstraction, general orientation of representation, and the meta-functions. Therefore, qualitative or quantitative method of analysis can be employed accordingly, and the real meaning can be compositionally determined. More importantly, it allows the examination of texts relate to their situational and cultural contexts (Halliday & Hasan, 1985). To investigate the synchronization of semiosis is to accept the fact that each semiotic system embodies its own unique complexity and adopts the assumption of "incommensurability" between the sign systems (Lemke, 1998). With this belief, the proposed model forms a basis for

further analysis and construction of each identified field, as well as possible co-ordinations among two or more fields.

5.7 Faculties of Human Learning

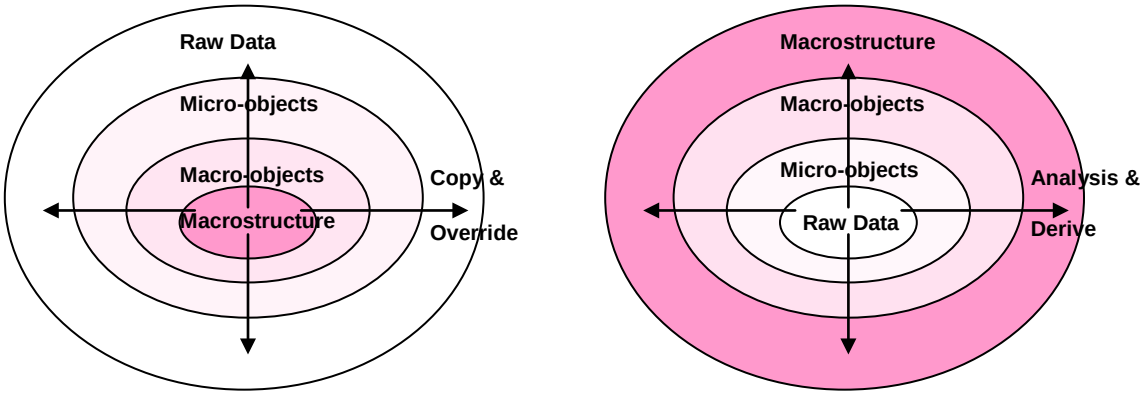
Supervision, computation, representation, projection, mediation, imitation, imagination, remembering, problem-solving, forgetting, and so on, are faculties of cognition. They involve the four cognitive artifacts in different manners, weaving a very complex network. Showing how these artifacts distributed in these functions leads to in-depth understanding of both sides.

Supervision and Computation

In supervision, the process of cognition is to scan the raw data (such as in a naturalistic environment the objects of learning are real objects), or the micro-objects and macro-objects (such as in a novel the objects of learning are micro-objects which are scenes, characters, events, and macro-objects which are themes). During supervision, the general sense of the environment is copied and grasped. This includes the thematic atmosphere and the characteristics of the environment. Data that have a continuous nature, such as the real objects in the physical world, which the study defined as raw data (the artifacts that are in their physical forms) and those are their sensuous copies, the pictures, as micro-objects, have a continuous nature that are easy to be supervised. During the process of scanning, instinctive emotional responses might occur, which can have an overriding effect. The main purpose of supervision is to find the “learning

objects" through detecting discrepancies compared to the knowledge that the central system beholds. Supervision indicates an outward direction of the cognition; the information mainly flows from the highest level of cognitive artifact—macrostructure—to one or more lower levels of cognitive artifacts (see Figure 8).

In contrast, the purpose of computation is to grasp the sensitivities or degrees of believability of the meaning related to the objects, which requests more efforts from the individual. Computation is usually conducted locally on the identified learning objects and occurs within any lower level of artifact and brings results that belong to a higher level of artifact (see Figure 8). Through computation, new explanations and meanings can be derived.



Supervision
(Outward from high level to low level)

Computation
(Inward from low level to high level)

Figure 8. Supervision and computation.

Supervision and computation are the most common cognitive activities in cognition. Between these two modes of cognition, supervision is universal and is

generally carried out before computation. Though both are holistic in nature, supervision is a biological default mode of cognition, whereas computation is more deliberate and sequential in nature. However, it is nearly impossible to practically draw a distinctive line between these two modes of cognition. There must be cases when the computation mode is on while the supervision mode is still in the background. When they interchange in loops, supervision has an outward tendency, whereas computation has an inward tendency to the central system—the macrostructure.

Computation and supervision may be comparable to the two modes of thoughts suggested by Bruner (1986). One is *paradigmatic mode* or inductive mode, and the other is *narrative mode*. The paradigmatic mode of thought is concerned with both the objects and the laws that supervise them; the narrative mode of thought is subjective and implicative. The subjective nature includes both the context of the action and the consciousness of character in the action; the implicative nature calls for a tacit understanding between what are said and the interpretations of the reader. Epstein (1994, 1997) elaborates these two modes into two major systems that describe human thought in psychology. One is the *analytic mode* that involves logical thought; the other is the *experiential mode* that is associated with narrative and emotion functioning in a more holistic manner. In analytic mode, thinking follows an organized sequential and abstract process, and conclusions are drawn rationally. The experiential mode applies a broad generation of thinking rather than precise integration. This process can activate strong emotions but can fall into stereotype thinking because of the impact of imageries and the strong beliefs from the process when these images are established.

Reflection

Reflection is a more complex thinking process, which can be conducted through three types of cognition: projection, imitation, and imagination. In projection, there is no limit where the source of the projection comes from and at which level of artifact the conclusion situates. Also for that reason, projection is a very flexible and powerful method of thinking. It, however, does have an origin and direction (see Figure 9).

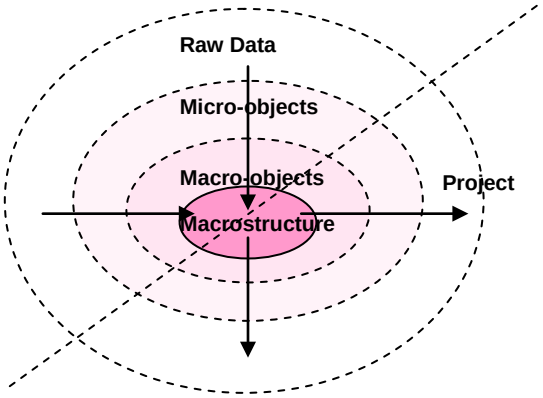
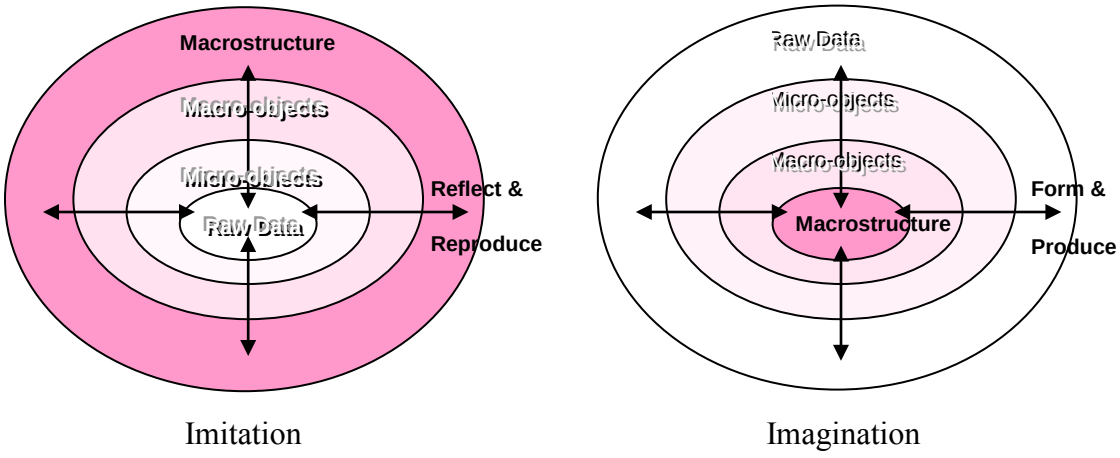


Figure 9. Projection.

When reflection is independent of direct perception, the processes of thinking are called imitation or imagination. Though there are no actual presences of any external objects during these two types of reflection, the source of imitation comes from early perception anyway. This has important implications.

In imitation, percepts of the original objects and concepts are reproduced. The purpose for imitation is to activate, compare, and internalize artifacts, no matter what the artifacts are—raw data, micro-objects, macro-objects, or even macrostructures. Repeating of the words or actions of another is a typical example of activation of the original artifacts.



Imitation Imagination

Figure 10. Imitation and imagination.

Imagination is the capacity of concrete visualization of the cognitive artifacts. These artifacts can be: the referent in raw data, the context in micro-objects, the ideas and concepts in macro-objects, or even the untold feelings of another in macrostructures. The purpose of imagination is to construct the aboutness of the absent objects and through the construction to achieve understandings, and certainly, with a propensity for producing ingenious or unprecedented representations and associations. Creativities happen when un-interpreted sensory inputs are interpreted. The sensory inputs in the consciousness are

the stimuli of imagination, and sensory inputs in unconscious need to be brought into consciousness to be interpreted or to function as tools. The process of imagination is to turn both of these sensory inputs into external imperatives with logical sense through conscious thoughts.

Imitation and imagination are, therefore, different types of cognition. Imitation has a strong inclination of internalization of the existing materials—the identification and interpretation of the external objects, but imagination has a strong inclination of externalization of the possibilities held in the central system—the formation of new concrete artifacts and methods to do so. In these two types of cognition, both supervision and computation participate. In imitation, computation is dominant, but in imagination, information flows from the central system to the outside, indicating a strong projective mode. Differing from imitation, the newly formed images in imagination are not necessarily stored separately from their meanings and emotions. For example, the results of a discovery under any environment, a naturalistic environment or an artificial one, the raw data (or micro-objects) and their affordances, the macro-objects, coexist in the products of imagination.

Mental Image Mechanisms

In order to prove the symbolic function of mental images, Piaget and Inhelder (1971) conducted several inspections. Their results suggest that imitation is the source of mental images, and they believe it is only through imitation that the formation of mental images has accommodated actions and cognitions. They also suggest that imitation

ensures the transition between the sensory-motor and the representation, and the image itself is the internalized imitation. Though it is an active imitation of the perception, "sharing some of the forms of organization of the concept" (p. 49), "the image is indeed still the product of an attempt to produce a concrete and even simili-sensible copy of the object" (p. xix); and it keeps "as faithful and accurate as possible of the perceived datum" (p. 366). A more satisfactory interpretation and assumption might be that through imitation or other types of reflection of an external object, concepts and images are internalized interchangeably, and two separate additional images and their concepts and structures are internalized. One is an *idealized objective image*, and the other is an *adopted subjective image*. These two types of images differ from the *originally copied image* that comes from the sense organs.

The reason for this assumption is that, in order to keep the original images untainted by the ones formed by later projections, it takes three mental image groups to realize this. Piaget believes that sensation is not a faithful copy of the stimulus, which implies that different mental images necessarily coexist. This is also in line with Kant, who suggests the distinction between sense perception and sense conception and between things as they appear and as they actually are (or intellectual). From the above discussion, the structure of the mental image systems is proposed in the following (Figure 11).

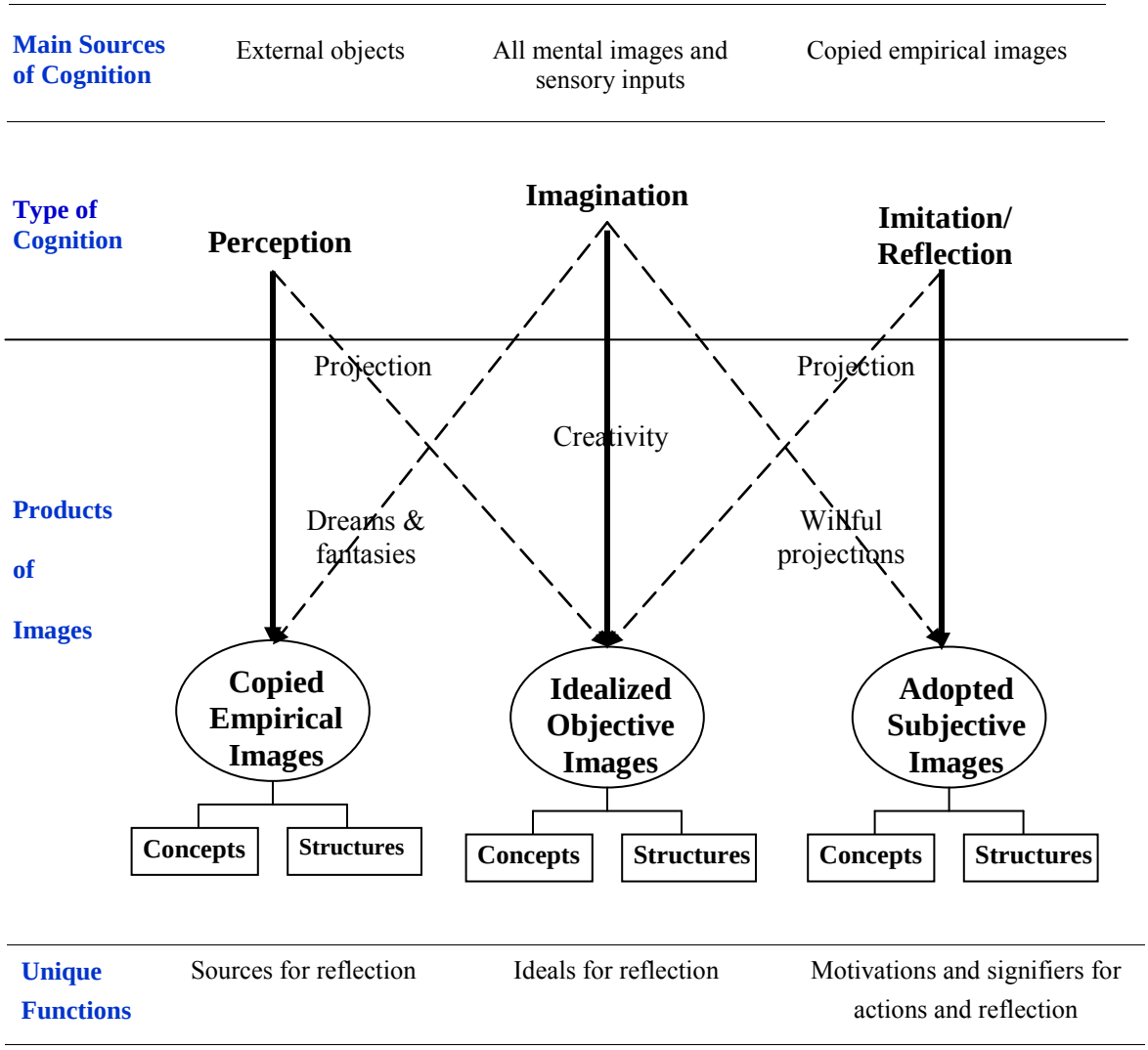


Figure 11. Mental image mechanism.

Both imitation and perception involve a process. Perception is not a passive recipient of its stimulations. Empirical research suggests that people have internationality in what they expect to see. Two additional image systems have to be coexisted to keep

the internalized images to ensure that the original images are as faithful and accurate as possible. They are *adopted subjective images* and *idealized objective images*.

In perception, what an individual "sees" obviously suffices the purpose of copying of images. Through continuous supervision or computation, sensory inputs constantly update the images in the sensory buffers. Regular re-writing of images is necessary if they are not to fade away (Kosslyn, 1991). Imitation has an organizing effect on percepts that makes the sensory experiences become significant ones rather than meaningless flows.

Copied images are kept separate from the existing adopted subjective images and idealized objective images, and further integration beyond perception usually takes time to achieve. During a later perception, the existing images and their attached concepts are activated. The objective image mechanism allows the originally copied images to be separated from those idealized objective ones and those in transformed forms, so they can work as a background and springboard for future transformation and integration of meanings.

Copied Empirical Images

Perception is the direct and major source for copied empirical images, and perception includes seeing, touching, hearing, tasting, smelling, and other senses. Dreams, fantasies, and those originated from imagination also belong to the copied empirical images. One crucial property of the copied empirical images is that the initial perceptual conditions of the images or concepts are kept. Words are later retrieved

descriptionally in terms of their verbal attributes, but nonverbal information is retrieved pictorially in terms of their imaginal attributes. This function of the original perception has been mentioned in the works of Piaget and Inhelder (1971) and Paivio (1986). Copied images which come from external sources, such as from seeing, listening, and so on, generally contain more perceptual and sensory details than those from internal sources, such as from dreaming (Schooler, Gerhard, & Loftus, 1986).

Adopted Subjective Images

Reflection (imitation) is the direct and major source for adopted subjective images. Willful projections that originate from imagination also generate adopted subjective images. The adopted subjective images are the results of the human need of coherence, and they are the alignments of the macrostructures, the macro-objects, the micro-objects, and the referents by the individual. The adopted subjective images control the motivations, attitudes, intentions, and plans of the actions. The adopted subjective images also contain the self-images of the individual.

Idealized Objective Images

Creative imagination is the direct and major source of the idealized objective images. Perception and other types of reflection can also form idealized objective images but only when active projective thinking is applied and achieve certain standard, such as the alignment of the different levels of artifact. The projective thinking processes are different from those of the willful projections, which lead to the adopted subjective

images and hold what is self-believed truth as the rule. An active projective thinking that leads to idealized objective images entails the individual to take an altruism stance and to escape the influences of any subjective matter. The concepts attached to the idealized objective images are not lacking of cultural assumptions, values, and attitudes, they are already beyond these assumptions because these concepts have been proven by history and have become the most fundamental beliefs and facts that humans live by. These concepts range from the simple existence of the human body and its movements to the dense scientific theories that define the universe and from newly emerged social rules to more developed family values and social responsibilities. Creativity certainly has a link to these fundamental concepts to the necessity of truth.

From the above delineation, it seems that an individual likely has two truth image systems: one for self, and another for the public good. The adopted subjective images keep individuals coherent and functioning well in their social contexts, whereas the idealized objective images provide additional tools for them to generate new concepts. It takes both an objective attitude and imaginative mind to create something new. It also takes an uplifted understanding beyond any specific another to achieve an idealized image. This also means that the interpretation of an idealized image is universally applicable. This, however, does not directly transform into the belief that the idealized objective images are more distant to individuals than those adopted subjective images; they purely form beyond the individuality.

CHAPTER 6

FUNCTIONS OF EXTERNAL REPRESENTATIONS

6.1 Overview

Having examined the functions of narrative and mental imagery within their individual spheres, and especially the functional cognitive artifacts in the proposed framework of semiotic resources, together with mental image mechanisms, this chapter turns to the functions of external representations in instructional design and answers these research questions: (1a.) What are the differences between a natural learning situation and a conventionally designed learning situation? (2a.) How are the external representations mapped in narrative and non-narrative texts? (2b.) How does the mapping difference of external representations affect a reader?

The emphasis is placed on the concern of the context issue in cognition which reflects not only in the hierarchical artifacts (as proposed in the last chapter) that people perceive as social tools and products mirroring reality and as historical and cultural facts of cognition, but also pragmatically in various cognitive interactivities, especially attention, perception, and association when individuals are situated in every context and actively participate in the detection and utilization of contextual cues, as when social artifacts are formed, used, and transformed. No perspective, in terms of the distinction between the artifacts and processes from which they are formed, is more important than the other, as they truly mirror each other. As such, a relativistic view must be held.

Similarly, Butterworth (1993) contends that, to insist on the contextualization of thought is not enough to explain its nature and development; a proper understanding must explain what motivates problem solving, expressed through individual goals as well as social intentions as defined within the various opportunities provided for the cultural transmission of knowledge. As such, the discussion of analysis of representation (or semiosis) returns to the individuals' experiential actions afforded by the social contexts in this chapter. Again, it is not behaviors (or actions) themselves with which this study is most concerned, but for what the social contexts afford and how they so do.

6.2 Stages and Orientations of Cognition in a Full Learning Process

Representation is neither the center nor the purpose of cognition. It is an action that emerges from the cognitive and affective interactivities between the individual and the social and physical world. External representations are both the media and the product of these interactivities. An individual creates, interprets, and reinterprets external representations continuously in a cycle of perceiving, encoding, decoding, and testing under every context when information is transferred.

Either as an action or a product, an external representation is always connected to an object of attention to which it is a response. The link between the representation and the object, however, is obscure to one in certain contexts. For example, content knowledge for most sciences in academic education is created when most of the original context of the information is missing. The meaning of a representation has a crucial dependency on the connection between a symbol and its pointed objects, and the

connection varies in different situations, and this has been an origin of concern of representation. In the discussion of situated teaching, educators have widely drawn a similar contrast between everyday life and a school setting, between everyday activities and ones happen in laboratory conditions (Vygotsky, 1981; Csikszentmihalyi, 1988), and between an extended naturalistic situation and a confined experimental training situation (Lehman & Nisbett, 1990). The concern is about the limitation of some conventional accounts of context and cognition for the purpose of teaching; in which, a particular example has been treated as the only source of reference in a conventional-designed instructional setting, and the complex and multitude connections between a symbol and its pointed object are reduced to a single link.

In order to clarify what different contexts mean for cognition, Berry and Irvien (1986) propose a four-level model of context. The highest level is the ecological context, which comprises all of the permanent or the environmental characteristics provided for human action. This ecological context equals the natural and cultural world we live in. The second level is the experiential level of context, or the pattern of recurrent experiences within the ecological context that functions as a basis for learning and development. The third level is the performance context that comprises the limited set of environmental circumstance that account for particular behaviors in limited settings. The last level is the experimental context, which equals to laboratory settings. The purpose of their examination is to allow the study of cognitive processes to fall into a contextual framework.

However, no detailed discussion has been made among different social contexts while cognition happens, or more specifically, on what factors differentiate a natural context and a conventionally designed context. As multimodal resources have increasingly been available to educational design, and conceptual knowledge becomes easy to be represented in diverse formats and with dense examples imitating real life, a basic contrast between these two contexts might be a good start to discuss the issue of context design under the new era of semiotics. It explains what is lacking in a conventionally designed context and what mulitmodal resources can provide for us, particularly in instruction.

Four Stages

Figure 12 delineates four primary sense-making actions, with four cognitive stages and orientations. The diagram shows that the content knowledge described in most textbooks (presumably in a conventional design) is at the opposite pole from the physical world in the cycle of cognition. The social and physical world is where cognition and real objects are embodied, and the content knowledge is where cognition and the real objects are disembodied. As a result, stage one, when representations happen and stage three, when interpretations (or representations) happen, are contrasting pairs and different entity groups between the content knowledge and the physical world. They are different entity groups applied by educators under different beliefs or aimed at providing different contexts designing an instructional situation, and they draw a contrast between a natural context and a conventionally designed context.

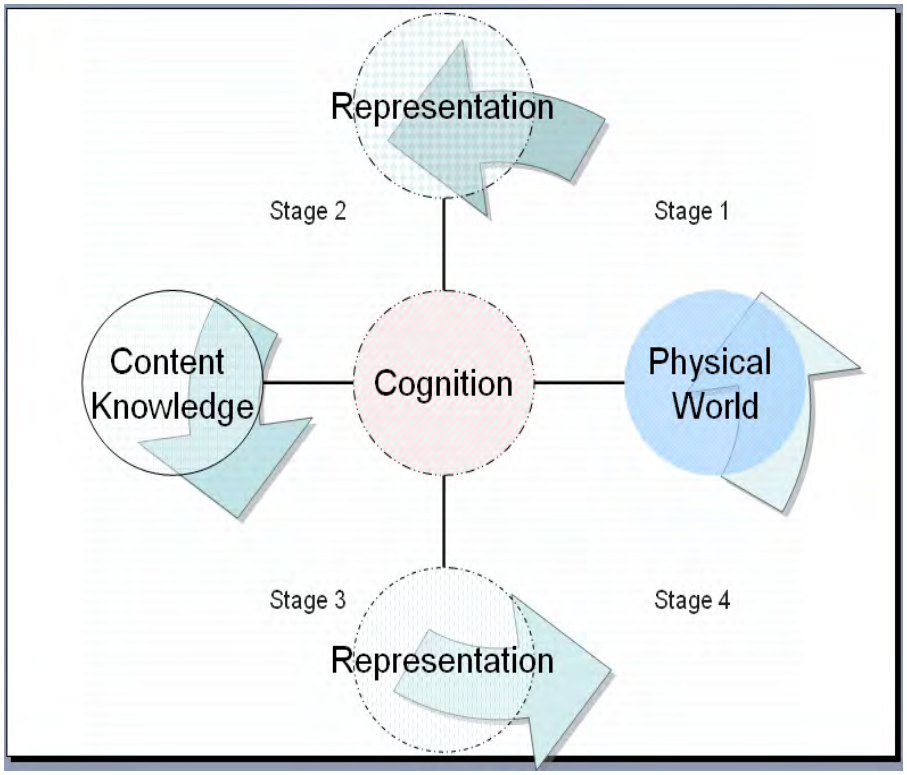


Figure 12. Cognitive affective activities and information flows in learning.

Stage 1

At the first stage, sensory realities of the physical world are transferred into the explicit representations for the purpose of communication. This process is subject to an individual's perceptual experience, emotions, and cultural background. Perceptions from the intuitive exploration are part of the cognitive and affective mechanism of the individual that have great impact on the perspectives of the individual. This stage reflects a direct perceptive process. Representations are rich and are particulars that are indexical in nature. The two major structures of these representations are: *micro-objects*, such as

mere facts, real objects, and their attributes, and *micro-macro-objects*, such as the objects that contain meanings or other values coupling with their physical properties. The former type of artifact has properties that are easy to be perceived; the latter indicates that the properties of the object have been sensed. At this stage, all artifacts contain micro-level objects, the primary subject matter; therefore, truth-value depends on direct perception and other senses. In views of ecologists, such as Gibson, cognition is fully situated in naturalistic contexts, and perception is an active interaction between one with the environment.

Also at this stage, the nature of the environment of inquiry is openness because the resource is indefinite. The individual can apply different modes of thinking, such as to interact with the real object by action, to feel the object through the senses, or to refer the object to another by an existing rule as applying symbolic thinking. Therefore, the experience of inquiry is usually multi-dimensional, implying the existence of time and space, a sense of continuity, as well as the individual self within an activity. In addition, the individual can apply all types of inquiry: *abduction*, to generate new ideas or to hypothesize; *deduction*, to clarify the hypotheses; and *induction*, to verify the hypotheses with empirical data. Abduction and deduction are the conceptual understanding of a phenomenon, and induction is the quantitative verification (Peirce, 1932, 1960).

Peirce introduces abduction into modern logic as creating new rules to explain new observations. Abduction is the "whole series of mental performances between the notice of the wonderful phenomenon and the acceptance of the hypothesis" (Peirce, 1960, 6. 469). By emphasizing the firstness of abduction, which is the existence itself, not the

possibility (the secondness of deduction) or the generality (the thirdness of induction), Peirce concurs with Kant on transcendental meanings or the internal meanings and structures of the object that are beyond subjective human senses. Therefore, truth and reality can almost be achieved by the continuous activities of abduction, through discovering and asking new questions and hypothesizing, and finding the "best explanation," "in which one chooses the hypothesis that would, if true, best explain the relevant evidence" (Wikipedia, 2008). Peirce emphasizes that abduction is not symbolic logic but critical thinking, and it is the only logical process that actually creates anything new.

Stage 2

At the second stage, the subjective senses that have been externalized are condensed and kept as the content knowledge. This is a process of divesting entities of their original contexts and a process of disembodiment. The perceptual world is not the primary subject matter anymore; emotion is lessened and is being filtered out from the abstract content.

This is also a process of encoding and modeling from which the discovered properties of the objects at the first stage are confirmed through the creation of invariant structures—representations in abstract forms. These abstract entities are deprived of their original real world features. Therefore, instructional materials derived from this condensed knowledge may create barriers for the individual to see what was perceived in the first place. The encoding process also generates synthetic entities, such as in the

cognitive structures of *micro-objects--macro-object*, as facts with an abstract form, and *macro-object--macro-object*, as an abstract form connected with another abstract form. The functional links of these synthetic entities, however, resort to limited reasoning rules but not critical thinking such as explorative thinking.

Stage 3

At the third stage, an individual faces and explores the reduced knowledge—the content knowledge or conventional subject matter where exemplars of human understanding become instances of the individual's very present subject(s). Actions within this stage reflect the process of indirect perception in a conventional context, which abstract linguistics are usually the dominant representational tool, especially the perception through one type of highly developed signs—the *macro-objects*. The two major types of structure for artifacts within this stage are: *macro-objects*, which are the abstract meanings and forms, and *micro-object--macro-objects*, which are the reattached artifacts with the additional dash indicating a loose link.

At this stage, because micro-level objects have almost disappeared in a conventional setting, where no mimesis are applied in linguistic and visual texts, truth-value does not depend on direct perception or other basic senses any more. Therefore, the experience of learning is considered primarily mono-dimensional and less real. Indirect perceptions based on the abstract artifacts may have a greater chance to be biased if there is no other context. This also because these highly developed signs themselves can be interpreted from one situation to another. The entities that are synthetic might also be

prone to error to a spectator because they are not naturally coupled, and the link between them is easy or is deemed as temporary or loosely connected in the first place.

In addition, the inquiry of abduction is out of the question because the environment is confined at this stage. As a consequence, fallacies from the individual's interactions with the content knowledge cannot be explained and corrected within this stage because the environment that the individual is in is not sufficient for new knowledge and explanation. Also because the perceptual world is being de-emphasized and reduces to indirect perception, emotion is less relevant to the interactions with the artifacts. In other words, though emotion and motivation are still beneficial in cognition itself, they exert less impact to memory at this stage because emotion needs perceptual properties or objects as pegs in memory, which are missing.

Stage 4

Stage four reflects the process that the individual applies: what is perceived and studied from the content knowledge into his or her immediate physical context. Piaget used "imitation" and Leont'ev (1981) introduced the concept of "appropriation" as the function that one understands conceptual knowledge through dynamic interactions with the social and culture contexts. This is a proactive process, which is necessitated by the possible new perceptions from the physical world. The individual self comes back into the picture at this stage as the individual's emotion and motivation become more accountable in interactions with the physical world. This is a process of embodiment and re-embodiment. The intuitive exploration of the newly acquired knowledge in the

physical world is especially valuable during this process. Mercer (1993) gives an example that teachers can adopt appropriation as a pedagogic function and take up children's utterances and actions and frame of mind, thereby offering them a recontextualized version of their activities, which facilitates a social dynamic loop that may hard to run with children's own capacity. This also implies the function of storytelling, which acts as a practical tool to ensure new knowledge and abstract concepts are collectively reconstructed and evaluated, and most importantly, obtainable.

Four Orientations

The first stage of cognition, namely, perceiving or perception, reflects the individual seeing the world through various social lenses. Direct perception, therefore, has a clear social intention in the first place, and it is guided by social norms and ideologies. Because of this, it is reasonable to infer that the process that makes the representations explicit has a strong social orientation.

The second stage of cognition is a process of abstraction, or disembodiment, in which emotions attached to the original representations are lessened because of the removal of context or the original perceptual attributes. Abstract knowledge from another domain may be introduced in the process of interpreting and forming of a new domain of knowledge, and everything produced, therefore, comes from logical deduction. This process has a logical orientation.

Decoding and testing, which are different stages of embodiment and/or re-embodiment, are more or less a personal process, and if some sort of linking to the social

and physical contexts happens, either backwardly or forwardly, emotions are able to participate. The decoding process at the third stage has a personal orientation and is a pre-embodiment process, whereas the testing process at the fourth stage has a personal and emotional orientation and is an actual process of embodiment.

A Full Learning Process

A full learning process starts from a natural environment, or one with a similar context, such a naturalistic context, that engages the individual to interact with the physical and social world in an active, direct perception and with objects containing possibly all forms of visibility or sensibility, and when all methods of inquiry are used interpreting certain aspects of the physical world. In addition, learning is mostly a personal issue; it is only possible for the individual to make sense of his or her own needs. When there is a need and a self-imposed purpose of learning, emotion contributes to cognition. However, only when the individual actively interacts with the indefinite perceptual world and is involved in intuitive exploration, or heuristic construction, can emotion be tightly embodied in cognition. In other words, a complete learning process includes inquiries at all levels, abduction, induction, and deduction, and activities that lead to different awareness: observing, pondering, classifying, imagining, predicting, inspecting, and verifying from which emotion, motivation, and the individual self and the physical world are embodied.

In addition, a complete learning process has to have its own method to address errors and new questions. This requires that the nature of the resource of the environment be open enough to contain adequate information and mechanisms of problem solving.

6.3 Characteristics of the Conventional Instructional Design

Motivation of cognition comes from a sense of purpose. This is how an individual prioritizes and allocates the energy of his or her body and mind. Based on unconscious, motivation only comes from real social situations, in which senses are able to connect with the mind and the spirit. For Panofsky, the necessity of trying to prove a perspective or thought is "the logical consequence of pursuing the questions of cultural relativism and pictorial realism" (Elkin, 1994, p. 11). This means that the utility for learning a concept or a perspective must be found in the real social and physical world. In an environment where the individual cannot see his or her actual needs of learning as a contention between mind and body, motivation is compromised.

Moreover, perception directly affects memory and, as a result, information retrieval. The cognitive activities involved in direct perception and indirect perception are different, as explained through Figure 12. The major actions in direct perception are to perceive and to reflect in an infinite environment, whereas the major actions in indirect perception are to decode from a limited abstract content pool and to use limited logics to rationalize. The actions involved within the latter cannot replace the former from which the continuous structures of the perceptual world are perceived, and their differences also affect memory and information retrieval at a later time. In contrast, naturalistic

environments make it possible for people "to use structural features and higher order relations," or more precisely, intuition. Furthermore, naturalistic settings "influence the retrieval conditions, often stressing the search for higher-order analogs rather than analogs that share superficial features" (Dunbar, 2001, p. 329). Piaget (1952) also contends that gestalts are irreducible, and they must be used as a totality and cannot be analyzed by their original constituent elements. This nature of perception greatly differentiates direct perception provided by naturalistic settings from indirect perception provided by conventional settings.

The position of the content knowledge as we historically has made it, as well as its associated major cognitive activities, defines the characteristics of the conventional instructional design. The typical textbooks, or instructional materials, contain entities that are social rules and the products of these rules. These representations are constructed based on difference rather than inexhaustible naturalistic relations of the physical world. Therefore, instructional materials are severely limited exemplars that stand for optional perspectives, and they are intended to form particular collections of knowledge that can be perceived and reflected in a particular context.

The characteristics of the conventional instructional materials determine that the individual starts with an indirect perception, and the decoding process overlaps with the perceiving process, or the decoding process totally overrides the perceiving process. The different natures between the conventional instructional settings and the natural environments also define the logic that the individual can apply. Induction and deduction

are allowed in an abstractly designed environment, but induction, deduction, and adduction are allowed in a natural environment.

As a consequence, the experiences an individual obtains from interacting with the two environments are also different. In nature, the individual is close to the perceptual world and affects, which both have a physical basis. The open resource allows the individual to have a sense of real experience and become involved in activities such as "pondering these phenomena in all their aspects" as in the inquiry of abduction (Peirce, 1960, 6.469). Therefore, self is emphasized in the experience. In a conventionally designed situation in which the source is limited, logical reasoning overrides the individual as explicit rules suffice for the sense instead. Also, self and cognition can be separated, and usually are, and because of the separation of self and emotion from cognition, the experience becomes less real.

In addition, because the sensual qualities perceived from the interactions are different between these two experiences, memories of them also differ. The copied images formed through interactions with nature are more stable, have more sensual qualities, and usually imply or combine emotions, but the copied images formed through interactions with the abstract content contain more concepts than images, and images generated from the latter are also synthetic or vague, which are treated as secondary and easy to fade away. Moreover, the effects that are associated with image formation also differ, in which the process of imaging through multiple senses, such as visual, touch, and smell, from natural settings are more motivating than those image generation from

conventional settings. Table 8 summarizes the differences between a natural learning situation and a conventionally designed learning situation.

The purpose of distinguishing the differences between a natural learning situation and a conventional-designed learning situation is to delineate a historical picture of showing how different representational resources have been applied and treated in different social activities so far, especially in formal knowledge transformation. As such, we can see the drawbacks of the past in terms of designing instructional materials as well as the advantages and options we have now with the increased knowledge and accessibility to representational resources beyond linguistics. Then, we can foresee and plan for the future of education and make efforts to shorten the difference between a natural learning situation and a classroom setting by employing the knowledge of how individuals perceive, interpret, and associate, and by providing learning resources close to an indefinite openness, under the new era of semiotics as well as social development.

Table 8

A Comparison between a Natural Learning Situation and a Conventionally Designed Learning Situation

	Natural Environment	Conventional Environment
1. Nature of Resource	indefinite openness	abstract contrasts
2. Structure of Artifact	micro-object; micro-macro-object, micro-macrostructure;	macro-object; micro-object--macro-object;
3. Perception	direct (cognition depends on perceptual world)	indirect (cognition does not depend on perceptual world, and logics override perceptual process)
4. Embodiment	embodied cognition	disembodied cognition
5. Cognitive Method	induction, deduction, & abduction	induction & deduction
6. Handling of Errors	heuristic constructive; adoptive and tolerance	no solution or limited solution; less tolerance
7. Effect on Memory	contain more images; images are more stable and have more sensual qualities; and images are motivating	contain less images; images are vague and easy to fade away and with less sensual qualities; and images are less motivating

6.4 Functions of External Representations

One of the implications for contemporary and future instructional design is to change the natures of the environmental resources or the structures of the artifacts in these resources in a learning situation, in order to provide individuals with more options of thinking methods and modes, and to make the experience of the learning process more memorable and coherent. One direct solution is to choose the representational method(s) that can accomplish or contribute to this task.

As different representational methods may have different capabilities to provide learning experience, the functional method in their interpretation is suggested, as it has driven the study from the beginning. The contention here is that the functional method is the best solution to connect environmental resources with learning experience and results. Therefore, if we want to make a designed instructional environment more like a natural environment, a representational method that transfers a sense of indefinite openness in its external representations, especially in designing contextual concepts, is what we are looking for. This openness can be tested in terms of the affordances of the representation.

Affordance

Gibson (1986) introduces the concept of affordance in his work on visual perception. He interprets affordance as an action possibility available in the environment to an individual, and this law governs the informational coupling that is independent of the individual's ability to perceive. Norman (1990) later introduces this concept into human-computer interaction and transforms affordance into cognitive affordance and

physical affordance to support individual cognitive actions and physical actions separately.

So far, the study has discussed several effects of different types of external representations, such as the concrete effect of the pictorial resource, the contextual, the associative, the constructive, the adaptive, and the emotive effects of narrative, and the symbolic effect that all external representations share. These effects are functions and affordances that external representations provide when taking on a specific syntax type. In addition, Halliday (1973, 1978, 1985) also suggests three meta-functions, the ideational, the interpersonal, and the textual meta-functions that each external representation has.

In addition, in a conventional instructional system, the cognitive affordance, which supports the individual in the interpretation of the content, is emphasized more than the emotional affordance and the physical affordance that supports the individual to carry out actions or tasks through the system interface. Among these functions, the function of context which anchors all other functions is the locus of this study because it implies the natures of the environmental resources as well as the cognitive structures of the representations, which directly affects perception and memory.

Function of Context

The word "context" originates from the Latin word "contexere," which means to weave together and exist in interrelated conditions that lead to meaning (Merriam-Webster, 2008). In Chinese, context also means "atmosphere." Teaching with context,

which means using sceneries and emotions in instruction, is a methodology with a long history. The function of context has been discussed generously in the literature. Halliday (1978) says that context is "foregrounding," "a kind of environmentally motivated prominence," in which certain sets of options are favored, and the meaning of a text resides (p. 149). Context does not only activate memories and internal structures of the individual, but also facilitates the building of new internal structures.

Context provides two forms of affordance for cognition: one is non-cognitive affordance, functioning as mere markers to distinguish events and to bring humans to consciousness; the other is cognitive affordance, which allows one to build a structure-like event model for future actions. Non-cognitive affordance shares a similar function with emotion in representation, whereas cognitive affordance is referential.

Most representations have multiple meanings and roles; they are only interpretable and transferable in the embodied cognition when the individual actively interacts with the physical world. As such, learning the content also includes learning the regulatory component—emotion—that associates with it (Oatley & Johnson-Laird, 1987, 1995). To provide a rich context to the individual is a method to allow emotion to participate in the perceptual process and to facilitate thinking and memory by coupling events with feelings.

Two different types of context exist. The first is the context of the social and physical world; the other is the dialect relationship between text and context. In the latter case, "the text creates the context as much as the context creates the text," which includes both the intertextual and intratextual contexts (Halliday & Hasan, 1985, p. 47). Again, the

purpose of education is to communicate and transfer certain meanings and skills, which are only transferable when context is available. Which context can fulfill this task and how much context is enough also depend on the receiver of the information.

Association is a critical faculty in nearly all cognition. Association makes mental images alive and forms new connections. Association is required when new knowledge is acquired. An individual cognizes an entity only to the extent that she or he sees it from a unity, and from which she or he can draw part-entirety relative characteristics for the entity (Arieti, 1976). Because of this, it is critical to use dense contexts to enlarge the cognitive domain of the individual, whether they are facts or systematical abstract entities.

In addition, the function of context in representation is also an issue of coherence, whether coherence means the perceptual unity of the real object or the unity of the logics within the text(s). Only when unity is achieved can an internal model over the content be formed. The more connections made over the representational units, the more stable and flexible the model the individual creates, which may benefit later cognition, such as information retrieval.

6.5 Perception in the Symbolic System

In the previous chapter, different image systems and how they are formed in cognition are introduced. In this section, how images and concepts are formed during perception in the symbolic system, especially how the four proposed cognitive artifacts

function in image formation, is discussed. Most importantly, it further explains how narrative differs from non-narrative texts.

The quality of learning depends on the intensity of the interactions experienced by the individual between self and the social and physical world through the exchange of internal and external representations responding to the system. These interactions are shown in three key cognitive protocols: attention, reflection, and memory, and each start with perception and are affected by it.

Perception and cognition go hand in hand. Perceptual recognition and reconfiguration, which symbolize the main process of reflection, are grounded in external stimuli. According to Gibson (1986), an ecologist and psychologist, salient functional features present in the environment lead to direct sensation, perception, and action of the individual. The representations that are in well-connected forms and straightforwardly illustrate the relationship among the elements give strong support for a spectator. They are good for step-by-step exploration by holding alternative thoughts within sight for the individual, and they are also supportive for an iterative nature of reflection. They liberate the mind to allow comparison, association, and transaction easily among concepts.

Recent neuroscientists (e.g., Damasio) propose that brain function and visual perception are due to biological evolution. They point out that psychology can compartment the issues related to perception and make speculations, but psychology alone will not be able to fully explain the issues. To full interpret visual perception and to explain important concepts, such as consciousness, awareness, and attention, empirical results from brain research are critical. However, until now the dynamics between the

perception and brain are still a black box to experimental neuroscientists. As such, the interpretation of perception in this study is far beyond this limitation suggested.

Lower level perception involves supervision and computation as default modes. The results of these basic perceptual functions then are brought under human consciousness. Johnson-Laird (1988) contends that the results of computation are what humans are conscious of rather than computation itself. He also associates awareness with short-term memory, in which awareness means that some content is processed by the short-term memory. Perception as an active process may lead to higher cognition, like imitation and imagination, but only part of what an individual sees is being processed immediately.

The integration of knowledge occurs in two situations. One is to make coherent interpretations over external representations; another is to integrate discrepancies that exist in the long-term memory when knowledge and belief might be updated. Integration is achieved when newly perceived images and concepts are perceived as coherent with the *adopted subjective images* or the *idealized objective images*. Discrepancies from perception might become potent images for the individual that are stored in the *copied empirical images* for further processing. Other perceived images might fade away with the passing of time.

Image Value of the Components

Objects are deemed as containing different forms of visibilities to us, and people picture and perceive objects in different forms and with different intensity. Objects of all

sorts come to us in concrete and physical forms, in visual and moving images, and in abstract and dense symbols. This means that the semantic and syntactic values, and forms of visibility of the representations comprised by the micro-object, macro-object, macrostructure, and raw data in a symbolic system are different. Mostly, they generate images with different potency levels.

The potency level is another difficult concept. Nevertheless, an inference can be drawn from the discussion in the above section that the potency level is both an affordance given by artifact and inherent of the human brain. For the latter case, humans culturally inherit a similar capability that differentiates which objects are phenomenal or distinctive to us and which are rare phenomena from those that are common. As such, objects that are distinct, carrying any of the characteristics like greatness, beauty, ugly, divine, and taboo, etc., will generate potent images. People share more similarity in this regard than difference, and this aspect of reason is a lesser concern of this study.

The concern is of the affordance of artifact, in which the image values depend on the manner in which the artifacts are presented. For example, the potency of the images from perception can be represented by strength values in a range of 0 to 1 illustrated in Figure 13. Perceptions of different external objects such as macro-object, micro-object, and raw data have different image values ranging from 0 to 1, according to their level of stimulation for image generation. As such, there are different reasons that cause a difference in image value in artifact, or the way we represent.

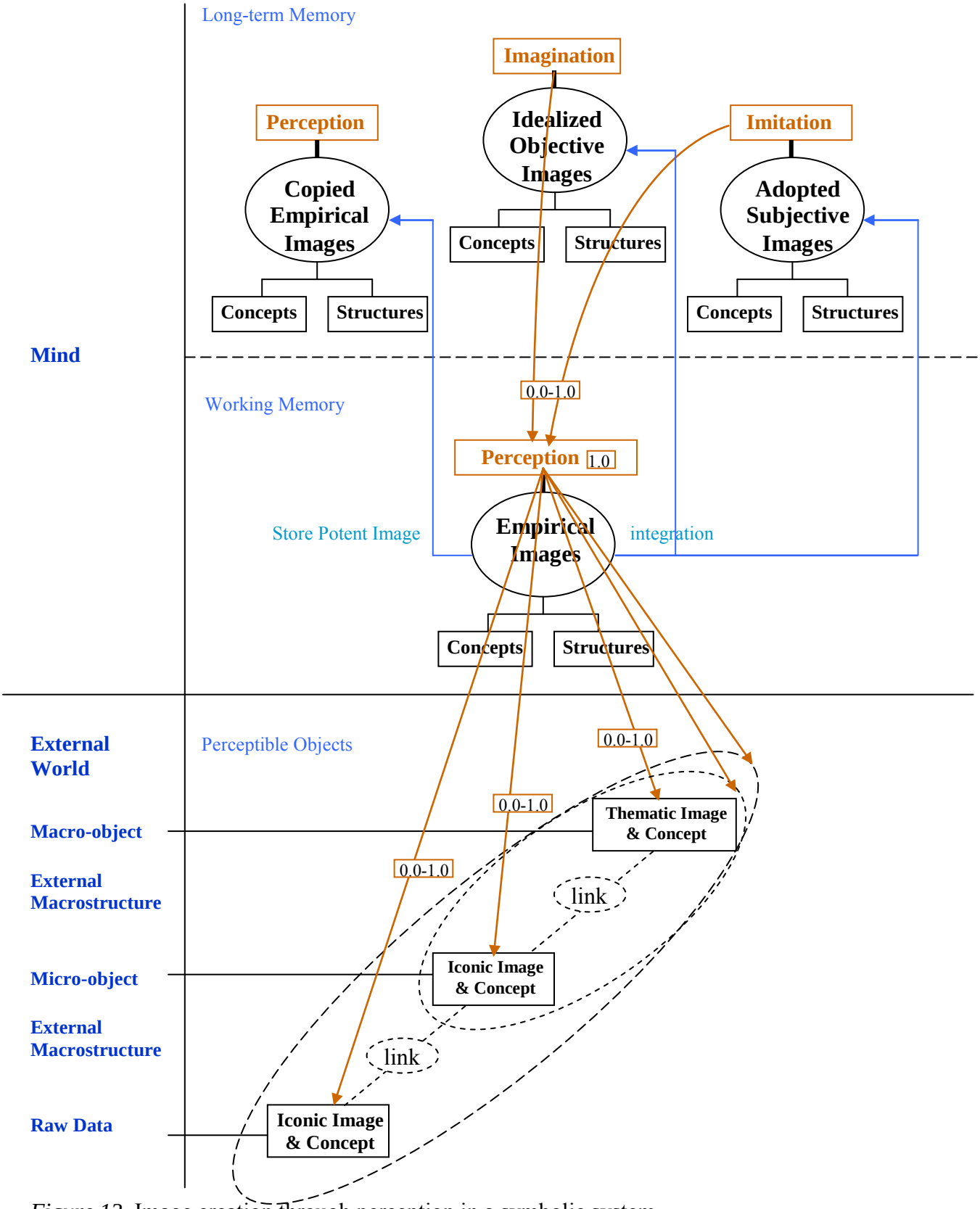


Figure 13. Image creation through perception in a symbolic system.

First, the image value can be defined by the object's closeness to the real object. Pierce (1932) defines three functions of signs, icon, index, and symbol, and each sign, at the same time, functions as an icon, an index, and a symbol. A sign functions as an icon when its meaning is found in some form of direct or unmediated relation to the original object. "Icon has no dynamical connection with the object it represents; it simply happens that its qualities resemble those of that object, and excite analogous sensations in the mind of which it is a likeness" (p. 168). Iconicity therefore, denotes the degree to which a sign bears resemblance. A sign functions as an index when it refers directly to something singular, an individual or an object. A sign functions as a symbol when it has an assigned referential meaning. So, though micro-objects and macro-objects have both symbolic and iconic meanings, the interpretation of a micro-object can be literally done because it connects directly to its referent, but the semantic content in a macro-object requires an interpretation metaphorically concluded. In general, macro-objects stimulate possible thematic images and concepts from a viewer, but micro-objects and raw data stimulate iconic images and concrete concepts from a viewer.

Theoretical studies on conceptual knowledge organization also suggest that a sharp distinction exists between superordinate level concepts that yield functional and abstract information and basic level concepts that yield perceptual information (Tversky & Hemensway, 1984; Tversky, 1989). Basic level concepts can be perceived through the senses and are mentally represented in a single image, but superordinate level concepts cannot be mentally represented in a single image. This is because the mental activation of a superordinate level concept also triggers the activation of several exemplars of the

category characterized by perceptual information (Murphy & Smith, 1982). Moreover, because a superordinate level concept is acquired by the individual in different contexts in which she or he experiences it as a hybrid between collections and classes (Murphy, 2002), the scene-like kind of information associated with a superodinate level concept is to be understood as a remnant of the various contexts in which its exemplars had been experienced. This might indicate that if the scene-like information is discrete and vague, its contextual function is less useful in memory.

In addition, abstract concepts trigger thematic images that are restricted to the common category of the meanings they stand for, and because of their high familiarity rate, image generation from these abstract concepts is less likely. Images may only be triggered when contexts are built around these abstract concepts. In contrast, signs that have a high iconic value (or image value) are easy to be integrated into the adopted subjective images and the idealized objective images that are ready to be used for new information quests. Iconic images and concepts related to themes in the long-term memory that are stored either in an adopted subjective image system or an idealized objective system also allows eliciting both thematic images and iconic images.

Therefore, the image value of an artifact depends on several factors: 1) its functional state and orientation, whether it functions like an icon, an index, or a symbol, 2) whether it arises from realism or mimesis of micro-objects that has a referential value, or an abstract macrostructure, and 3) its eventfulness that is only idiosyncratic to self. Regardless the different natures, these images are inevitably attached to emotion.

Different representational skills allow an artifact to contain a high image value. One can create a similitude to the real object or to imbue it with other distinctions, such as beauty or sublime. One can also create complex syntaxes that combine a group of basic artifacts, micro-object, macro-object, and macrostructure in which a single compelling image can be formed. For example, by telling a story, a string of actions can be fold into one image.

Associated Units

Different combinations of raw data, micro-object, macro-object, and macrostructure create bigger units with greater semantic and syntactic values and different forms of visibility. These associated units have several special functions: First, they stimulate the generation of more potent images; second, they are ready made models of cognition and social forms, so they may be applied to information processing immediately without being integrated or adopted internally by the individual; and third, they are seen as inferred social forms and their structures are kept as such in memory. These associated units can be further divided into static (or iconic) units and dynamic units.

Static Unit

Different text types contain heuristically defined syntactic rules, and these rules convey an arbitrary relationship. One text type implies one or more potential methods to construct representational units in a text. As mentioned before, there is a well-accepted

understanding that people usually store and retain the original syntactic value of the representation when the information is obtained, when in the process of decoding and internalization at a later time, the original structure is usually pulled out with the content. Thus, perception directly affects other cognition, such as information retrieval. The associate units bounded by syntactic rules in the text can easily function as static entities to a spectator. A good example is a pictorial representation, in which the objects that are put together in the same picture are a statically associated unit. Therefore, pictorial representations provide iconic artifacts similar to a natural environment. Again, in an iconic artifact, meaning and the physical properties of the object are coupled as one.

In narrative, all macro-objects are coupled with micro-objects, as meanings and forms arise from social facts, and because of this, descriptions and themes in a story have almost become combined static units. For a storyteller, narrative description services the creation of motif; for a reader, this mimesis also stimulates the invention of a private text associated to the motif and emotion. Furthermore, narrative structures, working like frames that hold different entities, are also static units. Therefore, in narrative, every scene becomes a picture with a motif that triggers recollection of self; every plot becomes an image with meaning that transforms abstract ideas inherited from the collected unconscious.

Dynamic Unit

Most narratives contain evaluative and rhetorical components, as external macrostructures that allow emotion and consciousness to connect with the micro-level

descriptions, or function as links between macro-objects. The artifacts joined as such are dynamically associated units. Images and concepts are enriched or proliferated in perception when macro-objects are associated with micro-objects in the small ellipse in Figure 13, and associated with micro-objects and raw data in the large ellipse, building streaks of images triggered from the long-term memory. They function like dynamic units, leading a spectator a story of actions from the comparison of scenes to the interpretation of new themes.

A spectator also forms dynamic units as she or he traces and connects objects while consuming a story. For example, a reader can pay particular attention to a specific character and trace every action the character conducted and inspect how the character evolved mentally. The entire character, therefore, strings several scenes, forming an associated unit.

These associated units create gestalt images that extend the capacity of the working memory, providing cognitive support for the spectator. These units become structures that allow the spectator to elicit new detailed inferences of the story without internalizing the content and integrate it with the stored knowledge. Highly associated units also give a holistic view of the environment, creating insights for a spectator that individual components cannot.

Narrative, metaphor, and a meticulously depicted meta-picture can create the effects of this kind of visual experience for the individual. The dense image-like structure supports broad inference processes when various types of information are integrated, and most importantly, it conveys a sense of continuity and reality, as well as the active

participation of the spectator. Ortony's (1975) contention about the function of a metaphor is that a metaphor fulfills the necessary communicative function of conveying continuous experiential information while using a discrete symbolic system. He hypothesizes that a metaphor provides a compact way of representing the subset of cognitive and perceptual features that are salient to it, and like an image, metaphor provides a vivid, memorable, and emotion-arousing experience.

In summary, the differences in mapping of artifacts between narrative and non-narrative texts start from their building blocks, the basic representational as well as perceptible units that they employ. Narrative is rich in factual and emotional cues compared to non-narrative texts. All meanings in narrative arise from background description and there are no individual macro-objects. Therefore, the basic units in narrative are iconic in the structure like *micro-macro-object* and *micro-macrostructure*, as meaning and emotion are embodied with their physical properties. Thus, there are no individual micro-objects either because they all imply certain meanings or convey certain feelings.

Second, the static units in narrative and non-narrative texts are different. The complex narrative syntactic structure provides complex statically associated units. A frame in narrative must contain a scene, an action or traces of an action, and a motif. This kind of frame can become fairly large when containing several tracks of actions and characters and motifs. In contrast, non-narrative texts are less capable of having these extended statically associated units.

Third, the dynamic units in narrative and non-narrative are also different. In narrative, because every entity is associated, the net can be interlaced intensively, so analogy can be used. In contrast to other text types, narrative contains much more evaluative and motivational cues that function as links to associate one part to another. These macrostructures are also easily adopted as independent implicit skills used for more association.

Furthermore, these associated units, both static and dynamic ones allow narrative to be remembered as an entirety that be retrieved as such at a later time. The active and natural interrelationship between the static units and the dynamic units also identifies where the differences between narrative and pictorial representations reside. Specifically, in narrative, a dynamic association among the elements is easy to achieve, whereas in a pictorial representation, a dynamic association among the elements may be difficult or unable to form. However, narrative provides the same advantage as a pictorial representation does, in which the basic units and static units of narrative make the images formed by a spectator stable similar to real pictures that are not prone to errors and do not fad away easily in memory.

Functional Differences between a Narrative Text and Non-narrative Texts

The study has illustrated how narratives differ from non-narrative texts in mapping entities and creating different perceptual experience for an individual, which also affect one's long-term memory. This difference in mapping entities, therefore, can be seen as creating different functions for a spectator.

First, a narrative text that contains rich iconic objects and associated units has the potential to trigger iconic images. These iconic images themselves easily become potent images that are kept in all three types of image systems functioning as sources and tools for further imitation, reflection, and imagination. They nevertheless have a strong contextual function in spite of their abstract nature.

Second, compared to non-narrative text types, narrative provides strong causal logic and interactive effects to the spectator that are usually lacking in other text types. This can be explained by using Halliday's (1985) meta-functional model. Halliday contends that every representational text can be analyzed by three main meta-functions, the ideational function, the interpersonal function, and the textual function. The ideational function also comprises the experiential function and the logical function. The experiential function allows the individual to "understand the processes being referred to, the participants in these processes, and the circumstances—time, cause, etc.—associated with them" (p. 45); the logical function allows the individual to "understand the relationship between one process and another, or one participant and another, that share the same position in the text" (p. 45).

Among many text types, only narrative uses time as a logic structure in its representation. Time allows the creation of complex plots and characters that transfer layers of social meanings and emotions, so concept models can be built gradually similar to how memory functions. These complex descriptions also give more interpretive options, and they invite anticipations that provoke the interest of the individual. Time is a strong logical tool that connects entities. Non-narrative texts lack the experiential

function because time is not a structure in their representations. The logical function is also reduced because the relationships between the entities in these texts lack the structure of time.

Third, narrative is embodied with attitudes and judgments and has rich rhetorical features. This gives narrative a strong interpersonal function. In addition, the iconic entities and units of them in narrative also exert emotions through iconic images that increase the interpersonal function. In contrast, representations in conventional textbooks and other text types usually run short of both features, and as a result, the interpersonal function in these text types is comparably less effective.

All representations need context; context not only makes representations coherent, but also allows representations to transfer deeper social meanings, and allows the individual to build an internal model over the content. Narrative employs both the perceptual world and the inner conscious world of humans as origins of context. The contextual effect is displayed not only from narrative's ability to mimic the actual, but also from its power to generate images as an act of recollection from a reader. If individuals do remember things by well-formed models, narrative may be the best solution for representation. Unsurprisingly, this function of memory is confirmed by neuroscience. In narration, the *field*, the incidence; the *tenor*, the participant; and the *mode*, the importance of the incidence are all explicitly given which directly affect the ideational function, which relates to field, the interpersonal function, which relates to tenor, and the textual function, which relates to mode accordingly (Halliday & Hasan, 1985).

Fourth, every entity within a narrative text is connected with another in different ways, and a narrative text generates potent and especially well-integrated units through the mediations of the reader. An individual is impelled to imagine, to project, and to make links in order to discover deeper level of meanings because narrative does not show these deeper meanings or any meaning straightforwardly. So, to create dynamically associated units is a task given to the reader. Furthermore, people remember things in progression and construct models over a process. The associations between entities provided by a narrative text support this kind of model building. This provides narrative with strong associative and constructive functions. Most importantly, the abduction inquiry method can be applied in narrative texts. In this inference, an individual can use his or her own intuition, become the owner of the story, and claim his or her own hypotheses.

Moreover, the static and dynamic units become potent and unified images which are easy to be integrated into the adopted subjective image system and the idealized objective image system of the individual. The individual may save these well-integrated units as conditions and stabilize them for better predication. They effectively increase the capacity of the individual to determine what is connected to what in future contexts. As a result, narrative may be the best method of representation that allows the individual to remember what is represented.

This chapter has illustrated the differences between narrative and non-narrative texts. The perceptual experience that a narrative text provides differs from other non-narrative texts, and so does its functions. The subsequent cognitive process that a

narrative text exerts also differs from other non-narrative text, and so does its functions. Narrative is a real complex sign system, which is dense in both syntactic and semantic values. Narrative creates images with different visibilities: some are simply displayed and transparent, some are partially veiled, and others are totally concealed under different rhetorical strategies, and their visibility also changes from one moment to another in a spectator's viewpoint, as meaning is totally enrich and varies. In addition, narrative guarantees a spectator not only rich images, but also enough stable images. This is because narrative is embedded with social icons in addition to mimesis that is generally applied. The cognitive structures are in the form of *micro-object*, *micro-macro-object*, and *micro-macrostructure*, similar to the artifacts in a natural environment. Furthermore, narrative keeps these images moving by compelling the spectator to make his or her own connections and configurations, and by doing so it provides analogy and a sense of wonder. The result of the interplay between seeing and generating of images does not only intensify the perceptual world provided, but also embeds the dynamic associated units with enough perceptual pegs, which make them become memorable images pertinent to self images which is critical to identity. Narrative, therefore, provides one with multiple forms of visibility, leading the spectator to different modes of thinking, which eventually impact all protocols of the spectator's cognition.

CHAPTER 7

EMPIRICAL RESEARCH MATERIALS AND METHODS

7.1 Overview

One of the objectives of this study was to verify the functional effects of narrative identified in the previous chapters. Another objective was to determine the factors that affect the individual's online learning experience, which further validates the effect that is due to representational method. This chapter presents a detailed description of the materials, the participants, and the instruments used for the data collection and analyses. Statistical techniques and procedures used for the two experiments are also explained.

To seek the answers to the three research questions (1b. What are the factors that comprise the learning experience in an online learning environment? 1c. How do these factors affect each other? 2c. What are the effects of narrative as a representational method in an online course in terms of supporting creativity?), the study applied both qualitative method (content analysis) and quantitative data analysis. The qualitative method is to investigate a concept in an explorative fashion by using open-ended questions (Creswell, 2003). The quantitative method is to address factors that affect results like learning outcomes (Fowler, 2002). Using a narrative assessment method introduced in the next chapter, content analysis was conducted to yield a creativity score based on the participants' responses to the two essays. Though a model introduced in Chapter 2 delineates several factors that were deemed important to online learning, the quantitative analysis process also has an exploratory nature in terms of creating a

functional model of the online learning experience. In this process, factors are further modified while a model is generated. Confirmative factor analysis (CFA), multiple regression technique, and structural equation modeling were used in detecting the actual weights of the predictor variables upon the criterion variables and the causal relationships among the constructs related to learning experience.

The instruments include three open-ended essays questions, two questionnaires, a pretest, and a posttest. Online activities of the participant during learning, such as time of learning and content page read were additionally collected from Vista records. Validation methods applied throughout the process of design of instrument, data collection, and data analyses are also discussed.

7.2 Materials

The content of the original online short course, *Volunteers—Recruitment, development, and supervision,* was transformed into a discourse narration between two characters, Janice and Valli, as they communicate over a trail of scenarios concerning volunteering especially in library settings in real life. Some of the major techniques of the conversational narrative are to encode the background information of the events and to introduce the perceptional experiences and inner thoughts of the characters through exchanging point of views between the characters. Snap shots of the online course shown the original and transformed designs are provided in Figures 39-42 in Appendix A.

As a result of the conversion from the expository text to conversational narrative, about 85 percent of the original content was transformed into the content represented

through conversations between the two characters over a sequence of scenarios on the topic of volunteering. About 20 to 30 percent of the content in the narrative format was newly added due to the perspective nature of conversational narrative. In order to maintain a similar quantity of the surface content, external resources (information from the Internet), which function as part of the original content, were changed into embedded links in the narrative version of the course, which allows participants to choose if they would like to explore when taking the course. This made the quantity of the surface content of the two versions of the course nearly equal. Nonetheless, the transformed version (in narrative format) might be reasonably expected to be a little longer because of the nature of the narrative design.

7.3 Sampling

The majority of the users for the Lifelong Education at Desktop (LE@D) courses are library professionals and support staff in public and academic libraries in the United States. This is similar to the participants in this study, who were library directors and staff enrolled in the online Volunteers course from June to December 2007. Since the course belongs to the LE@D group of the University of North Texas, the data collection followed a similar procedure in administrating the course.

Purposive sampling was used to select participants. Purposive sampling involves the use of judgment on the part of the researcher, with a deliberate effort to obtain representative samples by including typical groups in the sample (Kerlinger, 1986). The intended enrollment to the course was 200. The expected response rate was 35%. This

number is chosen in order to provide adequate power for statistical analyses and to ensure that the sample reflects the population of library professionals for which this course is targeted.

7.4 Data Collection

Three sections and two different versions of the online course were set up for data collection. Sections 1 and 2 used the transformed version of the course in conversational narration with minor difference in terms of instruction to the participants on how to respond to the essays; section 3 used the original design in expository text. A letter of invitation to enroll in the online course and to participate in the study was sent by the researcher and LE@D group support staff to library directors and volunteer supervisors from July to November 2007 using multiple state library contact lists. Participants were randomly assigned into the three sections and were asked to complete the course and take the pretest and posttest, the two questionnaires, and the three essay questions. At the later stage of the data collection, an invitation letter to the existing participants to complete the study personally written by Dr. Turner was sent in November 2007. This was to ensure a higher completion rate in the data collection. The online course was held in Vista 4.0. The three essay questions were embedded in the content near the end of the course, and the two questionnaires were delivered at the end of the course.

Data collection was intended to draw different sources of data in order to reduce method bias. Observation of time spent on task is a method used to verify how participants respond to the online course content, questionnaires, and other instruments.

Vista provides information on online activities of the participants. Time spent on learning, therefore, was measured by both a self-reported value and one from the Vista record. Several measurement items were tested in a former study (Wu & Turner, 2006).

Treatment integrity occurs if an intervention being implemented is as intended. The interpretation of the results also depends on treatment effectiveness, acceptability, and social validity. The treatment effectiveness includes degree of change and the maintenance and generalizability of the change due to the particular intervention (Shapiro, 1987). Interventions with high effectiveness have a greater probability of making the intended effects evident in the outcomes. Treatment effectiveness is related to ease of implementation and treatment integrity. In two of the empirical designs, representational method was the major treatment. Since the transformed course was formally presented in the same way as the original one, the application of the treatment is considered standardized.

In addition, standardized administration of the treatment is another aspect of consideration ensuring the validation of research results. The course was formally delivered and administered among the targeted users. This course was also offered with a promotion: a price cut and several redeemable gift cards at Amazon.com awarded by a lottery. A good portion of the participants was registered with fees already paid in batch by their library systems. Data collection was conducted based on the following two empirical designs, answering different research questions.

Narrative, Imagery, and Creativity

The purpose of this experiment was to test if the individuals taking the narrative version of the online course exert a higher creativity score in their responses to the essay questions than those individuals using the expository version of the same course. This verifies the general functions of narrative, which include the literal, the symbolic, the associative, and the constructive effects of narrative.

In addition, the study also investigated if narrative has an incubation effect. In order to do that, two comparisons were proposed. The first comparison was between the group of individuals taking the course with the narrative design and those taking the course in the original format, with both groups being encouraged to use mental imagery while describing their volunteer experiences. The second comparison was between two groups of participants taking the course with the narrative design but only one group was urged to use mental imagery while describing their volunteer experiences. In other words, before answering the essay questions while taking the course, participants in sections 1 and 3 were prompted to rebuild mental images to describe their experiences. Participants in these two sections read the following instruction: "Try to rebuild mental images of the scene(s) of the experience. After you create the images, spend a moment thinking it over."

The information gained through the essay questions is also subjected to objective verification or validation check. The personal experience type of memory is usually called autobiographical memory, which may be subjected to memory errors (Tourangeau, 2000). Though an exact report of information is not the priority of either of the empirical

investigations, the general design of the instrument employs several methods to validate the integrity of the data.

Primarily, triangulation was used in data collection for the first two essay questions. The first part of the questionnaire consists of eight questions, which are designed to collect additional information in order to validate the self-reported volunteer experiences of the participants. Though the most prominent factor that influences memory appears to be the passing of time (Belli et al., 2001), self-relevance of the incidence and individual difference in the capability of memory are also accountable. Because of these considerations, participants were asked when their experiences occurred, how important the experiences were to their career development and personal beliefs, and how clearly they remember their volunteer experiences. The questions in the questionnaire were expressed in a uniform format in order to structure a way of explanation. An additional open-ended question is added into the questionnaire to allow participants to give comments and add additional information relating to their essay responses.

Factors Affecting Learning Experience

The purpose of this experiment was to explore the factors and the constructs that relate to learning experience, as well as the relationships among the constructs, which include intentional behavior (IB), outcome behavior (OB), perceived design quality (PQ), and perceived design utility (PU), answering two of the research questions (1b and 1c).

The design applied a theoretically and empirically based model shown in the following figure, developed based on the model introduced in Chapter 2.

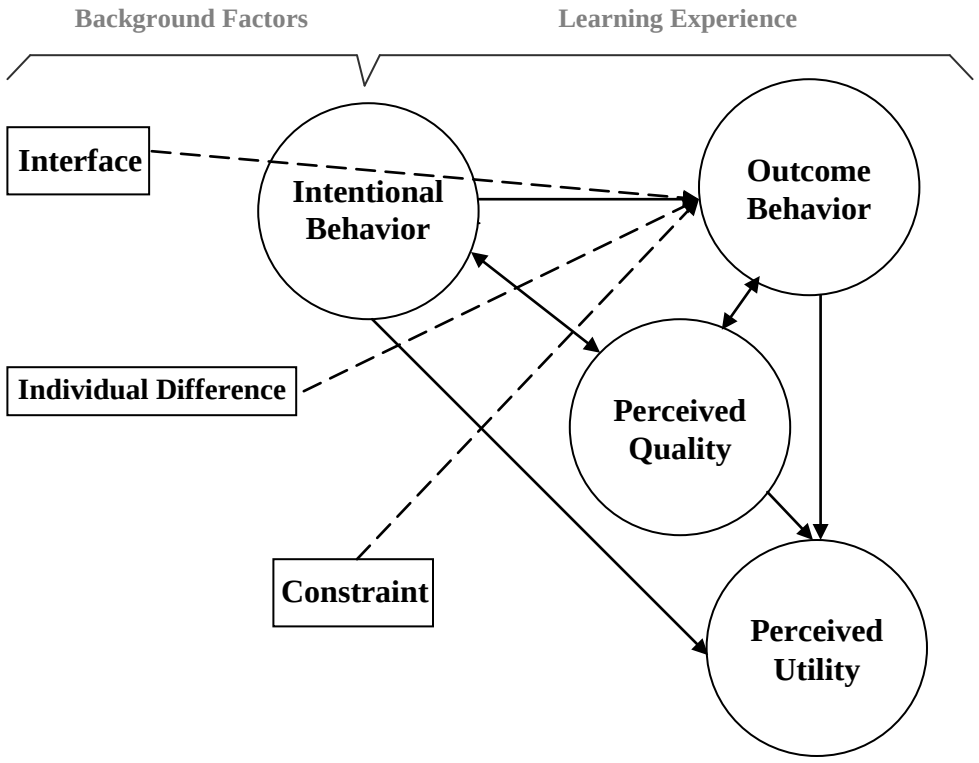


Figure 14. The conceptual model.

The model proposed that intentional behavior (IB) directly affects outcome behavior (OB), perceived design quality (PQ), and perceived utility (PU). Outcome behavior (OB) also directly influences perceived design quality (PQ) and perceived utility (PU). Perceived design quality (PQ) in return affects intentional behavior (IB) and outcome behavior (OB). In addition, interface design, constraint, and individual

difference might predicate or have a meditating effect on learning experience represented by the four major latent constructs. The attributes of the variables in the model are defined as follows.

Interface (or System Design)

Interface is indicated by the difference of the representational method used. In this experiment, interface reflects a contrast between the originally designed course and the transformed course in narrative conversation. This difference in representational method in content design is the treatment of the study that guided the data collection as well as data analyses.

Individual Difference

Individual difference includes a variety of personal and situational factors, such as experience, skills, interests, expectations, and moods. The variables measured in this experiment were: creativity trait, immersive tendency, online communication style, and preference of design method. For example, for the later measure, participants were allowed to rate on a seven-point scale indicating their preference of using visual tools in content design and their preference of using narrative in content design, respectively. In addition, demographic information also belongs to individual difference that includes gender, age, education, position, and work-related experience. In this model, individual difference was suggested as an affiliation problem to the main constructs, intentional behavior, outcome behavior, perceived design quality, and perceived utility. Indicators

that measure individual difference were additionally explored after the main structure of the constructs was established.

Constraint

When an individual takes the online course, she or he may encounter some spatial-temporal constraints, such as lack of technical skills, possible physical discomfort, time limitations, and interruptions during learning. Constraints can have a significant impact on learning experience, including behaviors of learning and outcome.

Intentional Behavior

Attitude (or emotion) has been a focus of interest in behavioral research in which attitude is regarded as motivation that supervises behavior. The tripartite causal relation between thinking, feeling, and behaving (Tomkins, 1970) and the four-party causal relation between action, outcome, attribution, and affect (Meyer & Mulherin, 1980; Weiner & Kukla, 1970; Weiner, 1980; Kelley, 1983, 1984) have been consistently investigated. They can be represented in the following permutable diagrams.

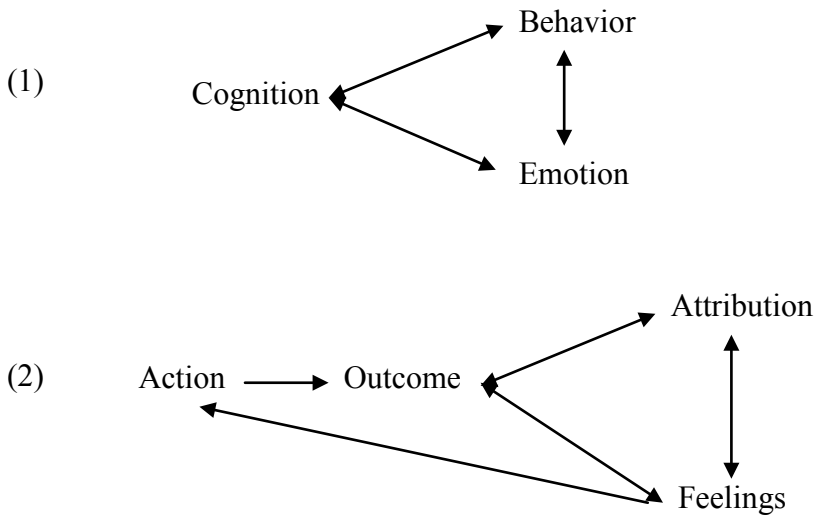


Figure 14. Relationships between cognition, emotion, and behavior.

Prominently, recent empirical evidences also support a modularity hypothesis method that treats the investigation of motivation as different individual sub-systems explaining different cognitive and emotive constructs (Kuhl, 1986). Along this line of research, the Theory of Reasoned Action proposed by Ajzen and Fishbein (1980) suggests that behavior is best predicted by intention indicated by attitude toward the behavior. Similarly, researchers also suggest that motivation has an indirect function upon action, and people transform motive into behavior through recruiting possible selves according to a particular context and transform the motive to cognitive-behavioral strategies with which they construct a reality or outcome that in some way serves their goals (Cantor, Markus, Niedenthal, & Nurius, 1986). Kuhl (1984) also emphasizes a process from motivation to the maintenance of intentional states that is mediated by the strength of self-regulatory ability, the difficulty of enactment of current intention, and the

mode of control that is currently activated. According to this understanding, it is more precise to evaluate behavioral intention that identifies both motivation and concrete behavior facts as antecedents to actual outcome behavior rather than to evaluate the function of motivation alone. Following this thought, in the current empirical model, motivation and learning time were both measured representing the intentional behavior. Motivation was evaluated by three measures: individual's motivation to learn the topic, new questions discovered during learning, and reason for taking the course. Learning time, which indicates how much time a participant spent learning the course, was also tested by three different entries: Vista time, self-reported time (later referred as time spent), and content page read (see Wu & Turner, 2006). This strategy of using multiple indicators also reflects a concern about the reliability and validity of self-reported data as well as the relationship between intention, disposition, and actual behaviors (see Monson, Henley, & Chernick, 1982).

Outcome Behavior

Learning performance (or learning result) is defined as outcome behavior (OB). OB is proposed to be measured by four sub-constructs: test score, indicating the content acquisition, creativity score, indicating the richness and depth of meaning of inferences in the participant's narrative responses to the essay questions, presence score, and the quantity of emotional release.

Perceived Quality (of Design)

In order to discover what other factors affect the attitude-behavior relation, many variables have been suggested to this relation, such as subjective norms, including the individuals' definition of the event they experience, behavioral control (Ajzen & Fishbein, 1980), attitude toward object in favor or disfavor (Eagly & Chaiken, 1998), and other evaluative judgments about an object (Crites, Fabrigar, & Petty, 1994). In most of these theories, the attitude-to-behavior process is regarded as a rather deliberated decision process. In addition, attitude that guides behavior is usually considered mediated by perception. Perceived quality of design reflects the affect quality of the learning experience. In the current model, perceived quality of design includes two dimensions: the emotive aspect measured by enjoyment felt during learning and the attributional aspect measured by the factually bound variables for different aspects of perceived quality of design. Presence is considered as a new concept. The evaluation of presence is suggested as consisting of two dimensions: perception of experience (or introspective judgment regarding the experience) same as when internal representation is evaluated and outcome behavior same as when external representation is evaluated (Schubert et al., 2001; Wu, 2007b).

Perceived Utility (of Design)

User satisfaction is the ultimate goal for system design. Perceived effectiveness using a system, which is usually regarded as evaluation of satisfaction, is also found to significantly influence future behavior (see Fazio & Zanna, 1981). Therefore, to evaluate

user satisfaction is an inevitable task, and the evaluation of satisfaction is also considered as containing a variety of factors (Bailey & Pearson, 1983). The technology acceptance model (TAM) identifies perceived usefulness and perceived ease of use as the two dimensions that directly affect the individual's attitude toward the system and the actual system use (Davis, 1989). In the current modal, perceived utility of design evaluates four aspects: the perceived aesthetic of the design, the usefulness of the design, level of design, and satisfaction (or overall rating) of the course design. As a result, both perceived quality of design and perceived utility measure the affect quality of the learning experience.

7.5 Instrumentation

This is an explorative study that applied a total of seven instruments, including three essay questions and two questionnaires to collect data. The three open-ended essay questions are given in Appendix D. Employing a variety of question types, Questionnaire 1 collects data on the first three constructs related to learning experience, intentional behavior (IB), outcome behavior (OB), and perceived design quality (PQ), and most indicators for individual difference.

Questionnaire 1 contains four parts. The first part consists of eight questions related to the participants' responses to the first two essay questions related to their volunteer experiences within and outside libraries, respectively. The participants were also requested to rate how vividly they remembered the experiences and the importance of the experiences. The second part contains fourteen questions related to the individuals'

online learning experience, and among which information on participants' emotional release, identification of new questions on the topic, constraints endured while taking the course, perceived realness and sense of being, and perceived coherence over the content, etc., are collected.

The third part of Questionnaire 1 consists of six questions about individual characteristics and a self-rate of the creativity level of the participant. Among them, items 27 and 28 are adopted and transformed from two items from the Immersive Tendencies Questionnaire (ITQ) designed by Witmer and Singer (1998), which was intended to measure the capability or tendency of individuals to be involved or immersed. (The two items are: 3. How frequently do you get emotionally involved—angry, sad, or happy—in the news stories that you read or hear? 9. How frequently do you find yourself closely identifying with the characters in a story line?) The fourth part contains six questions collecting demographic information of the participants. Most of the questions in the first three parts of the questionnaire allow participants to rate according to a scale; one indicates the highest degree, and five indicates the lowest degree.

Questionnaire 2 was designed along with the original design of the course but was modified according to the result of a pilot test. The measurement items for the construct of perceived utility (PU) are from Questionnaire 2. Several items in Questionnaire 2 also serve a validation purpose.

Content validity was also considered in the experimental design. Content validity refers to whether the instrument truly measures the structure of interest (Carmines & Zeller, 1991). First, in order to achieve the objectives of the study, the researcher

established the measurement items based on extensive literature review. In order to reduce response errors to the questionnaires and to the essay questions, all the questions were explained with care. Then, two faculty members and three doctoral students, who are regarded as experts of research design, reviewed the instruments to ensure their validity, clarity, and accuracy. Questionnaire 1 was thus revised several times.

In addition, the online course and the survey instruments were tested by a brief pilot test in June 2007. A total of ten participants took the narrative version of the online course and the surveys. The purpose of the pilot test was to test if the instruments measure what they were designed to measure and if they had the ability to elicit responses consistently. The results revealed some minor problems in Questionnaire 2, and revisions were made.

The results of the pilot test indicated that all respondents understood the items in Questionnaire 1 and did not have difficulty with any item. However, the researcher did make three changes after the pilot test. First, in order to validate if the participants followed the instruction of creating images before answering the essay questions, one question (current item 8) was added into the questionnaire, asking the participants if they actually built mental images of the scenes of their volunteer events before replying to the essay questions. Second, an additional open-ended question was also added, asking participants to identify any other aspects that they considered significantly related to their learning experience that were not addressed by the questionnaire items. Third, the scale for most items was changed from five to seven in order to further differentiate the responses.

Table 9

Items Mapped in the Questionnaires and Items Retrieved from Vista

Component	Q1./Q.2/Vista	Item
Volunteer Experience	1	1-9
Motivation_1 (Interest in the topic)	1	10
Motivation_2 (New question)	1	11
Motivation_3 (Reason_t)	2	14
Time_1 (Self-reported)	1	12
Time_2 (Total time of learning)	Vista	
Time_3 (Content page read)	Vista	
Constraint	1	13
Emotional Release	1	14
Perceived_affect_1 (Enjoyment)	1	15
Learning Process	1	16-17
Perceived_affect_2 (Presence_1-3)	1	18-20
Perceived_affect_3 (Design_1-3)	1	21-23
Creative Trait_(1 –3)	1	24-26
Immersive Tendency_(1-3)	1	27-29
Communication Style	1	30
Ultility_1 (Aesthetic)	2	1-2
Learning Process	2	3-4
Preference to Content Design (1-2)	2	5-6
Ultility_2 (Design_level)	2	7
Ultility_3 (Usefulness)	2	8
Ultility_4 (Rate_design)	2	11
Other Components in Design	2	9-10, 12,16
Demographics	1	31-36

For Questionnaire 2, several items were removed, as they are deemed as less relevant in comparison to the items in Questionnaire 1. Several new items were added to replace them. Questionnaires 1 and 2 are provided in Appendices E and F separately. Table 9 shows how items are mapped in the two questionnaires after revision and the items retrieved from Vista.

7.6 Data Analysis Methods and Procedures

SPSS@14.0 for Windows (SPSS Inc., 2006) and structural equation modeling software LISREL 8.80 for Windows (Jöreskog & Sörbom, 2006) were the major tools used for the data analyses. SPSS was mainly used for data preparation and univariate data analysis. LISREL was used for model testing, specifying, modifying, and model fitting.

For the first experiment, content analysis and a correlation data analysis method were conducted to answer the research question. Creativity level of the respondent is measured by two scales, a creativity score gained through content analysis and a word count measure of the respondent's essays. The first two essay responses were applied to both the content analysis method and the word count measure. A framework for narrative analysis used in the content analysis is proposed based on the semiotic resources framework introduced. The framework and the content analysis are presented in the next chapter.

Validity and reliability are major issues in content analysis. Face validity requires results of the content analysis to be consistent with characteristics of the objects under study (Holsti, 1969). Besides fulfilling a concern of face validity, the author designed a

detailed method for the content analysis, which includes definitions, examples, rules, and a scoring method in order to improve the validity and consistency in rating. The Cronbach's alpha internal consistency reliability was also used to verify the constructs that comprise the dimensions used in the creativity assessment. In order to ensure reliability, which is pertinent to the accuracy and consistency in content analysis, the author rated each essay multiple times. Inter-rater comparison was also carried out, and two other raters each analyzed half of the total essay replies; however, the results are not reported due to time (the data analysis results of the comparison between the scores from the first rater and those from the researcher are agreeable; the second rater's data were not processed).

For the second experiment, principle component analyses (PCA) were applied first to detect the validity of the measurement items to their latent constructs. Structural equation modeling approach, which includes confirmative factor analysis (CFA), multiple regression analysis, and model fitting technique, was then employed to confirm the validity of the measurement models and to find out the nature of the relationships between the higher order latent constructs, specifying the structural model. Several indices were used to test the proposed and modified models. Detailed procedures are discussed in the later section of this chapter.

Reliability refers to the degree of internal consistency of an instrument or construct (Kerlinger, 1986), and Cronbach's (1951) alpha is commonly used to assess reliability, which measures how well two or more items measure the dependent construct.

Cronbach's alpha scores were calculated for each of the major constructs before the SEM approach, indicating the internal consistency of the items within each construct.

Construct validity verifies whether the measurement items assigned to a construct truly capture the essence of that construct. Factorial validity, convergent validity, and discriminant validity are all variances of construct validity, with each emphasizing one aspect of the validity issue of the measurement. Factorial validity focuses on the individual construct, concerning how the indicator variables within one construct converge, whereas convergent validity and discriminant validity concern about distinguishing indicator variables that constitute one particular construct from those are not. More specifically, convergent validity requests that different measurement items agree upon the same concept. This means that if these indicators do measure the same concept, they should converge highly upon it. Discriminant validity instead, seeks distinction among the indicator variables that are supposed to measure different constructs. This requests that the items believed to belong to one construct should not cross-upload upon another construct. In addition, a concern over the discriminant validity between the items within one construct is also valid. This means that the items that consist of one construct should not be correlated too highly with each other, preferably less than 0.70. If the correlation between two items is more than 0.90, it means that the two items might measure the same thing (Cronbach, 1951; Streiner & Norman 2003; Wood, 1991).

Factorial validity and unidimensional reliability can be verified using principle component analysis (PCA) for single level constructs. The other two validities likely

involve more than one level of constructs that may need more procedures to fully verify. Structural equation modeling approach facilitates different validity tests by suggesting common indices and providing information about factor loadings, and by giving more options to explore the data through model specification and detection of error terms.

Structural Equation Modeling Techniques

Structural equation modeling (SEM) approach combines factor analysis, multivariate regression, and path analysis with latent constructs. In the SEM procedures, the researcher specifies which variables are indicators and which are latent variables (or constructs). The relationships between the latent variables are regarded as a priori proposed by the researcher based on literature review, theoretical understanding, and assumptions. Structural equation modeling approach allows for the simultaneous examination of the relationships among multiple latent variables and separates the measurement errors from the effects of correlation.

SEM is a comprehensive multivariate analysis approach that uses covariance and means as the basic statistics to understand patterns of correlations among a set of observed and latent variables (Kline, 2005). A covariance indicates the strength of the association between two variables, X and Y, as in the formula of $cov_{xy} = r_{xy}\ SD_x\ SD_y$, where r_{xy} is the Pearson correlation between the pair, and SD_x and SD_y are the standard deviations of the two. In SEM, the major purpose is to interpret as much of the variance between the variables as possible with the model specified by the researcher.

SEM approach was used because the study aimed at detecting how well the measurement variables reflect and converge upon the intended constructs, as well as the relationships among the higher order constructs reflecting learning experience. In addition, in SEM, error variances are allowed to correlate or set for individual measures, giving more analytic possibilities and generalizability. More specifically, it allows for simultaneously assessing the relations among multiple indicators as well as among latent constructs that other univariate and multivariate data analysis methods combined cannot achieve.

In SEM, indicator variables or constructs are called exogenous variables that do not have causal inputs from any other variables, whereas latent variables are called endogenous variables that are the receivers of causal inputs. In typical SEM diagrams, exogenous variables are indicated by rectangles or squares, and each links to an error term in a circle. Error terms are the residual variances within variables not being accounted for by the pathways hypothesized in the model. Endogenous variables are indicated by ellipses or circles, and the error terms linked to them are called disturbances. Each endogenous variable represents a causal model that is weighted function of variables prior to it and the residual (disturbance), allowing the comparison of the magnitudes of each variable included.

For sample size, structural equation modeling is similar to other multivariate analysis, and the general rule is to have a minimum of five times as many observations as there are variables. Sample sizes less than 100 are considered small, between 100 and 200 are considered medium, and sample sizes that exceed 200 are considered large (Kline,

2005). With a small sample size, the researcher followed several steps to screen the data before the SEM procedures were applied. This is expected to reduce the chance of encountering any technical problems in the data analyses using the SEM approach.

Model testing and fitting follow a similar five-stage application of SEM: 1. model specification, 2. identification, 3. estimation, 4. testing fit, and 5. re-specification suggested by Bollen and Long (1993). Several fit indices are given for each model test as an output indicating degree of fit. The better the model fits, the better the sample data supports the model.

Model Specification

Specifying a model is the step in which parameters in the measurement diagram are determined to be fixed or free by the researcher. The criterion of specification depends on theory, former research, and research context. Free parameters are ones that are allowed to be assessed in the tests when the hypothesized diagram is compared to the sample population variance and covariance matrix testing the fit of the model.

The specification method that allows one indicator and its error term to be independent of others in their causal relationship to only one latent variable is called unidimensional measurement. If the specification allows one indicator to load on two or more factors or if it allows its error term to converge with that of another indicator, it is called multidimensional measurement (Anderson & Gerbing, 1988). Though unidimensional measurement models are generally adopted by researchers as they provide more precise parameters with convergent and discriminant validity for the

construct, the decision of choosing one method over another should depend on the actual situation of research, especially the nature of the exogenous indicator. Cattell (1978) states that for indicators that are complex that may actually measure more than one domain, allowing one indicator to load on two different factors would be consistent with the actual situation and should reflect the real pattern of the data. Based on the current research context, cross loading was allowed to one construct—presence. Moreover, allowing paired error terms to correlate in a model is also regarded as a method to test hypotheses about shared sources of variability other than the ones that are due to the underlying factors (Kline, 2005). Also due to the reason that the chance of having intercorrelation of error terms increases because measurement errors are easily multiplied with a small sample, correlation of error terms was allowed.

Model Identification

The task of identification is to find if there is a unique solution representing the pattern of the correlations between the variables, though this does not mean that a fit model is the only model. A researcher usually has to choose a fit model among several optional ones. Optional models can be introduced by model trimming or model building techniques. A model can be simplified by eliminating paths using trimming techniques or building a model from a just overidentified model to which paths can be added in model building techniques (Kline, 2005). Both methods can produce a more parsimonious model.

Estimation

In estimation, maximum likelihood (ML) method is widely recommended to generate an estimated population covariance matrix when the data satisfies the multivariate normality (Schumacker & Lomax, 2004). The ML estimation procedure is also known as not requiring an excessively large sample size. The purpose of estimation is to produce an estimated population covariance matrix that converges upon the observed population covariance matrix with minimum residuals. In this study, each model was tested using the ML method.

Testing Fit

A good model fit indicates that the loadings on the latent construct(s) are significant, and the specified model produces the original sample covariance matrix with minimum or no residuals. Model fits are measured by chi-square tests (X^2). The cut-off value for a fit model is, however, less consistently given in the literature. Models with indices of $X^2/df < 3$ are regarded as acceptable (Jöreskog & Sörbom, 2002). Bollen and Long (1993) suggest that X^2 statistic is a reasonable measure of model fit for models with about 75 to 200 cases, but for models with more cases, the chi-square is almost always statistically significant. With this consideration and with a small sample size, X^2 statistic is regarded as a suitable indicator for the model testing in this study.

However, researchers are usually recommended to employ several fitting indices reporting the model testing results (Hair et al., 1998; Kline, 2005). Among the indices, the root mean square error of approximation (RMSEA) is an estimate of the discrepancy

between the observed and estimated covariance matrices in the population (Hair et al., 1998). A smaller value is better. Values below 0.08 for RMSEA indicate a good fit; 0.10 or less indicate adequate fit (Bentler, 1990; Hu & Bentler, 1999). Standardized root mean squared residual (SRMR) is also widely used. If the value of SRMR is large, it means that the sample variances and covariances differ from the estimated variances and covariances.

Normed fit index (NFI) depends on the correlations or covariances between the variables. The more parameters added to the model, the larger the index for NFI, which is close to 1.0. Non-normed fit index (NNFI), which is also called Tucker_Lewise Index (TLI), is a comparative fit index to estimate the improvement of the model fit between the specified measurement model and a zero factor model (Hu & Benteler, 1999). NNFI takes model complexity into consideration and is less biased by sample size. The value of NNFI however, may exceed one and fall below zero due to sampling fluctuations.

Comparative fit index (CFI) refers to the average correlation between variables. The higher the correlations, the higher the CFI value close to 1.0. Goodness-of-fit index (GFI) indicates what proportion of the variance in the sample variance-covariance matrix is accounted for by the model-implied covariances. The value of GFI is analogous to R squared in multiple regressions. Hair and colleagues (1998) suggest that GFI greater than 0.90 is an indication of a good model with a potential of convergent validity.

In summary, the above seven indices, Normal Chi-square (X^2/df), *p* value, RMSEA, SRMR, NNFI, CFI, and GFI, are selected in the model testing for the current

study. The criteria for the seven selected indices and their cutoff values are summarized in the following table.

Table 10

Criteria for the Selected Indices

Index	Cutoff Values	
	Excellent Fit	Good Fit
Chi-square *(X^2)*	$p > .05$	
Normal Chi-square (X^2/df)		< 3
Root mean square error of approximation (RMSEA)	< .06	< .08
Standardized root mean squared residual (SRMR)	< .05	< .08
Non-normed fit index (NNFI)	About 1	> .90
Comparative fit index (CFI)	> .95	> .90
Goodness-of-fit (GFI)	> .95	> .90

Re-specification

The final model must attain acceptable fit, indicating that the model is consistent with the data in order to further interpret its parameter estimates, and then the strength of the parameters can be compared. The t statistic (or z distribution depending on sample size) is the ratio of a parameter estimate over its standard error. The absolute *t*-value of 1.96 (at the 0.05 level) indicates statistical significance for a two-tailed test. P values reflect both sample size and effect size. As a result, a small effect can be statistically

significant in a large sample, whereas a large effect can be statistically insignificant in a small sample (Kline, 2005).

If the fit indices show an unfitted model, the researcher can evaluate options to improve it, such as freeing a parameter or add or delete a variable or construct. Model fitting procedure can rerun after reasonable and necessary modifications are done according to modification indices or theoretical understandings.

Model Fitting Procedures

The SEM data analyses conducted in this study consist of four major phases in which the proposed model was incrementally generated, modified, and validated. In the first phase, measurement models were examined. Measurement models specify the relationships among the observed variables measuring the higher level of latent constructs. Confirmatory factory analysis (CFA) was applied to assess the measurement models in which the factor-loading regression paths were estimated. These path coefficients indicate the magnitude of the contribution of each indicator variable to the specific latent construct.

In the second phase, the simple structural models involving two latent constructs were verified for model fit. This allows the individual investigation of the causal effects between the latent constructs. The proposed full model was then modified accordingly to the results of simple structural models.

In the third phase, the full structural model was measured for fit. Optional models were explored and a final optional model was concluded.

In the fourth phase, two separate structural models, one for the treatment group and one for the control group, were measured for model fit. In other words, the full structural models were further tested for group difference according to representational type applied to the online course. Each group was analyzed separately, and no constraints across groups were applied.

The SEM approach also allows further detecting the threats that the PCA method cannot detect. Hair and colleagues (1998) suggest that discriminant validity can be verified when items load upon the latent construct significantly in addition to indications of good fit model indices. Convergent validity is confirmed when items thought to load upon a construct with good model fit indices and show high correlation with each other compared to the items in other constructs (Gefen et al., 2000). Kline (2005) also suggests that loadings higher than 0.5 from the items upon the associated construct indicate convergent validity.

7.7 Summary

This chapter presents the empirical research context, materials, selection of participants, and data collection instruments. The empirical study was guided by two designs: one is the effect of narrative on creativity of the participants; the other is the relationship between measurement items and their assigned constructs and the relations among the constructs. Reliability and validity issues are also discussed. Reliability was tested through a brief pilot study in addition to the Cronbach's Alpha tests conducted over the constructs that are represented by the aggregated measurement items. Construct

validity was tested using several types of tests with different concerns both prior and during the SEM procedures.

CHAPTER 8

THE DEVELOPMENT OF A THEORETICAL FRAMEWORK OF NARRATIVE ANALYSIS FOR CONTENT ANALYSIS

8.1 Overview

Among the data collected, the answers to the three essay questions from the respondents belong to written narration, a mono-modal discourse in nature. In order to analyze this data, this chapter first introduces a narrative analysis method, which is developed based on the framework for the analysis of semiotic resources introduced in Chapter 5 (which a general framework for the analysis of semiotic resources was presented, which shows how a text or combination of different types of texts can be investigated using the layered functional fields, regardless of which sign system(s) would apply). The prototypical framework is shown in Table 6 in Chapter 5.

The fundamental rationale behind this chapter is that, rather than to allow a narrative text to be simply explained away by an existing narrative theory or a few general concepts, the study takes a functional approach and suggests a framework to systematically assess it. This functional method not only completely displays the text and allows it to speak for itself, bringing a comprehensive understanding to it, but also allows the analysis of narrative texts to be conducted in a systematical way and under a larger context when other formats of text can be analyzed in an integrated manner if needed. Therefore, the analysis of narrative can be done under a broader narrative theory or theories and with a general cognitive philosophy.

Elements for narrative analysis are identified first. These identified elements are then applied into the functional fields identified. Detailed narrative analysis method and a creativity assessment framework for storytelling are presented.

8.2 Elements of Narrative Analysis

The structural model of narrative suggested by Labov and Waletzky (1967) has six separate elements: the abstract, the orientation, the complicating action, the resolution, the evaluation, and the coda (see Table 11). Though Labov and Waletzky anticipated that these structures might typically be used by a teller to construct a story out of a past experience and make sense of it, the framework is widely adopted into formal narrative studies as 'high-point analysis' (Coffey & Atkinson, 1996; Labov, 1972; McCabe & Bliss, 2003; Peterson & McCabe, 1983).

Table 11

Elements of Narrative from Labov's Model ™

Abstract: summary of the story
Orientation: about who, when, where, and what of the setting
Complicating action: what and how have happened
Evaluation: what the story means
Resolution: how it ended
Coda: the narrator returns to the present of the storytelling

Researchers, nevertheless, do point out that using this method as an analytic scheme for narration is, in many respects, too rigid (Elliott, 2005; McCabe & Bliss, 2003), leaving much of the content largely unanalyzed (Edwards, 1997; Langellier, 1989). These observations are relevant to this study. The rigidity can be explained by at least two reasons.

First, in most narrative texts, non-narrative descriptions typically occupy a large part of the content. Genette (1980) refers to them as "pauses," halting the action to provide description, either about the current context or not. Bruner (1986) regards these non-narrative descriptions and explanations as logical-scientific paradigmatic modes of thinking. Chatman (1990a) also describes two non-narrative text-types: description and argument, contrasted to narration. As "narrators of novels routinely digress to describe or argue," the three text-types routinely operate at each other's service (p. 10). Mostly, these descriptions either abstractly explain or vividly account for the characters and their inner thoughts. In narrative, the former transfers perspectives and powerful ideas, whereas the latter creates contextual cues and vibrant characters for actions. Additionally, examples, whether in the form of an argument or description, can also function as narrative elements transferring tacit knowledge, the implicit cultural beliefs, as well as rationalities of the characters. Leaving these descriptions uninvestigated fails to interpret the real meaning of a story, or distorts it.

Most importantly, a narrative text is the social and emotional account of experience rather than a mere chronological retelling of events. Beliefs, ideologies, and intentions of the author may be evident in any part of storytelling. However, interior

reflections, which represent a significant part of the content and an integral component of the investigation of human experience, are not mentioned in this method.

In addition, the supervisory functions of the macrostructures, which are distinctive in four aspects—context management, saliency management, thematic management, and rhetoric management, are also missing from the method. For example, in storytelling, to select certain parts of experience as salient aspects over others and to construct them into a coherent narrative whole itself is an important step of rhetorical management and may have deeper implications. Why the narrator selects these events to portray, and why the narrator starts the story at certain point rather than others are all concerns of rhetorical management. These management mechanisms are in command of the creation of other narrative elements, and most of all, they governor the interaction between the author and the reader. Narrative analysis must find ways to investigate how the interior of the narrator, such as her or his intention, attitude, and mood, has impacted the recounting. As Langellier (1989) points out, the Labov's model leaves out the relationship between the teller and the listener in the assumption that narrative is a relation among clauses, rather than an interaction among the respondents.

Table 12

Elements for Narrative Analysis

Opener: the narrator initiates the storytelling (the declarative mood)

Abstract: summary of the story

Orientation: about who, when, where, and what of the setting

Event (or Action): what and how it happened as fact

Event mapping: how events developed

Evaluation: what the story means

Resolution: how it ended

Coda: the narrator returns to the present of the storytelling

Inner thought

Argument: deduction based on some more abstract logic

Description: describes the properties of things

Rhetorical components:

1) Narrator type, the virtues of the speaker;
2) Style, linguistic features;
3) Overall structure, the mapping of events; transaction words or words for conjunctive cohesion; and how saliency is achieved;
4) Local structure, logic and quality of argument and description;
5) Emotion appeal, degree of the emotional charge;
6) Modality, words indicate the truth value or credibility (may, always, best of all, whenever);
7) Status, relative position of the teller;
8) Contact, degree of institutional involvement with audience; and
9) Key words, metaphors or words that are clearly referential or evidential of attitude or theme.

Because of these reasons, in order to establish a full account for narrative analysis, several elements are added into the existing structural model of narrative analysis by Labov and Waletzky: *opener* (that tells the narrator type), *description*, *argument*, *inner thought*, and *rhetorical components* (see Table 12). A detailed introduction of rhetorical components is in Chapter 5, when the artifact of macrostructure is introduced. In addition, complicating action is divided into two elements. One is the *mapping of events* or plotting, from which the author's intention and the rhetoric technique are embedded, and the other is the description of actions or *events*. Plotting belongs to an overall structure which constructs a macro-object, a type of form, whereas a description of an *action* or event itself is a micro-level object.

8.3 Functional Orientation of Narrative Analysis

The three types of artifact—macrostructure, macro-object, and micro-object—in Table 13 also illustrate the cognitive level to which they belong. Inner thoughts, rhetorical components, abstracts, and evaluations are macrostructure level objects. Descriptions, when at macrostructure level, are descriptions of the interior world; when at macro-object level, they are explanations or arguments from which thematic perspectives are logically extended; and when at micro-object level, they are background descriptions. (The corpus of this data analysis clearly runs short of argument clauses.) Salient forms, which include mapping of events, suspense, complex contrasts, and arguments, are dominant themes of narration that belong to macro-objects. Orientations, descriptions of background, events, as well as resolutions, are micro-objects that mimic the experiential

world. Explanations and examples are elements that run across between micro-object and macro-object level in narrative text.

Table 13

Functional Levels of the Narrative Elements

Macrostructure	description (inner thought), rhetorical components, abstract, evaluation	
Macro-object	salient form (mapping of events, suspense, complex contrast), argument	explanation, example
Micro-object	orientation, description (background), action (event), resolution	

The distinction between levels of artifact is necessary. It explicitly shows the process of how the individual infers social relations from lower to higher levels of artifacts. This process also shows where transformations may happen, such as the recreation of self or the reconstruction of the social and physical world, by giving forms to life experience. The distinction of artifacts, accordingly, emphasizes both individual and social values. For individual value, the staged artifacts clearly demonstrate how self-concepts are formed from the ideology of the social environment or in concrete social context through the individual's interaction with other individuals and the physical world. For social value, these artifacts display how social relationships are, in fact, aggregated and generalized concepts from the social and physical context of the experiential world.

Consequently, they demonstrate how canonical forms of narrative are fashioned through the congregation of individual representations. The endeavors made for these transformations are thus: evidences of the skills of the author in rhetoric, the reflection of his or her interior mood, and an ability to convey truth in the course of giving form to life experience through the portrayal of events and creation of suspense, conflict, contrast, vivid characters, and memorable scenes. Therefore, these transforming processes can be reasonably assumed as the best places to investigate the creativity of the author. For example, new social meaning is easily located at the macro-level of representation, whereas an individual value is mostly located at the level of macrostructure, the interior world.

Therefore, this distinction of artifacts identifies the author's effort of creating themes and emotions and describing inner thoughts, as well as his or her effort of describing contexts that have absolute factual or historical values and ones that are rooted in the physical and social reality. A narration without context and character description at the micro-object level is in danger of becoming a worthless replica; in an extreme case, a narration that relies heavily on the delineation of inner thoughts but anything else discloses a person of paranoia, who is locked in the confinement of his or her doubts. Also in this extreme case, a narrative text might become theorization rather than a process of pragmatic meaning-making or a reflection of the real life, and self becomes the sole referent of the entire narration. Because the author refuses to externalize the event or any context that associates to self, recounting the experience itself cannot create a distance between self and the associated incident, and it loses a chance to find an

objective evaluation of the subject matter. In this situation, the author fails to establish a contrast between subjectivity and objectivity when ideology and identity of self at macrostructure level are contrasted to the realities at the lower level context. Also because of this, alternatives cannot be seen, and the analysis of self becomes a closed hermetic loop. Conversely, and regardless of this danger, skillful description of inner thoughts became a known genre in the twentieth century in the Modernist movement favored by authors like Ezra Pound (1895-1972), T. S. Eliot (1888-1965), William Faulkner (1897-1962), Virginia Woolf (1882-1941), and James Joyce (1882-1941), who notably employed stream-of-consciousness to emphasize the psychological aspects of characters.

In brief, the distinction of levels of artifacts can be used to evaluate the quality of a narration, such as at which level meaning rises. Or, what kind of contrast is made and at what level? The assumption is that meaning arises from different levels of artifacts, containing different degrees of social significance, as has been discussed in Chapter 5. In addition, contrasts that combine different levels of artifacts may have a higher association value and imagery level than those contrasts residing within one level of artifact.

Following the introduced framework of semantic resources, these narrative elements are further applied to the three interdependent meta-functions identified by Halliday. The result is shown in Table 14. Again, the ideational function expresses the referential meaning of the content, the objects, and the relationships; it is about experiencing “something” (Halliday, 1978). The interpersonal function allows the transformation of social and personal relations through texts and the act of telling, when

the individual "intrudes himself into the context of situation, both expressing his own attitudes and judgments and seeking to influence the attitudes and behavior of others" (p. 112). The textual function refers to how texts are connected structurally, and through which the other two functions are realized.

Table 14

A Matrix of Narrative Artifacts, Meta-functions, and Realization

Function	Ideational (ID)	Interpersonal (IT)	Textual (TX)
Macrostructure	X_{11} Description (inner thought), Abstract, Evaluation	X_{12} Description (inner thought), Abstract, Evaluation	X_{13} Description (inner thought), Abstract, Evaluation
	(Aesthetic, added value) ←	(Emotion appeal, modality) ←	Rhetorical components (Overall and local structure)
Macro-object	X_{21} ↓ Salient form, Argument	X_{22} ↓ Salient form, Argument	X_{23} ↓ Salient form, Argument
Micro-object	X_{31} ↓ Orientation, Description, Action (Event), Resolution	X_{32} ↓ Orientation, Description, Action (Event), Resolution	X_{33} ↓ Orientation, Description, Action (Event), Resolution

Though rhetorical components are supervised by macrostructures, they are not restricted to inner thoughts or other overt forms. They permeate into each level of artifact in the entire representational text. Since every rhetoric application involves an audience, these rhetorical components are more *interpersonal* than *textual or ideational* in their

functions. The ideational function of the rhetorical component can be regarded as the additional value added to the artifact, such as increased sublimity, beauty, clarity, and truthfulness. The referential meaning is dependent on other narrative elements to which the rhetorical component is directed.

Until now, this study identifies the narrative elements and, by drawing on a distinction between micro-object, macro-object, and macrostructure, displays how the intentions and beliefs of the author are communicated through certain narrative elements, such as events, characters, evaluations, and vivid descriptions, and how these intentions and beliefs of the author transform other elements through contrasts that are created. In addition, the study suggests how rhetorical tools can be used to create various effects and convey possible interactions with the audience, which can also be tested using the analytical framework.

Related to this, three distinctive natures of narrative are identified in Chapter 3: the literal, the associative, and the constructive natures. These natures of narrative are also features of narrative which form the basis for its understanding. As a result, the investigation of narrative has to test how the author achieves these prominent narrative features in his or her storytelling. Therefore, in narrative analysis, narrative elements can be categorized according to their potential to achieve these effects (see Table 15).

Table 15

Narrative Elements and Their Effects

Feature	The Literal (context)	The Associative/ Constructive (contrasts & aesthetic)
Macrostructure	Description (inner thought)	Description (inner thought), Evaluation
Macro-object	Global structure	Salient form/unit (mapping of events, suspense, complex contrast), Argument, Style, and Genre.
Micro-object	Orientation, Description, Action (Event)	Orientation, Description, Action (Event), Resolution

The literal nature of narrative is realized through the vivid description of scenes, events, and characters, though these objects are not restricted to reality. Depictions of inner thoughts and imagined places create a different context. The associative nature of narrative is especially evident when an audience is overcome by an aesthetic feeling, and this kind of aesthetic effect can be attained from almost every narrative element. The use of emotion to associate with a reader is also highly emphasized. Adler (1929, 1931, 1956) contends that, for those narratives which are memories, emotions are always significant, even when they do not seem important. An individual "chooses to remember only those which he feels, however darkly, to have a bearing on his situation" (Adler, 1931, p. 73). In Oatley's (2002) opinion, emotions occur at moments of periodic evaluation. This is

also in agreement with Halliday (1978), who says that every narrative clause is declarative in nature and transfers attitude or mood of the recounter.

The constructive nature of narrative is mainly realized through the creation of contrasts. For example, the three types of contrast identified in Chapter 3 are objectivity-subjectivity, linearity–non-linearity, and mimesis–non-mimesis. Contrasts can be achieved through the depiction of all three levels of artifact. For autobiographical narration, in particular, creating a constructive feature is essential, if not obligatory. Underlying this type of narration, the important question is what the true purposes of self-representation are. The answers to this question may vary including organizing experience, discovering meaning, accepting and motivating self, and persuading and seeking recognition.

The literal effect and the associative effect both have two different priming sources: the physical environment which situates in both action and the physical plenary of the individual, and the emotional and ideological environment that situates in memory and mind. In comparison, constructive effect is derived from the interaction and integration between different layers of existence and meanings.

8.4 Narrative Analysis Method and Creativity Assessment Framework

The process of constructing a creativity assessment method for storytelling includes the discussion of both a fundamental narrative assessment method and an advanced narrative assessment method. Moreover, the process of content analysis applied within the current empirical study equals to the process of further formalizing the method

for narrative analysis using the collected data. Narrative analysis is both linguistic and psychological research in many ways. The method of analysis is developed through a dialectic process discovered from the building of the theoretical framework of narrative analysis and the actual analysis of the narrative texts from the research respondents. The two parts that constitute the method are: the fundamental narrative assessment method, in which individual functional fields are expounded; and the advanced narrative assessment method, in which combined functional fields are illustrated and a scoring method for creativity assessment is introduced.

A Fundamental Narrative Assessment Method

Since mapping of events is the most significant component in narrative, the data analysis method begins at the macro-object level, then, micro-object and macrostructure levels follow. Mapping of events differs from descriptions of individual actions because the former indicates the creation of a structure and the generation of new meaning, rather than the mere description of facts, resembling reflexes in human experience and functioning as the priming resource at the micro-level.

Functions of Macro-Object

As mentioned above, salient forms and arguments are macro-objects in narrative which transfer thematic meanings with significant social values. Mapping events and creating contrasts are essential for storytelling. Each of these artifacts can be analyzed through the functional fields identified.

Extract 1. From Site_A-Within_1B

1 I was looking for a volunteer job in a library. **(**Opener)

2 I used the TLA website to look at library jobs and found a volunteer job listed at the University Park Public Library. (Event 1)

3 I called and made an appointment for an interview. (Event 2)

4 I was interviewed (Event 3)

5 and my background in computers was cited as a ***good*** reason to train me to do copy cataloging. (Explanation-micro)

6 I spent 10 hours a week as a volunteer. (Description)

7 *After* some months, my responsibilities were increased to include working as the chair of the website committee. (Event 4)

8 I redesigned and currently maintain the library's website. (Explanation /micro)

9 *For* my work on the website, I was named Volunteer of the Year (Resolution)

10 and my name is on a plaque ***prominently*** displayed in the library. (Resolution)

Ideational function of macro-object X_{21}

This story shows several changes of state. The macro-level meaning of the story is the structural meaning of the story as well as the theme transformed: the beginning of the event, interview, work, and final result.

Interpersonal function of macro-object X_{22}

Though event mapping generates a linear effect—a form at the macro-object level— the interpersonal function is limited because of a void of emotion and lack of rhetorical component in the text. Why the author represses his or her emotion in the accounting of the story is unclear.

Textual function of macro-object X_{23}

Events are presented in a natural sequence, and the events are linked together by the logic of time. The theme, combining with the narrative structure derived from the micro-object level description, is shown in the following figure.

Micro-object …	Micro-object ⟶	Macro-object
$\mathbf{X_{31i...}}$	$\mathbf{X_{31n}}$	$\mathbf{X_{21}}$
$\mathbf{X_{32i...}}$	$\mathbf{X_{32n}}$	$\mathbf{X_{22}}$
$\mathbf{X_{33i...}}$	$\mathbf{X_{33n}}$	$\mathbf{X_{23}}$

Figure 15. Simple mapping of events.

Functions of Macrostructure

Ideational function of macrostructure X_{11}

In extract 1, the author simply outlines his or her experience of volunteering, seeing these actions themselves as containing truth. Without any evaluation or any stance

of attitude, the account of the events is emotionless. Though the story uses first person, there is no way to see the teller's perception of the events. For an audience, reading the story seems like reading an account of chores; the events may become a little scattered, and the telling is less memorable in return. No wonder that Labov and Waletzky (1967) even describe those narratives that comprise only a sequence of actions as empty or pointless. The author, however, recognizes that putting events in a line itself implies a significant form and theme.

At the end of the story in lines 9 and 10, the resolution is given, which brings a focus to the theme, though it still cannot overcome the overall plainness generated. The results of the events are equivalently there, somewhat implied. However, an audience still cannot know the how and why or especially the author's character, attitude, and emotion.

Interpersonal function of macrostructure X_{12}

Evaluation is usually treated as the soul of a story. Without evaluation, an audience cannot see the author's emotions and perspectives in the incident; the lack of evaluation therefore may compromise the theme. If other elements of macrostructure, such as rhetorical components and inner thoughts are also missing, the narration will become insipid. Unfortunately, this is exactly what has happened to this narration.

Contact is an indicator of degree of involvement with others that directly influences the interpersonal value (see Table 12). In the following example of extract 2, the author uses other individuals' presence, 'the look of gratitude on their faces,' in the evaluation to increase the interpersonal value of the text. This is an effective way to make

the story dynamic, and by doing this, the author creates an interaction with another at a macrostructure level description.

Extract 2 Site A_Outside_9m

1. After a hurricane had swept through our community (Orientation)
2. I volunteered to help the elder[ly] clear debris from their property. (Event)
3. It was the look of gratitude on their faces that was the greatest reward I could have ever wanted. (Evaluation)

Functions of Micro-Object

Orientations, events, and vivid background and character descriptions are the main elements of micro-objects in narrative. Orientations inform the reader about the circumstances of the event, the background information, time, place, participants, and the situation, and they are usually given at the beginning of the story. Explanations and background descriptions are the extensions of orientations; they provide additional information for characters or events, which are beyond those descriptions telling who, when, and where about the settings.

One important effect of micro-objects is their ability to create vivid characters, life-like events, and memorable examples and integrate them into the plots, therefore, contributing to the construction of meaning and form at a higher level of artifact. Though here, discussion of a micro-object is limited to its own level first. In the following examples in extracts 3, 4, and 5, each author resorts to a particular micro-object element.

The author in extract 3 describes a unique *example*; the author in extract 4 tells a story through creating a lively *character*; and the author in extract 5 uses *explanation* to give a summary to an experience. Each illustrates a basic function of the micro-object.

Extract 3 Site B_Within

1. Of course, there have been other odd jobs that some have performed. (Explanation-micro)
2. For instance, when books are discarded and can no longer be used, (Example-micro)
3. the volunteers will tear off the covers so we can carry them to a paper recycling place. (Example-micro)
4. (Recycle places do not want the hard covers.) (Explanation-micro)

Extract 4 Site B_Within

1. Joan is a 74 year old volunteer in our library. (Orientation)
2. She has been volunteering with us for 15 years now and came to us (Event)
3. "because she needed a reason to get up in the morning." (Explanation-micro)
4. Her duties include calling people for whom we are holding books, shelving books, preparing library cards and other duties. (Description)
5. She is zealous and jealous of her "calling people" job and gets upset if other people do this for her. (Description)
6. She works Tuesday and Thursday evenings about 4 hours each. (Description)

7. Joan would like more responsibility to be able to check out books and deal directly with patrons, (Description/Event)
8. but cannot due to privacy policies. (Description/Resolution)

Extract 5 Site A_Outside_12p.

1. I volunteered as a Cub Scout Leader when my boys were smaller. (Abstract)
2. I enjoyed it greatly. (Evaluation)
3. It gave me a sense of giving back and the love of the children was a great asset. (Evaluation)
4. I would do it all over again. (Evaluation)
5. It also gave me a sense of great pride. (Evaluation)
6. As a cub scout leader volunteer, I led weekly meetings. (Explanation-micro/Event)
7. I planned activities for the whole group and special projects, such as the Pinewood Derby race. (Explanation-micro/Event)
8. I also provided refreshments as well as the games and entertainment for each weekly meeting. (Explanation-micro/Event)
9. i was a cub scout leader for 5 years. (Explanation-micro/Event)
10. I also helped in the local school as a volunteer at the Spring Festivals and any field trip my sons class got to go on. (Explanation-micro/Event)

Ideational function of micro-object X_{31}

In extract 4, the text is effective in building a character at the micro-object level. An audience can easily see Joan's responsibility for the volunteer work, her experience as well as her characters.

Interpersonal function of micro-object X_{32}

Also in extract 4, the vivid descriptions of the subject make the character come to life for an audience. In addition, by giving a 'real' name to the character, the author effectively increases the modality of the vividness of the description.

Most importantly, the real power of micro-level descriptions is that they give a genuine sense of storytelling, and this genuine sense comes from the effect of allowing an audience to generate images voluntarily. This can be illustrated by extract 2. In this text, the author only writes two independent clauses but already makes it an engaging story. With one dependent clause attributing to the orientation, a reader can easily form an image. The word 'swept,' which has a high image value, compels a reader to generate a vivid image for the scene of the event. This shows that the effect of the rhetoric techniques permeates into the basic level of event descriptions.

Advanced Narrative Assessment Method

In the previous section, a fundamental narrative assessment method is presented. Basic artifacts of narrative are evaluated according to the proposed semiotic analytical fields. In the following, narrative analysis is focused on the interpretation of complex units of artifacts. Important concepts associated with narrative creativity are interpreted

first, as they are the foundational understandings of building the advanced narrative assessment method.

What is quality of narration?

A story with quality is not only a fuller account of someone's experience, but also deals with a serious subject matter. The content of literary creation "is always a symptom of the rift between inside and outside, a sign of the essential difference between the self and the world, the incongruence of soul and deed" (Lukacs, 1971, p. 29). The seriousness of story is what Lukacs (1971) calls heaviness:

> "In life, however, heaviness means the absence of present meaning, a hopeless entanglement in senseless causal connections, a withered sterile existence too close to the earth and too far from heaven, a plodding on, an inability to liberate oneself from the bonds of sheer brutal materiality, everything that, for the finest immanent forces of life, represents a challenge which must be constantly overcome." (p. 57)

This heaviness must root itself in reality, in the material world as well as in the daily life. Though the subject matter is undeniably important in the creation of a successful story, the mood state of the author and the rhetoric technique that reflect it are also important to an audience. Creating saliency and emotional appeal are intrinsically tied to the effectiveness of storytelling. Rhetoric technique provides saliency for description, and emotional appeal adds value to the created meanings in narration. Emotion is a kind of personal reality that is beyond the sphere of rhetoric, though it projects into every application of it. According to Nussbaum (1988), stories, in short, "contain and teach

forms of feelings, forms of life" (p. 218). Nevertheless, subject matter may always be regarded as the paramount factor of storytelling. A narrative that is not only memorable as an image but also valid and signified as an exemplar that has a constitutive meaning is a story successfully told.

What is creativity in narration?

The creativity in storytelling may be seen as a story differently told or simply telling a different story. Both content (the subject matter) and form are thus accountable. Form here means structure, style, and distinctive characteristics that belong to macro-objects that rise from content. In narratives, content includes all levels of artifacts, and all macro-objects in narration are coupled with context, either with micro-objects or macrostructures. Creativity in narration, especially the biographical type, is reflected through the author's effort to give an external form to actual life problems, with a possible aim of self-recognition and achieving individuality. Form here means that the subject matter takes an objective structure. A structure, however, can be the total narration or a major part of it, such as suspense or a well-depicted contrast that transforms certain meanings through comparison of artifacts.

According to Lukacs (1971), a novel seeks to uncover and construct the concealed totality of life by giving form to it. The process of telling is to surrender to this totality, the interrelationships between convention and personal ideal, between history and current, and between cognition and action, to a form, from which a storytelling equals achieving a mastery over reality. The product of creativity is this type of externalized

form that reflects a totality, an embodiment that transcends both the subject and the object and the abstract interiority and the concrete reality in the outside world. Lukacs (1971) also emphasizes that, since any problem accounted in the narration is only an excerpt of that character's life, "[w]hat is given form here is not the totality of life but the artist's relationship with that totality" (p. 53), a relationship that could reflect through the mood, "as the very sense and content of the creative process" (p. 51).

The meanings of the qualities of narration also explain the importance as well as the method for the measurement of creativity in narration. It is easy to conclude that, both the content and the form of the narration define the level of creativity. Though content may have an undeniable significance over form, the importance of one over the other must be defined based on the situation, as the overall form is also derived from the totality of the narration, the two aspects may not be evaluated in separation.

Overall, assessing the creativity of a narrative text is suggested to test the functional values of all three levels of artifacts when necessary, depending on how a story is constituted. The deconstruction of artifacts according to the three levels of meaning is for the purpose of investigating how these narrative units independently contribute to narration as well as how they integrate and project over each other, creating forms and images, overcoming the gaps between the different forms of beings: the self, the collective consciousness and unconscious, and the social and physical world. Combining different levels of artifacts therefore is inevitable, and they are shown through the functional analysis of complex units of narration, such as contrast, conflict, and suspense.

According to the corpus data for this analysis, three levels of creativity are identified. These three levels of creativity can also be seen as three prototypes in storytelling: The first prototype is the mere mapping of events; the second prototype is the creation of inter-level contrast between two levels of artifacts; and the third prototype is the creation of suspense. Therefore, a story has to belong to one of the three prototypes to be regarded as a creative product, or one that transfers a significant macro-object.

First Prototype

The first prototype is mapping of events by putting actions or events into a sequence as displayed in Figure 16. This is the same process as creating a simple form illustrated in Figure 15. Creating a form belongs to the fourth of the transformational functions of macro-objects introduced in Chapter 5, in which the form gives a structure to the micro-object level of descriptions. Extract 1 is a typical example of simple event mapping. Putting events into a structure has a momentum itself, and the power is solely implied by the sense of a pure form.

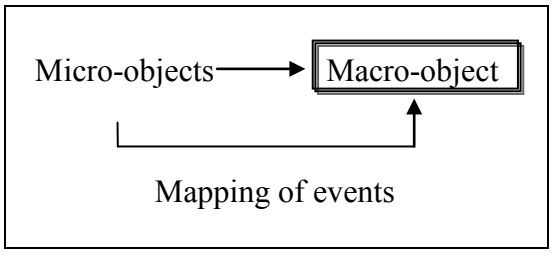


Figure 16. Mapping events.

Second Prototype

The second prototype is the creation of a contrast or contrasts achieved by combining two levels of artifacts: the macrostructure and the micro-levels of artifacts displayed in Figure 17. This is the same as the first of the transformational functions of macro-objects introduced in Chapter 5: to connect to the collective consciousness, from which ideology and practice in the real world can merge.

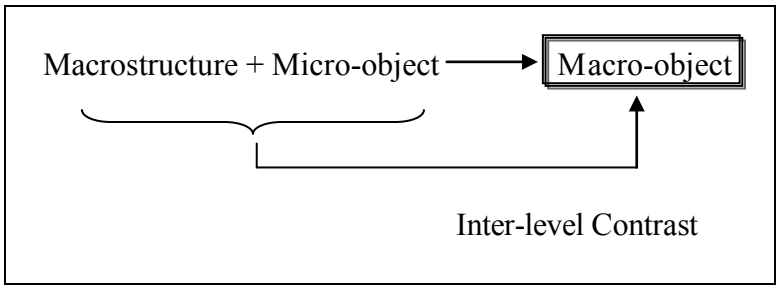


Figure 17. Creation of inter-level contrast.

The inter-level contrast is actually a conflict, indicating an unbreakable gap between human nature that is in the form of a plan and a reality that the character is bound to face. A character comes to life for an audience only in the face of conflicts. As through conflicts moral values are tested, the physical and mental fortitude of the character is shown and new resolutions of self and the conscious states when these resolutions arise are clear to the audience. Therefore, conflicts are the forefronts for changes: change of action and perspective, and change of plan and consequences. Consequences then create new changes of state, leading to new platforms of perception, actions, and conflicts, in multitude. In storytelling, because a character evolves and

changes in the face of conflicts, their descriptions have an overshadowing power on character building. Options for actions of a character are given through context, the physical context and the mental and ideological context. This inter-level contrast is thus similar to what Aristotle (in *Poetics*) regarded as a plot. For him, a plot contains the characters' reasoning of their actions that inevitably define their states of feeling, happy or otherwise.

A concise version of this inter-level contrast is action-reflection description, from which the author or character reflects after each action of different types. In order to fully explain the creation of inter-level contrasts, intra-level contrasts, are illustrated first. An example is presented in the following extract, as the contrast is only limited to one level of artifact.

Extract 6 Site_C-Within_2B

1. I have never volunteered in the library,
2. but will try to tell of one volunteer in particular who worked for a good long while in our library. (Opener)
3. I will call her Erma,
4. and she worked filing cards in the card catalog. (Orientation)
5. I was a part of the training team and helped her with the correct way the library filed the cards, omitting the a, an, and the in book titles, and other details pertaining only to library filing systems. (Orientation)
6. She worked tirelessly for the library and tried to do her best. (Event)
7. I checked her work many times and at first she made lots of mistakes. (Event)

8. I corrected her mistakes explaining why they were wrong. (Event)
9. I bragged on the things she had done well. (Event)
10. She was silent, never showing anger or discouragement, (Description)
11. but she listened and learned. (Event)
12. Soon, she made fewer mistakes in her filing (Event)
13. and I congratulated her and gave her positive feedback. (Event)
14. Not long after that, it was a breeze to check her work as she was not making any mistakes. (Event)
15. I really was proud of her success and told her how valuable she was to the library and to me. (Resolution)
16. She worked for the library as a volunteer in the summer months and was with us 3 or 4 years. (Description)
17. I really appreciated her and the fine work she did for the library. (Evaluation)

Extract 6 limits its description to one level of artifact, the micro-object level. The author creates three contrasts: One is between her actions and the actions of the other character, one is between the work conducted initially and the work done at a later time by that character, and one is between the tireless work of the character and her silent demeanor. The essay is less exciting even with these contrasts because all of them are limited to only one level of artifact.

Now, the study turns to show the creation of inter-level contrasts. In order to explain them, integrated functional fields become the basic unit of their analysis.

Extract 7 Site_A-Within_8k

1 I had volunteered at my children's school as room mother, reading tutor and chairman of the "Campbell Soup Label" Drive. (Abstract)

2 I also was an assistant leader in Girl Scouts. (Abstract)

3 These experiences have their good and bad moments. (Abstract)

4 As Room Mother, *seeing* the kids faces light up when they had parties *was rewarding*. (Event/Evaluation)

5 *Trying* to get other parents to volunteer for the yearly Bazaar *was not much fun*. (Event/Evaluation)

6 *Working* with children in an attempt to increase their reading skills *was the best*. (Event/Evaluation)

7 *Watching* their faces light up when they discovered that they could read something *was fantastic*. (Event/Evaluation)

8 *Working* with the girls in Scouting and helping them learn new skills *was exciting*. (Event/Evaluation)

Extract 8 Site_A-Outside_3D

1. *For years*, I have volunteered my musical *talent* for various organizations, (Abstract)

2. and it has *always* been a *fulfilling* experience for me. (Abstract)

3. *Currently*, I play each week for a local retirement center. (Event/Explanation-micro)

4. *Some days* I may *not feel like* going, (Inner thought/Event)

5. but *once* I'm there, (Event)

6. I realize that there is *no place* I'd rather be *at that moment*. (Inner thought/Event)

7. Helping others is a *blessing*. (Evaluation)

Integrated ideational function of macrostructure and micro-object ($X_{11} + X_{31}$)

In extract 7, if a reader looks at the clauses in the stanza (from line 4 to 8) individually, each clause exhibits a mere evaluative critique. However, with the compact structure and the inter-level contrasts formed between the clauses, the functions of the clauses also become descriptive and eventful. Similarly, in extract 8, if there were no inter-level contrast created by the comparison between the micro-object and the macrostructure (from line 4 to 6), the contrast would be less distinctive and memorable to an audience.

Integrated interpersonal function of macrostructure and micro-object ($X_{12} + X_{32}$)

Again, in extract 7, the stanza builds vivid contrasts between the events at the micro-object level and the different feelings at the macrostructure level, which creates a high emotional appeal and image-like effect for the audience. This also illustrates how rhetorical components as well as the structure of the sentences convey an emotive effect for the audience. It shows that these rhetorical techniques and the representation syntaxes are able to integrate with the identified functional units in the creation of meaning.

Also because of these contrasts, the narration in extract 7 becomes more than an accounting of the experience of the author but an invitation to the audience to come along

with the author to see what the events were, how the situations were, as well as how the events turned out to be. In each clause of the stanza, the author also successfully shows how she or he actively interacted with others. This effectively encapsulates the interpersonal meaning of the narration.

In extract 8, the author creates a conflict between the reality and the inner thought, and how the action of physically being there changes the author's decision to leave. The inter-level contrast is close to human nature, which recalls truth, and revives emotions from the audience.

Integrated textual function of macrostructure and micro-object ($X_{13} + X_{33}$)

In extract 7, the author uses one stanza to organize five parallel independent clauses that all use exactly the same structure. The stanza occupies the major part of the narration, which makes the entire text coherent and compact.

Third Prototype

The third prototype is the creation of a contrast that achieves integration among the artifacts across all three levels, the micro, the macro, and the macrostructure levels and is indicated by the generation of the effect of suspense. The creation of suspense implies that the text does not only attain a complex integration of the three levels of artifacts in the form of conflict, but also transforms meanings in the process of plotting (see Figure 18). Therefore, suspense is an artful combination of facts (or contexts), contrasts, inner conflicts, and plots. This also belongs to the first and the fourth of the

transformational functions of macro-objects combined: to connect to the collective consciousness and to give structure to micro-level representations.

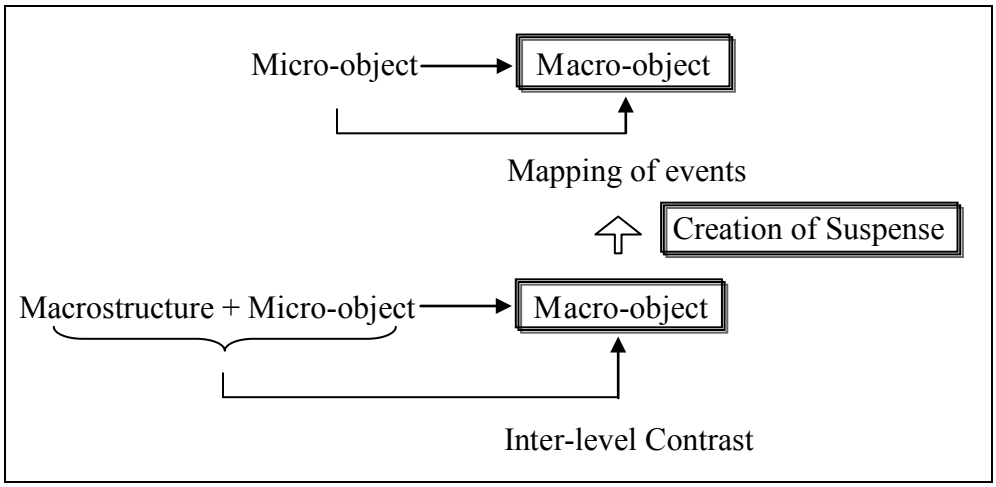


Figure 18. Creation of suspense.

Suspense is a feeling of uncertainty and anticipation that a reader has about how events will unfold upon a character. Brewer (1996) and Lichtenstein (Brewer & Lichtenstein, 1982) propose a structural–affect theory of suspense, in which they suggest that suspense could be created for a reader by employing the linear structure of narrative and at the same time the author has to intentionally hide some critical information at the beginning. From this understanding, to ensure suspense, a contrast or conflict has to be created as an antecedent. For example, a conflict or contrast is created that might be because certain information is intentionally blocked from one character to another; therefore, tension between the characters may build up, which leads to potentially staged actions. Thus, suspense encourages anticipations and evokes emotions, especially

sympathy, from an audience. A suspense combined with a vivid depiction of character is more successful due to an associative effect, evoking a strong sense of empathy in an audience. A vivid account of scene of the events that creates visual images for the audience also intensifies his or her emotions. In other words, suspense ensures the reader a constructive effect and implies the vivid imaginations of characters and scenes, whereas through giving a sense of sublime to the reader, suspense also ensures an associative effect. These two effects reinforce each other as suspense is felt.

Conflict and suspense reflect as well as generate senses of tension between different levels of artifacts. They are dynamic tools of narration that encourage introspection, reflection, and meditation, which open up different readings and explanations with infinite possibilities; as a result, they afford visual experience and more meanings to the audience than their constructed form. Furthermore, a narrator uses suspense to give saliency to the subject matter and creates dominant themes that show how meanings are constructed from different social contexts. Because of its complexity, suspense requires a combination of three levels of artifacts in its analysis.

Extract 9 Site_A-Within_2J

1 I have very limited experience recruiting volunteers. (Abstract)

2 In fact, my very first experience turned out disastrous! (Abstract)

3 I'll tell you about that one. (Opener)

4 We had decided to start a new Friends of the Library group, as our old one disbanded many years ago. (Orientation)

5 That was *truly* the extent of my assignment: Start a Friends group! (Rhetoric/Inner thought)

6 I *really* didn't know where to begin, (Evaluation/Inner thought)

7 but my thinking was I needed someone to be in charge of this group and help me recruit a governing board so that we could then begin the group in earnest. (Inner thought)

8 Then one day, *out of the blue*, (Orientation)

9 a patron called me to complain about something. (Event 1-1)

10 She was *very* vocal, yet *very much* a library supporter. (Orientation)

11 Once I calmed her down, (Event 1-2)

12 I thought *perhaps* she *might* be helpful. (Inner thought)

13 So I met her for lunch. (Event 2-1)

14 I *suppose* this was my "interview," though I had no idea how to go about it. (Evaluation)

15 At the lunch, (Micro)

16 she told me of her *extensive* experience fundraising for a local public radio station. (Event 2-2)

17 Since she had retired, she was interested in helping get the Friends off the ground and raising money for the library. (Description)

18 She was bright, funny, and articulate. (Description)

19 Then I invited her to lunch with my director. (Event 3)

20 This was, *I guess*, our second interview. (Rhetoric/Explanation)

21 The recruit was enthusiastic, filled with ideas. (Description)

22 My director liked her *as much as* I did. (Explanation)

23 So, *I guess* I "hired" her, (Rhetoric/Event 4)

24 but I didn't do it any formal way. (Evaluation)

25 We held a meeting, at which we invited other people who were interested in getting the groundwork going on a Friends group, (Micro/Event 5)

26 and the other people were impressed by her, too. (Explanation)

27 It became clear they wanted her to be the first president. (Explanation)

28 Then she called me on the telephone. (Event 6-1)

29 During our conversation, (Micro)

30 she berated me for *everything* she felt I was doing wrong. (Event 6-2)

31 She criticized *all* the other people who had come to the meeting, saying they had *nothing* to offer the Friends group. (Event 6-3)

32 It was a *horrible* conversation. (Evaluation)

33 She asked me if I wanted her to be in charge of the Friends group and my reply simply *had to be*: "No." (Event 6-4)

34 She started to cry and hung up. (Event 6-5)

35 I have *never* heard from her again. (Resolution)

36 When I think back on this experience (Evaluation)

37 (and, by the way, a year later I still don't have a governing board for my group or a president), (Evaluation)

38 I know I *mishandled* it because I *had no idea* what I was doing. (Evaluation)

39 That's why I signed up for this course! (Rhetoric /Evaluation)

40 In the year since the experience, and in the hour or so I've been reading these materials, I see that I need a clear plan. (Coda/Evaluation)

41 I cannot go into this ***willy-nilly***. (Evaluation)

42 That ***just*** doesn't benefit anyone. (Evaluation)

Integrated ideational function of all three levels of artifact ($X_{11} + X_{21} + X_{31}$)

The plots are clearly presented in this narration. The story describes a train of state changes about how the author came to know a patron (a potential volunteer employee), met her, liked her, and then departed from her.

The story is rich in evaluative components, and the author also did not hesitate to express her inner thoughts. The evaluations are densely used at the beginning of the story in line 2 in abstract and in line 6 in inner thoughts and at the end of the story in lines 36-42. These evaluative clauses clearly express the personal stance of the author on her past experience, the recent study of the course, and the purpose of the telling. The inner thoughts are in lines 5 –7 and 12, explaining the reason why the incident could have happened. These evaluative parts heighten the believability of the events.

Orientations and descriptions focus on the nature of the events and the character of the patron. The author describes the patron as a supporter of the library, who is bright, funny, articulate, and enthusiastic. The descriptions are vivid, which greatly enhances the plots.

Integrated interpersonal function of all three levels of artifact ($X_{12} + X_{22} + X_{32}$)

One prominent feature of this story is that the author generously uses the elements of evaluation and skillfully embeds them into the event descriptions. They make the telling itself persuasive and purposeful.

In the opener of the story, the author clearly indicates that she is the first person of the narration. Throughout the evaluations in lines 2, 6, and 37-38, and in lines of 14, 24, and 32, the self-critiques are evidently presented. The author depicts herself as a naïve employer who wrongly handled every step in hiring a patron as a volunteer. These self-critiques go through the whole narration and are very effective in asking the sympathy from a prospective audience.

The author particularly chooses to use those words with low modality or connotation in descriptions related to herself. Such as "out of the blue" in line 8 in orientation, "perhaps" and "might" in line 12 when inner thoughts are described, "I guess" in lines 20 and 23, and "had to be" in line 31 when event level elements are described. The only word related to the author with high modality is in line 35 (the word ‘never’) when resolution is presented, which does not belong to the account of the events, and this resolution results from the action of the other major character who never show up again. Creating a clear contrast, the author closes the story perfectly. The contrast, as well as the low modality words used in the descriptions of the narrator, shows a person with an approachable manner.

In orientation, the author uses those words (“very” and “very much” in line 10) with high modality describing the character she came to know. This again creates a clear

contrast to those words in low modality in orientations and in describing the inner thoughts and events related to the author.

In addition, the author employs as many positively connotative words as she can in the early descriptions of the volunteer she hired, such as "she was interested (in line 17)," "she was bright, funny, and articulate (in line 18)," "the recruit was enthusiastic, filled with ideas (in line 21)," and "liked her as much (in line 22)" compared to the overall negative remarks made on herself in the evaluative units. This obviously creates another contrast across the different levels of artifacts. These contrasts altogether imply hidden meanings that ensure the impending events that follow, something greater than the current state of events as well as understanding. Therefore, these contrasts create suspense for the audience. They also create a believable situation that tells why the events happened as they did.

In a word, the author uses different rhetorical components, emotion appeal, and words with different modality, and embeds them into the creation of all three levels of artifacts: the micro-objects in orientations, descriptions, and event depictions; the macro-objects in contrasts and plots; and the macrostructures in evaluations and inner thoughts. They intensify the contrasts that make the narrative dramatic, and the story turns out to be full of suspense.

Integrated textual function of all three levels of artifact ($X_{13} + X_{23} + X_{33}$)

Conjunctive cohesion is achieved through using words such as "then," "so," "once," "at the lunch," and "during our conversation" between events. Also, description,

explanation, and rhetoric technique are integrated nicely, which make the account of events coherent.

In summary, these three prototypes of narration indicate different methods and degrees of intensity to generate new forms and themes in narration. They, therefore, imply different levels of creativity in storytelling. Another type of creativity, to give distinctive functional characteristics to the whole representational text, which also belongs to the fourth of the transformational functions of macro-objects, nevertheless, needs to be investigated with other data sets.

The common functions of storytelling should be considered from three aspects: 1) its information and aesthetic value, by seeing how the content is seen as an integral form itself, 2) its evaluative value, by seeing how the accounting of personal experience is transformed into moral categories and larger social themes, and 3) its emotive value, by seeing how the conveying of certain attitudes of life are rendered in the work. Among them, one thing worth mentioning is that information and aesthetic values have been considered contending to each other for those texts considered as artistic. Many believe that the significance of an artistic work does not lie in communication of information; therefore an artistic work is not an instrument as other communicative signs. Nonetheless, a work with an artistic value does not denounce itself with an information value. Therefore, to consider a work with both informative and aesthetic value is proper though they should be evaluated by different rules or with different explanations. The identified narrative functional units and prototypes proposed by this study greatly emphasize these considerations.

The qualities of taste, artistic composition, and distinction of words, though are also concerns of creativity (Caplan, 1954), are not introduced as individual criteria in the current study. Taste refers to the correctness and clarity of the words that are used, artistic composition refers to the arrangement of words, and distinction refers to the effect of making the speech ornate and varied. Though these aspects also define the appeal of the narrations used by the current data analysis, they are not individually assessed here; they are nevertheless being taken into consideration when the interpersonal function is evaluated.

A story remembered is a story survived and becomes the existent meaning. An effective storytelling is one that makes a great impression for different reasons. Contrast, conflict, and suspense are indispensable to an effective storytelling, and they produce rich imaginations for the audience from each of their own projected world. They therefore make it easier for the audience to generate complex structural conceptual images rather than focusing only on those narrative elements that belong to mere micro-objects or ideology.

What is creation of identity?

Identity does not only relate to personal truth and existence but also to how individuals see themselves. Both are contingent on social interaction that is always changing and is embedded in activities at a fundamental level. Description of inner thoughts, evaluation of personal experience, and use of rhetoric technique, especially those that have an emotional appeal are direct reflections of identity, personal beliefs, and

images. For the storyteller, the very effort of selecting certain events and concepts over others as the subject matter of narration is inevitably a major display of personal ideal. Depiction of conflict, which is identified as the multifaceted approach for the pursuit of meaning is necessary because it is through conflict a person finds that his or her interior life is being threatened, and only from showing and solving conflict does the creative subjectivity in which the interior self and the exterior world achieve consent comes into shape. In Luckacs' (1971) words,

> "[t]he novel tells of the adventure of interiority; the content of the novel is the story of the soul that goes to find itself, that seeks adventures in order to be proved and tested by them, and by proving itself, to find its own essence" (p. 89).

Another thing worthy of mention is that more conflicts are believed and so recognized in the life of a more idealistic soul (Lukacs, 1971). So the amount of conflict that a person sees in social experience is a priori, presupposed by experience or nature. This can be seen as a potential variable in the investigation of individual creativity of storytelling. Whether the questionnaire items assess this aspect when the respondent's character is assessed may be explained in the data analysis.

Why use quantity of the words as one of the indicators of creativity?

The flow of ideas, the emergence of large numbers of concepts and information, may be seen as the ultimate example of intrinsic motivation. The flow of ideas also seems to have ties to creativity. Several standardized creativity tests, such as the Torrance Tests of Creative Thinking (TTCT) and the Wallach and Kogan Tests, include fluency (or

divergent thinking), the number of ideas listed as an important component (Guilford, 1976; Runco, 1999; Torrance, 1990; Starko, 2001).

As discussed before, the interpersonal function, the construction of idea, and the build-up of emotion all can be intensified by an extended text. In addition, discovery of new meaning is hardly achieved by one thought, and emotions, especially those empathy types rarely arise to a certain height without a process. Thus the quantity of words reflects whether the account of the story is adequately given in support of this constructive process. In other words, if we regard content and form as contingent on each other, the quantity of words is directly responsible for the creation of structure and meaning.

The necessity of a detailed account in storytelling has also been emphasized through the concern over the distinction between autobiographical beliefs and autobiographical memories. According to Conway and Pleydell-Pearce (2000), an autobiographical belief involves a judgment about a specific event that may be partly based on more general autobiographical knowledge. This implies that beliefs are something already given, and they are knowledge, but memories are dynamic, constructive, and transitory. The point is that a person may report an autobiographical event on the basis of inference, such as giving a summary rather than on the basis of a recollective experience through experiencing or reliving the incident again. The nature of these two types of account differs in their truth-value and in the significance of the recounting itself. The former is a process that emphasizes making judgment and taking a stance, but the latter is a much dynamic process that focuses on rebuilding and discovering the self. There is a substantial body of research indicating that the ease and

fluency with which mental contents are generated are an important basis for the subjective experience of memory (Kelley & Jacoby, 1996).

A Scoring Method of Creativity Assessment

In this section, a detailed scoring method of creativity assessment for storytelling based on the collected narrative texts is presented. It comprises the integrated functional values of all three levels of artifacts. The total creativity score can be calculated by combining these following aspects across all levels of artifact:

1. *Construction of macro-objects* through mapping of events and creating of complex contrasts and themes
2. *Portrayal of characters or scenes* that are image creating
3. *Emotional appeal*
4. *Contact* that tells the degree of interaction with others in narration
5. *Evaluation*
6. *Account of event*
7. *Modality* of each element of narration that tells the degree of interaction with audience
8. *Practical Function of telling*
9. *Friendliness of telling* that shows the elegance of thinking

These nine aspects are ordered according to their saliency in appreciating the narrative texts for the collected data. In addition to the first two aspects, emotion tells how consciousness and unconscious affect real actions. Emotion, in general, is not only a requisite for creativity but also the frame and prior state of it. Emotion in storytelling does not only tell the intention of the author but also shows the lure of telling itself—the

moralities. In fact, an ideal state that creativity tries to achieve always has an emotion. Therefore, the emotion appeal of narration is one of the most important aspects for creativity evaluation. Contact and modality are rhetoric techniques that closely connect to emotions. In addition, friendliness of telling uses elements of abstract, opener, and coda to lead and interact with an audience, implying the elegance of thinking, which also reinforces an existing linear effect and helps in creating saliency.

Based upon the functional orientation of narrative analysis in the current data analysis, a detailed scoring method is illustrated in Table 16 that is finally applied in the score measure. The method employs seven of the nine aspects discussed above to evaluate the creativity level of a narrative text. These components are ordered according to a likely natural process of story evaluation, from awareness of the basic narrative elements, such as event, character, emotion, and other descriptions to the appreciation of the complex structures, such as contrasts and suspense, and then the distinctiveness of the function(s) of telling. If a narration successfully creates suspense, these aspects, *event mapping* (belongs to contrast), *interaction* (belongs to contact), *emotion*, *description,* and overall *contrast* must all be satisfied to a larger extent. Aspects 7 and 9 were not applied in the evaluation of creativity for the final score measure.

Table 16

Scoring Method of Creativity Assessment for Storytelling

	Less effective -2	Effective 0	More effective +2
Event Mapping (3)	Has no linear effect (1)	Has a linear effect (3)	Has a heightened linear effect (5)
Interaction (3)	Only has presence of other character (1)	Has interaction with other (3)	Has high interaction with other (5)
Emotion (3)	Has a low emotional appeal (1)	Has a medium emotional appeal (3)	Has a high emotional appeal (5)
Description (3)	Description is less effective (1)	Description is effective (3)	Description is image creating (5)
Contrast (5)	Has no inter-level contrast (3)	Has inter-level contrast (5)	Has suspense (7)
Evaluation (3)	Evaluation is less effective (1)	Evaluation is effective (3)	Evaluation is meaning creating (5)
Function (3)	Has no distinctive function (1)	Has a distinctive function (3)	Has a high distinctive function (5)
Total Score (Ranges from 9-37)			
Total Words			

Rules of Scoring

The neutral value is set at 3 for all elements except for contrast, which uses 5. Neutral means that the story is effective in presenting the specific element. 2 points will be deducted when it is "less effective"; 2 points will be added when it is "more effective".

Event Mapping (macro-object) (3): If there is a linear effect, scores 3; if the linear effect is an impaired one and/or no linear effect is created, scores "3-2"; and if there is a linear effect and the effect is strengthened by suspense and character description, scores "3+2".

Interaction (interpersonal function of all levels of artifact) (3): implies the degree of presence and the interaction with others.

Emotion (interpersonal function of all levels of artifact) (3): If emotion of the author is clearly presented, scores 3; if it is not, scores "3-2"; and if the emotional appeal is heightened by vivid description of character and creation of suspense, scores "3+2".

Description (micro-object) (3): If the description of character, scene, and event is effective, scores 3; if the description is less effective, scores "3-2"; and if the description is image creating, scores "3+2".

Contrast (macro-object) (5): If the contrast is inter-level one then scores 5; if it is intra-level contrast, scores "5-2"; and if it is suspense, scores "5+2".

Evaluation (macrostructure) (3): If the text contains one or more evaluative components that are effective, scores 3; if there is no evaluative component, scores "3-2"; and if the evaluative components are intensified, scores "3+2".

Practical Function (macro-object) (3): If there is a clear overall practical function of telling, scores 3; if there is no clear practical function of telling, scores "3-2"; and if there are intensified practical functions, scores "3+2".

8.5 Summary

Based upon the framework for the analysis of semiotic resources introduced, this chapter first identifies the elements for narrative analysis by extending the model suggested by Labov and Waletzky (1967) in order to establish the basic functional fields for narrative analysis. Then, using answers to the first two essays collected from the respondents, a fundamental narrative assessment method and an advanced narrative assessment method are introduced in the process of creating a creativity assessment method of storytelling for the current content analysis. A detailed scoring method is also provided for the content analysis for this study.

CHAPTER 9

EXPERIMENTAL DATA ANALYSIS AND DISCUSSION

9.1 Overview

This study employed two experimental designs to answer three research questions. This chapter presents a summary of the demographic data and data analyses results for the two empirical investigations.

Content analysis results from the previous chapter were presented and applied into correlation data analysis to seek answers to the first research question on the effects of narrative (2c. What are the effects of narrative as a representational method in an online course in terms of supporting creativity?). Structural equation modeling techniques (SME) using LISREL were used to seek answers to the other two research questions on learning experience (1b. What are the factors that comprise the learning experience in an online learning environment? 1c. How do these factors affect each other?).

The SEM approach consists of four phases. In the first two phases, the factorial structure of each latent constructs were identified and verified for validity. Maximum likelihood methods (ML) were used when the measurement models and structural models were gradually tested for fit. In the third phase, the path coefficients of the model with acceptable model fit were examined and used to interpret the final model and an optional model, respectively, illustrating the relations between the proposed constructs related to the online learning experience. In the fourth phase, separate models for each of the two

groups were generated to verify if group difference due to representational design does exist.

9.2 Respondent Profile

Out of about 200 library professionals and library staff who were enrolled in the online course, 110 took the course, and 82 of them answered the majority of the seven instruments—three essay questions, pretest, posttest, and two questionnaires, which indicates a completion rate of 41%. Thus, the proposed response rate was achieved.

Females made up the majority of the sample (95%). This ratio likely represents the gender make-up of the population in the state level libraries. Approximately three quarters of the respondents were between 30 to 60 years old. Among the participants, about 29% of them were library directors, 39% were professional staff, and 24% were paraprofessional staff. Among them, 68% of the respondents have worked for more than two years in the library settings, and 7% of them have never worked in a library. Half of the respondents have a bachelors or some level of college education; 37% of them have a Masters or Doctoral degree. Table 17 reports the distribution of the respondents enrolled in the three sections of the course by gender, age, educational background, position, and years in the profession.

Table 17

The Descriptive Data of Respondents

Demographics		Section One	Section Two	Section Three	Total Count	Total %
Gender	F	23	33	22	78	95.1
	M	1	2	1	4	4.9
Age						
	- <= 30	4	2	5	11	13.4
	- 30-39	3	6	5	14	17.1
	- 40-49	4	13	5	22	26.6
	- 50-59	12	8	4	24	29.3
	- >= 60	1	6	4	11	13.4
Education						
	High School	3	1	5	9	11.0
	Vocational 2yr.	0	1	0	1	1.2
	Some college	5	4	7	16	19.5
	Bachelors	9	13	3	25	30.5
	Masters	7	16	6	29	35.4
	Ph.D.	0	0	1	1	1.2
	Other	0	0	1	1	1.2
Position						
	Director	7	13	4	24	29.3
	Professional	8	14	10	32	39.0
	Paraprofessional	6	6	8	20	24.4
	Volunteer	1	1	0	2	2.4
	Other	2	1	1	4	4.9
Year_work						
	Never	3	3	0	6	7.3
	Less than 1yr	1	3	2	6	7.3
	1 to 2 yr	3	4	7	14	17.1
	3 to 5 yr	6	6	3	15	18.3
	6 to 10 yr	5	6	4	15	18.3
	More than 10	6	13	7	26	31.7

Note. $N = 82$. Section 1 and 2 were in narration, which later was referred as group 1; section 3 was in plain text, which later was referred as group 2.

9.3 Data Analysis for Creativity

The content analysis was conducted on the first two essays from the respondents. First, word count measure was used to assess the total quantity of words in each of the first two essays for each respondent. There are three sections of the course. Section 1 and 2 were in narrative text, and section 3 was in expository text. Participants in section 1 and 3 were encouraged to generate mental imagery before answering the first two essays. Missing data were found across the sections. Among the respondents, two in section 1, three in section 2, and one in section 3 responded to one of the two essays only. In order to retain these cases, mean value substitution was used to fill in the missing data (Tabachnick & Fidell, 2001). This method of treating missing data was chosen because the current study needs to maintain an adequate sample size for the multivariate data analyses.

Results through comparison of means indicate that those respondents who took the narrative sections of the online course gained a higher quantity of words in the two essays combined (M = 271.958, SD = 124.758 for section 1; M = 274.829, SD = 153.839 for section 2) compared to the respondents who took the course in plain text (M = 169.087, SD = 119.924). However, the mean difference of the total quantity of words of the two essays between the respondents who were in both narrative sections of the course was small (mean difference = 271.958 - 274.829 = -2.871).

Table 18

Comparisons of Means of Word Count Measure among Sections on the Two Essays

Section		Within-Total	Outside-Total	Word-Count
1.00	Mean	152.4167	119.5417	271.9583
	N	24	24	24
	Std. Deviation	103.40546	66.81316	124.75767
2.00	Mean	139.7143	135.1143	274.8286
	N	35	35	35
	Std. Deviation	85.16613	98.72147	153.83882
3.00	Mean	91.0870	78.0000	169.0870
	N	23	23	23
	Std. Deviation	67.35720	65.45922	119.92381
Total	Mean	129.7927	114.5366	244.3293
	N	82	82	82
	Std. Deviation	89.06534	84.21214	143.16218

Note. Section 1 and 2 were in narration; section 3 was in plain text.

Then, creativity scores were assessed for each essay using the scoring method introduced in Table 16 in Chapter 8. Results through comparison of means indicate that those respondents who took the narrative version of the online course gained higher creativity scores in both of the two essays (M = 36.750, SD = 7.731 for section 1; M = 37.371, SD = 9.239 for section 2) than those who took the course in plain text (M = 25.304, SD = 7.498). However, the mean difference of the total creativity scores of the two essays between the first two sections when the individuals were in both narrative sections of the course was small (mean difference = 36.750 - 37.371 = -0.621). Results are displayed in the following table.

Table 19

Comparisons of Means of Creativity Scores among Sections on the Two Essays

Section		I_creativity	O_creativity	Creativity Score
1.00	Mean	18.3333	18.4167	36.7500
	N	24	24	24
	Std. Deviation	5.58466	4.73577	7.73052
2.00	Mean	18.3143	19.0571	37.3714
	N	35	35	35
	Std. Deviation	4.19924	6.18320	9.23894
3.00	Mean	12.9130	12.3913	25.3043
	N	23	23	23
	Std. Deviation	4.24171	4.01971	7.49809
Total	Mean	16.8049	17.0000	33.8049
	N	82	82	82
	Std. Deviation	5.20787	5.93795	9.83122

Note. Section 1 and 2 were in narration; section 3 was in plain text ($N = 82$).

The reliability of the scale was also determined. The Cronbach's alpha values of the constructs in evaluating the two essays both exceed 0.80, consisting of 0.837 for the constructs evaluating the first essay, and 0.873 for the constructs evaluating the second essay, as shown in the following table.

Table 20

Internal Consistency Reliability of the Creativity Scoring Constructs

Constructs	Items	Alpha
Essay Creativity Score (Within)	7	.837
Essay Creativity Score (Outside)	7	.873

The criteria were that a Cronbach's alpha value of 0.60 is regarded as acceptable for exploratory research, and 0.70 is regarded as acceptable for confirmatory research (Nunnally, 1978; Hair et al., 1998). The inter-item correlations for these two sets of constructs are provided in Tables 44 and 45 in Appendix B.

9.4 Data Analysis for Learning Experience

Data Exploration

Prior to the multivariate data analyses involving latent constructs, explorative data analysis was conducted to detect patterns of relationships among the variables and the first-order constructs, which also functioned as a variable deduction procedure. This includes steps of detecting the degree of significance (at 0.5 level) of the correlations between the observed variables and the dependent variables, verifying the validity of the proposed constructs and measurement items represented by the data. The results of the data reduction generated a fully identified model shown in Figure 19 based on the conceptual model proposed in Figure 14 (in Chapter 7).

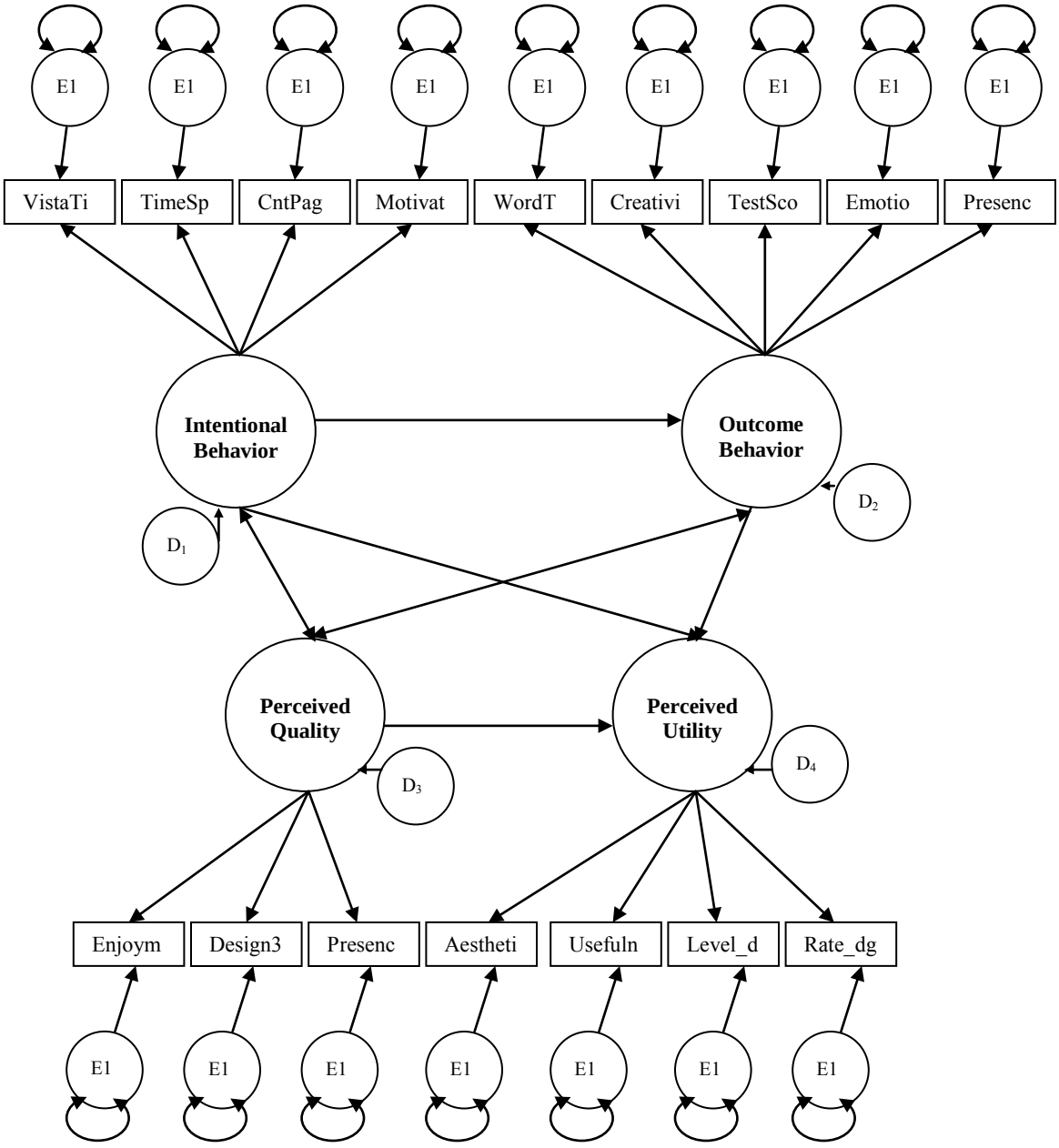


Figure 19. The full conceptual model.

The model identified intentional behavior (IB) as consisting of four dimensions: Vista time, self-reported time, content page read, and motivation. The model also identified outcome behavior (OB) as consisting of four dimensions: word count, creativity total, emotional release, and presence felt. Among them, presence is a special and complex construct that may be evaluated by both internal representation and external representation of the respondent at the same time. As a consequence, it was expected to be cross-loaded on two latent constructs, outcome behavior (OB) and perceived design quality (PQ). Besides presence, perceived design quality (PQ) also consisted of two other indicators, enjoyment and design quality. Furthermore, the construct of perceived utility of design (PU) consisted of four indicators: aesthetic perceived, usefulness of design, level of design, and rate of design. The model hypothesized the following effects:

1. An individual's intentional behavior (IB) directly affects outcome behavior (OB).
2. An individual's intentional behavior (IB) also directly affects perceived design quality (PQ).
3. An individual's intentional behavior (IB) also directly affects perceived utility (PU).
4. An individual's outcome behavior (OB) directly influences perceived design quality (PQ).
5. An individual's outcome behavior (OB) also directly influences perceived utility (PU).

6. Perceived design quality (PQ) directly affects perceived design utility (PU).
7. Perceived design quality (PQ) also in return affects intentional behavior (IB).
8. Perceived design quality (PQ) also in return affects outcome behavior (OB).
9. Interface design, constraint, and individual difference might predicate or have a meditating effect on learning experience represented by the four major latent constructs.

Then, correlation of variables was used to detect the relationships between the variables. Univariate data analysis method was applied to detect group difference for all variables. In other words, *t*-Tests were conducted to determine the difference in the means of all measures across the two groups of the respondents.

The results show that there are significant differences between the two groups on most measures that belong to outcome behavior (OB), which were word count, creativity total, and emotional release, on two measures that belong to perceived quality of design (PQ), presence felt and design quality, and on one measure that belongs to perceived utility of design (PU), which was rate of design. Table 21 displays the group statistics on major factors of the latent constructs, and Table 22 reports the results for the independent samples *t*-Tests for equality of means between the two groups that were significant.

Table 21

Group Statistics on All Factors of the Latent Constructs

	Section	N	Mean	Std. Deviation	Std. Error Mean
VistaTime	1.00	59	3.5536	1.78457	.23233
	2.00	23	3.3261	1.34375	.28019
ContentPage	1.00	59	58.0678	21.94732	2.85730
	2.00	23	55.8696	27.94525	5.82699
TimeSpent	1.00	59	3.4220	1.77823	.23151
	2.00	23	3.4261	1.76022	.36703
Motivation	1.00	59	3.8983	.84476	.10998
	2.00	23	4.2174	.85048	.17734
Word_Total	1.00	59	37.1186	8.59247	1.11864
	2.00	23	25.3043	7.49809	1.56346
CreativityTotal	1.00	59	273.6610	141.58933	18.43336
	2.00	23	169.0870	119.92381	25.00584
Emotion_TN	1.00	59	2.5424	1.05572	.13744
	2.00	23	1.9130	.90015	.18770
Pre_test	1.00	59	76.1017	7.88209	1.02616
	2.00	23	76.5217	10.27295	2.14206
Post_test	1.00	59	73.3898	12.12154	1.57809
	2.00	23	70.0000	13.48400	2.81161
Presence	1.00	59	16.7288	2.88773	.37595
	2.00	23	15.2174	3.50268	.73036
Design	1.00	59	17.9322	2.00744	.26135
	2.00	23	16.7826	3.27465	.68281
E_aesthetic	1.00	59	5.1864	1.18139	.15380
	2.00	23	5.0000	1.27920	.26673
Usefulness	1.00	59	6.0169	.91899	.11964
	2.00	23	5.7391	1.54383	.32191
Level_design	1.00	59	2.9661	.76488	.09958
	2.00	23	2.7826	.79524	.16582
Rate_design	1.00	59	3.2712	.78412	.10208
	2.00	23	2.7826	1.16605	.24314

Table 22

Independent Samples t-*Tests of Group Difference on Major Factors of the Latent Constructs*

		Levene's Test for Equality of Variances				
		F	Sig.	t	df	Sig. (2-tailed)
Word_Total	Equal variances assumed	.777	.381	5.786	80	.000
	Equal variances not assumed			6.145	45.743	.000
CreativityTotal	Equal variances assumed	.398	.530	3.129	80	.002
	Equal variances not assumed			3.366	47.128	.002
Emotion_TN	Equal variances assumed	2.239	.139	2.521	80	.014
	Equal variances not assumed			2.705	46.814	.009
Presence	Equal variances assumed	1.832	.180	2.003	80	.049
	Equal variances not assumed			1.840	34.290	.074
Design	Equal variances assumed	8.981	.004	1.930	80	.057
	Equal variances not assumed			1.572	28.685	.127
Rate_design	Equal variances assumed	7.471	.008	2.195	80	.031
	Equal variances not assumed			1.853	30.085	.074

The results also reveal that there are no significant differences between the two groups on Vista time, time spent, content page read, and motivation that belong to intentional behavior (IB), neither on creativity trait, constraint, communication style, and

preference of design that belong to individual difference. However, significant differences between groups were discovered on immersive tendency and reason to take the course. The results for group statistics on individual difference are provided in Table 23, and the results for the independent samples *t*-Tests for equality of means are given in Table 24. The results indicate that the individuals in the first group (M = 5.398, SD = .792) have a small but statistically significant lower immersive tendency rate compared to those in group 2 (M = 5.957, SD = .838), with the equal variances assumed. In other words, group 2 individuals were slightly more likely to engage themselves in learning the course, as an indicator of individual difference.

Table 23

Group Statistics on Individual Difference

	Section	N	Mean	Std. Deviation	Std. Error Mean
Constraints_T	1.00	59	1.3051	.83572	.10880
	2.00	23	1.4348	1.16096	.24208
Immerse_av	1.00	59	5.3983	.79209	.10312
	2.00	23	5.9565	.83819	.17478
Communicator	1.00	59	2.3458	.92537	.12047
	2.00	23	2.3174	.76197	.15888
Pref_Visual	1.00	59	5.8814	.94841	.12347
	2.00	23	5.9130	.84816	.17685
Pref_Narr	1.00	59	5.4068	1.00204	.13045
	2.00	23	5.5652	1.16096	.24208
Reason_t	1.00	59	.8475	.36263	.04721
	2.00	23	.7391	.44898	.09362

Table 24

Independent Samples t*-Tests on Indicators of Individual Difference*

		Levene's Test for Equality of Variances				
		F	Sig.	t	df	Sig. (2-tailed)
Constraints_T	Equal variances assumed	4.631	.034	-.563	80	.575
	Equal variances not assumed			-.489	31.301	.628
Immerse_av	Equal variances assumed	.042	.838	-2.821	80	.006
	Equal variances not assumed			-2.751	38.227	.009
Communicator	Equal variances assumed	.195	.660	.131	80	.896
	Equal variances not assumed			.142	48.491	.887
Pref_Visual	Equal variances assumed	.270	.605	-.140	80	.889
	Equal variances not assumed			-.147	44.650	.884
Pref_Narra	Equal variances assumed	.563	.455	-.615	80	.540
	Equal variances not assumed			-.576	35.498	.568
Reason_t	Equal variances assumed	4.552	.036	1.135	80	.260
	Equal variances not assumed			1.033	33.784	.309

In order to validate the proposed latent constructs, Cronbach's alpha was used to verify the internal consistency of the items within each construct. The Cronbach's alpha internal consistency reliability test was first applied to the measures that belong to the

independent variables: motivation, creativity trait, immersive tendency, and time spent on learning. The Cronbach's alpha test was then applied to the constructs that belong to the dependent variables: presence felt, which includes realistic felt, sense of presence, and memorable-ness of content, and the perceived aesthetic, which is comprised of aesthetic experience and inner-self experience perceived. The recommended cutoff values used were: Cronbach's alpha score above 0.60 is deemed as sufficient for an explorative study, and 0.70 or higher is deemed as sufficient for a confirmatory research (Nunnally, 1978; Hair et al., 1998). In addition, in the case of a scale with only two or three items, an alpha of 0.50 is deemed as acceptable (Cortina, 1993). This is because the alpha score increases when more items are calculated for a construct. According to these standards, immersive tendency, preference of content design, presence score, design quality, and perceived aesthetic were kept, whereas motivation and creativity trait were dropped because of low reliability. The alpha score for time spent on learning was low but is acceptable at 0.644. The Cronbach's alpha scores for these constructs are summarized in the following table.

Table 25

Internal Consistency Reliability of the Constructs

Constructs	Items	Alpha
Time	3	.644
Motivation	3	.410
Creativity Total	7	.855
Presence Score	3	.779
Design_quality	3	.827
Aesthetic Perceived	2	.820
Creativity Trait	3	.118
Immersive Tendency	2	.771

Note. The constructs in gray areas were regarded as unacceptable due to their low alpha values.

According to the above results, new constructs with new observed variables were defined for motivation, creativity trait, and learning time. Originally, motivation was deemed as a construct including three indicators; however, a single indicator, interest in the topic, was chosen for further data analysis. This selection was based on the result of the explorative data analysis.

Learning time also contained three indicator variables: Vista time, self-reported time, and content page read. Comparing the means of these three variables, the researcher observed that low correlations between these three variables did not mean that the respondents gave false information about learning time, but they actually assessed different dimensions of it. This observation was also supported by the results of the linear

regression tests, as each indicator of the intentional behavior directly affected one or more dependent variables respectively.

The measurement for the creativity traits of the individual was comparably less successful. From the responses to the four indicator items, it seems that individuals hold different standards in terms of judgment of creativity. This might also be overlapped by the different standards held by the respondents in terms of self-assessment. To reiterate, according to the prior steps of data exploration, two constructs, test score for outcome behavior and creativity traits for individual difference were dropped, and one indicator was selected to stand for motivation.

Following this, perceived presence and perceived design quality, which are the first-order constructs, with each having three indicators, were individually tested for unidimensionality upon their specific construct using principal component analysis (PCA). Unidimensionality means that each indicator loads upon only one construct (Anderson et al., 1987). This was verified using Cattel's Scree test in principal component analysis (PCA) with a varimax rotation (Hair, et al., 1998; Loehlin, 1992). This ensures that the aggregated score of each indicator construct truly represents the unitary construct.

Then the variables measuring the four higher order constructs were applied for the PCA method to further test the factorial validity and unidimensionality upon their specific construct. This verified that the measures used in this study truly belong to the four individual constructs: intentional behavior (IB), outcome behavior (OB), perceived design quality (PQ), and perceived utility of design (PU).

The eigenvalues and total variances explained by the measurement items for both perceived presence and perceived quality of design are illustrated in the following section. This was followed by the eigenvalues and total variances explained by the measurement items for each of the four higher order constructs.

Measurement of Presence and Quality of Design

Using PCA of exploratory factor analysis with a rotation method of Varimax with Kaiser Normalization, each of the two constructs was tested for factor loading and unidimensionality separately. Kaiser-Meyer-Olkin measure (KMO) of sampling adequacy test yielded a value of 0.663 for presence and 0.705 for quality of design, which were greater than the recommended values of 0.50. In addition, the Bartlett's tests of sphericity were also significant ($p < .0001$) for both constructs.

The eigenvalues and variances explained by the variables for each construct are displayed in Tables 26 and 27. The scree plots are illustrated in Figures 20 and 21. The cutoff value was that variables with loadings of 0.32 and above or with 10 or more percentage of its variance explained are deemed as significantly measuring the factor (Comrey & Lee, 1992; Tabachnick & Fidell, 2001). According to this rule, the variables in these two constructs were regarded as significantly measuring their specific constructs, with the component score coefficients at 0.360, 0.421, and 0.415 for presence, and the component score coefficients at 0.382, 0.401, and 0.377 for quality of design, with the variances measured by each variable all greater than 10%.

Table 26

Rotated Eigenvalues, Extraction Sums of Squared Loadings, and Variance Explained for Presence

Compt	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.087	69.556	69.556	2.087	69.556	69.556
2	.597	19.899	89.455			
3	.316	10.545	100.000			

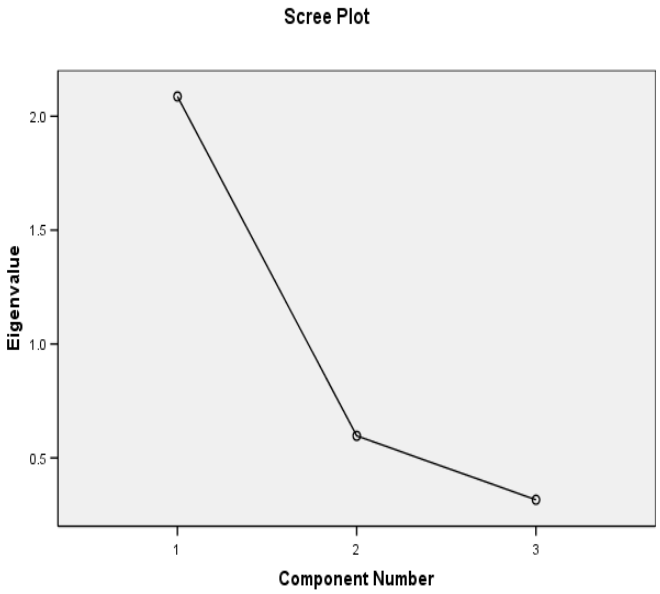


Figure 20. Scree plot for measurement of presence.

Table 27

Rotated Eigenvalues, Extraction Sums of Squared Loadings, and Variance Explained for Quality of Design

Compt	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.231	74.373	74.373	2.231	74.373	74.373
2	.457	15.232	89.605			
3	.312	10.395	100.000			

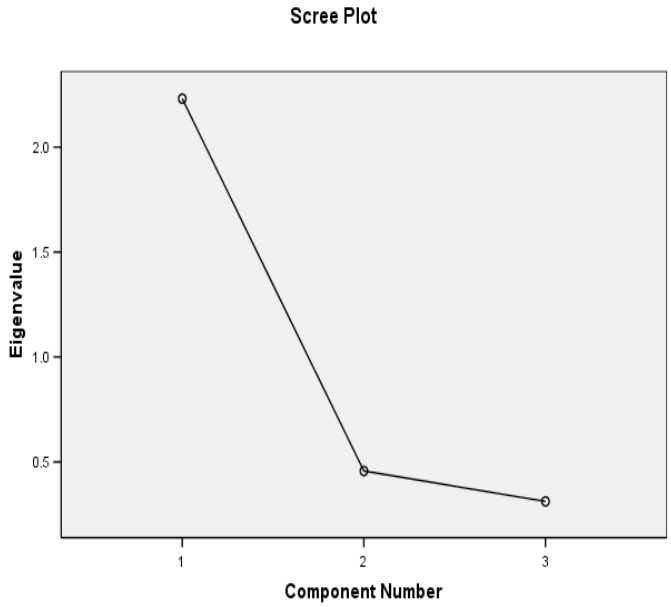


Figure 21. Scree plot for measurement of design quality.

The scree plot for each construct also indicates a large difference between the first and second eigenvalues, which means that each group of variables only measured one

unitary construct accordingly. In all, the results confirm that presence and quality of design were satisfactorily measured.

Intentional Behavior

Using principle component analysis (PCA), the four indicator variables were tested for factor loading and unidimensionality. Kaiser-Meyer-Olkin measure (KMO) of sampling adequacy test yielded a value of 0.652, which was greater than the recommended value of 0.50. The Bartlett's test of sphericity was also significant ($p <$ .0001). The eigenvalues and variances explained are displayed in Table 28. The scree plot is illustrated in Figure 22.

The results illustrate that the variances measured by each variable are all greater than 10%. The scree plot also demonstrates that a single component for the construct was measured. This means that the variables all significantly measured the unitary construct of intentional behavior. However, the value of commonalities for the variable of motivation was very low, at 0.030, whereas all other three variables were higher than 0.563. This low value indicates that motivation, which represents interest in the topic, did not share enough nature or did not measure a similar enough construct with the other three indicator variables. This was further confirmed by its component score coefficient extracted. The value for Vista time was at 0.441, content page read was at 0.427, and time spent was at 0.425, with the exception of motivation, which was at a much smaller value of 0.097. Therefore, given that standardized values greater than 0.32 demonstrate

acceptable factor loadings (Comrey & Lee, 1992), the results show that motivation failed to show significance.

Table 28

Rotated Eigenvalues, Extraction Sums of Squared Loadings, and Variance Explained for Intentional Behavior

Compnt	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.765	44.134	44.134	1.765	44.134	44.134
2	.996	24.904	69.038			
3	.642	16.040	85.078			
4	.597	14.922	100.000			

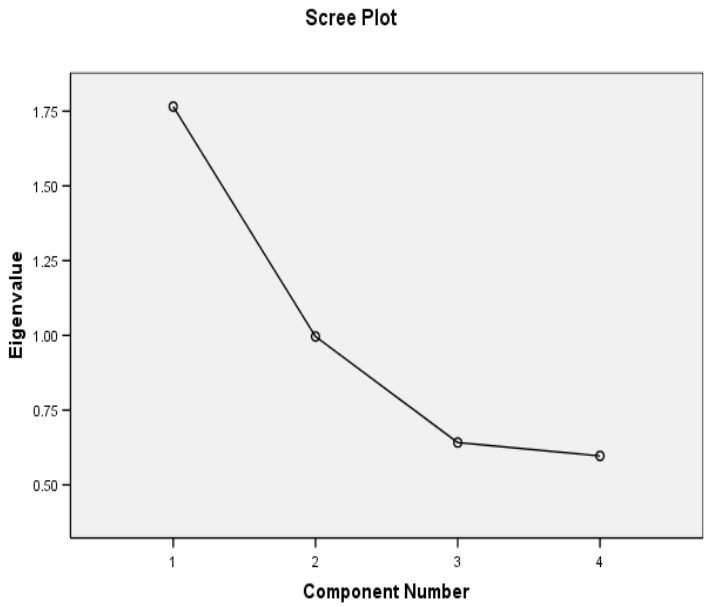


Figure 22. Scree plot for intentional behavior.

Outcome Behavior

Kaiser-Meyer-Olkin measure (KMO) of sampling adequacy test yielded a value of 0.690, which was greater than the recommended value of 0.50. The Bartlett's test of sphericity was also significant ($p < .0001$). The eigenvalues and variances explained are displayed in Table 29. The scree plot is illustrated in Figure 23.

The results show that the variances measured by each variable are all greater than 10%, except for presence. The scree plot also demonstrates that a single component for the construct was measured. This means that all the variables except presence significantly measured the unitary construct of intentional behavior. This is supported by the value of commonalities for the variable of presence, which was low at 0.150, with all other three variables higher than 0.550. This low value indicates that presence did not share enough nature with the other three indicator variables. This was further confirmed by the component score coefficients extracted for the four variables. The value for word count was at 0.392, creativity total was at 0.396, and emotional release was at 0.339. However, presence was at a much smaller value of 0.177. Therefore, the variable of presence failed to meet both cutoff values of significance at a minimum of 0.32 for factor loading and an explained variance for a minimum of 10% upon the construct.

Table 29

Rotated Eigenvalues, Extraction Sums of Squared Loadings, and Variance Explained for Outcome Behavior

Compt	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.190	54.738	54.738	2.190	54.738	54.738
2	.914	22.862	77.599			
3	.585	14.621	92.221			
4	.311	7.779	100.000			

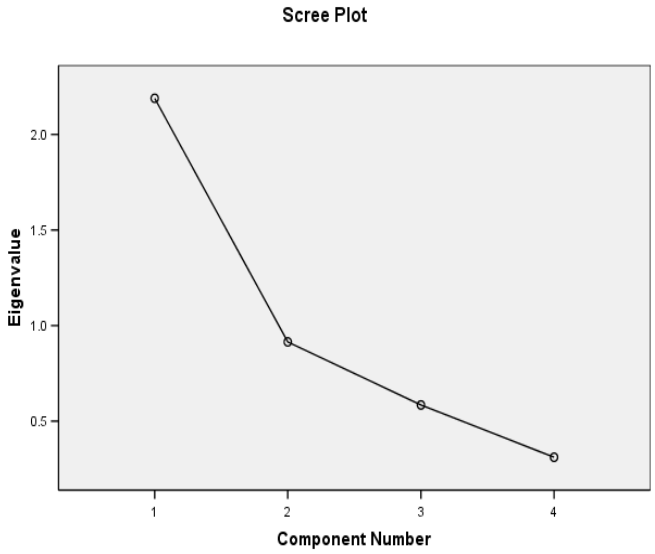


Figure 23. Scree plot for outcome behavior.

Perceived Design Quality

Kaiser-Meyer-Olkin measure (KMO) of sampling adequacy test yielded a value of 0.704, which was greater than the recommended value of 0.50. The Bartlett's test of sphericity was also significant ($p < .0001$).

The eigenvalues and variances explained are displayed in Table 30. The results show that the variances measured by each variable are all greater than 10%. The scree plot also demonstrates that a single component for the construct was measured. This means that the variables all significantly measured the unitary construct of perceived design quality. This was supported by the component score coefficients extracted for the three variables, with presence at 0.398, enjoyment at 0.369, and design at 0.394. These three indicators shared a high commonalities value, which were all greater than 0.672. These results demonstrate that presence was represented by perceived design quality only, rather than by both outcome behavior and the perceived design quality. The scree plot is illustrated in Figure 24.

Table 30

Rotated Eigenvalues, Extraction Sums of Squared Loadings, and Variance Explained for Perceived Design Quality

Compt	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.226	74.187	74.187	2.226	74.187	74.187
2	.471	15.693	89.880			
3	.304	10.120	100.000			

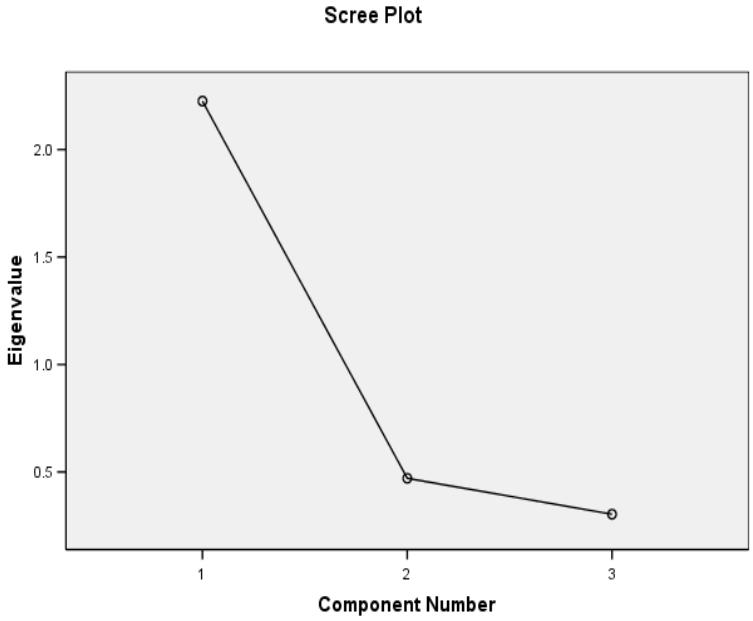


Figure 24. Scree plot for perceived design quality.

Perceived Design Utility

Kaiser-Meyer-Olkin measure (KMO) of sampling adequacy test yielded a value of 0.799, which was greater than the recommended value of 0.50. The Bartlett's test of sphericity was also significant ($p < .0001$).

The eigenvalues and variances explained are displayed in Table 31. The results show that the variances measured by each variable are all greater than 10% except for level of design. The scree plot also demonstrates that a single component for the construct was measured. This means that all the variables except level of design significantly measured the unitary construct of intentional behavior. This was supported by the component score coefficients extracted for the four variables. The value for aesthetic was 0.306, useful design was at 0.325, rate design was at 0.301, but the value

for level of design was 0.274. The indicator of level of design failed to meet both cutoff values for significance, a minimum of 0.32 for factor loading and an explained variance of at least 10% upon the construct of outcome behavior. The scree plot is illustrated in Figure 25.

Table 31

Rotated Eigenvalues, Extraction Sums of Squared Loadings, and Variance Explained for Perceived Utility of Design

Compt	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.742	68.556	68.556	2.742	68.556	68.556
2	.571	14.265	82.821			
3	.404	10.110	92.930			
4	.283	7.070	100.000			

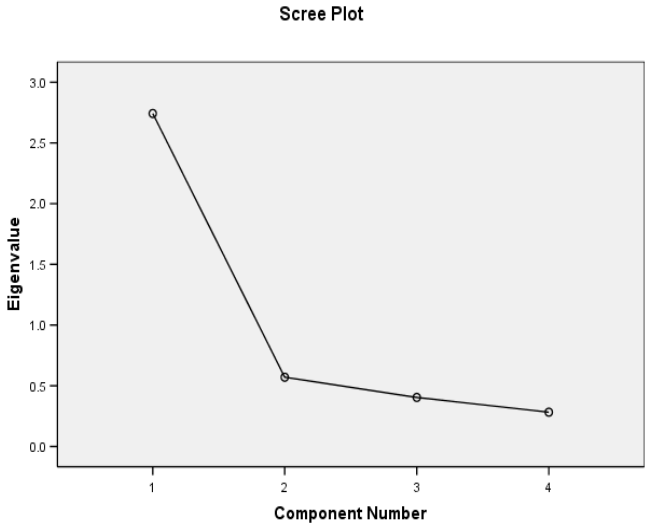


Figure 25. Scree plot for perceived design utility.

In summary, the exploratory factory analysis using PCA with an orthogonal rotation verified the loadings of the variables on their specific constructs. The results show that three variables—motivation, presence, and level of design—failed to load both as proposed and significantly so to their specific construct. These results suggest that removing motivation and level of design from their specific construct might improve validity; in addition, presence should be allowed to load upon to PQ only, instead of upon both to OB and PQ as originally assumed.

In order to confirm the results from PCA of the exploratory data analysis, all fourteen variables were further applied into SEM procedures to test their measurement validities and their relations with the four higher level constructs. Means, standard deviations, and measure correlations for these variables are given in the following table.

Table 32

Correlations of the Variables, Means, and Standard Deviations

	Intentional				Outcome			Perceived			Utility			
	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13	V14
VistaTime	1													
ContentPage	.381(**)	1												
Time_spent	.394(**)	.353(**)	1											
Motivation	.079	.084	.010	1										
Word_Total	.287(**)	.200	.187	-.021	1									
CreativityTotal	.164	.184	.178	.112	.688(**)	1								
EmotionRelea	.152	.238(*)	.169	.005	.474(**)	.481(**)	1							
Presence_3	.035	.085	-.088	.108	.191	.213	.150	1						
Enjoyment	.133	.210	.222(*)	.250(*)	.148	.200	.226(*)	.580(**)	1					
Design_3	.105	.039	.164	.139	.303(**)	.296(**)	.171	.695(**)	.560(**)	1				
Aesthetic	-.016	.138	.022	.125	.106	.097	.079	.396(**)	.345(**)	.395(**)	1			
Useful_design	.048	.232(*)	.204	.141	.166	.106	.030	.374(**)	.333(**)	.481(**)	.664(**)	1		
Rate_design	.152	.198	.023	.174	.101	.043	.025	.386(**)	.296(**)	.396(**)	.588(**)	.683(**)	1	
Level_design	.019	.044	.058	-.058	.108	-.010	-.007	.016	.143	.235(*)	.510(**)	.575(**)	.447(**)	1
N	82	82	82	82	82	82	82	82	82	82	82	82	82	82
Mean	3.4898	57.4512	3.4232	3.4232	33.8049	244.3293	2.3659	16.3049	5.9024	17.6098	5.1829	5.9390	3.1341	2.9146
Std. Deviation	1.6677	23.6221	1.7623	.8533	9.8312	143.1621	1.0483	3.1252	1.0376	2.4633	1.1208	1.1259	.9264	.77302

Note. ** Correlation was significant at the 0.01 level (2-tailed).

* Correlation was significant at the 0.05 level (2-tailed).

9.5 Empirical Research Findings and Discussion

Data screening and preliminary data analyses were conducted prior to the actual structural model analysis using structural equation modeling procedures. Normal distribution of data was tested by the skewness and kurtosis for each of the final twelve measurement variables. The cutoff values were skewness < 3.0 and kurtosis < 10.0 (Kline, 2005). Using this standard, the skewness and kurtosis levels for each of the items were checked, and they were below the suggested level of the absolute value of less than 3.0 and 10.0 separately, except for three cases for content page read and two cases for Vista time that were due to high skewness. A further inspection of the data also indicated that these extreme cases were due to the extreme high value in the original data. The next highest and acceptable scores for these measures, without violating the recommended cutoff values, were used to replace the extreme cases. This strategy is considered similar to the method of imputation in treating missing data, in which the researcher makes an intelligent guess about what the missing score on a variable would have been if the data were not missing and uses this value to substitute the missing data (Jaccard & Wan, 1996). This strategy is better than using a mean replacement method, as mean replacement intends to make the data more evenly distributed.

Multicollinearity was examined by the variance inflation factor (VIF) and tolerance (TOL). Larger values for VIF indicate multicollinearity, and the larger the value, the larger the standard error of the regression coefficient for the variable on the regression end. For TOL, smaller values indicate multicollinearity. The cutoff values used were VIF >= 10 and TOL<= 0.10, indicating multicolliearity (Hair et al., 1998).

Based on the current data, the VIF test did not yield any results higher than 2.781, and the TOL test did not produce any results lower than 0.360. Therefore, there was no indication of multicollinearity in all variables. Another method to verify multicollinearity also applied is to check the criterion of Pearson's *r* to see if it is greater than 0.70. Using this method, it was further confirmed that there was no evidence of multicollinearity between the independent variables. Furthermore, the assumption of linearity was inspected by using the scatter plot of the residuals for each pair of independent variables, and no non-linearity relationships were found.

Finally, all original scores were transferred into normal scores. Normal score approach is recommended in LISREL if sample sizes are small or moderate (Jöreskog & Sörbom, 2002). The transformation corrected the possible nonnormality of the continuous variables. Mean, standard deviation, and the correlation and variance-covariance matrices of the normal scores were nevertheless nearly the same to those of the original data (Jöreskog & Sörbom, 2002). The descriptive statistics for the variables in normal scores are displayed in Table 33. The covariance matrix for these variables is also provided in Table 34.

Table 33

Descriptive Statistics of all Observed Variables in Normal Scores

Variable	Mean	St. Dev.	*t*-Value	Skewness	Kurtosis
VISTA_TI	3.490	1.668	18.948	0.006	-0.028
CONTENTP	57.451	23.622	22.024	-0.001	-0.044
TIMESPEN	3.423	1.762	17.589	-0.115	-0.380
MOTIVATI	3.988	0.853	42.316	-0.301	-0.310
WORD_TOT	33.805	9.831	31.137	0.083	-0.307
CREATIVI	244.329	143.162	15.454	0.000	-0.035
EMOTIONR	2.366	1.048	20.435	0.220	-0.542
PRESENCE	16.305	3.126	47.236	-0.052	-0.105
ENJOYMEN	5.902	1.038	51.508	-0.359	-0.610
DESIGN_3	17.610	2.463	64.734	-0.092	-0.221
AESTHETI	5.183	1.121	41.874	-0.074	-0.197
USEFUL_D	5.939	1.126	47.763	-0.444	-0.700
RATE_DES	3.134	0.926	30.634	-0.491	-0.812
LEVEL_DE	2.915	0.773	34.143	-0.030	0.657

Table 34

Covariance Matrix

	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13	V14
VISTA_TI	2.781													
CONTENTP	13.361	558.004												
TIMESPEN	0.910	17.211	3.106											
MOTIVATI	0.199	1.665	0.016	0.728										
WORD_TOT	4.868	55.894	2.660	-0.538	96.653									
CREATIVI	50.511	731.009	44.340	1.539	1042.679	20495.412								
EMOTIONR	0.312	3.308	0.166	-0.009	3.948	49.661	1.236							
PRESENCE	0.282	3.989	-0.464	0.183	6.966	104.270	0.570	9.770						
ENJOYMEN	0.226	4.734	0.371	0.221	1.673	28.700	0.267	1.920	1.077					
DESIGN_3	0.491	4.840	0.735	0.304	7.520	112.676	0.470	5.326	1.487	6.068				
AESTHETI	-0.031	2.448	0.145	0.110	1.221	21.242	0.096	1.416	0.383	1.070	1.256			
USEFUL_D	0.075	6.393	0.525	0.182	1.630	16.569	0.044	1.274	0.393	1.271	0.792	1.268		
RATE_DES	0.194	4.233	0.045	0.165	0.909	6.530	0.019	1.075	0.264	0.829	0.582	0.680	0.858	
LEVEL_DE	0.004	0.999	0.171	-0.042	0.711	3.987	0.002	0.047	0.133	0.477	0.441	0.444	0.291	0.598
Means	3.490	57.451	3.423	3.988	33.805	244.329	2.366	16.305	5.902	17.610	5.183	5.939	3.134	2.915
Std. Deviation	1.668	23.622	1.762	0.853	9.831	143.162	1.048	3.126	1.038	2.463	1.121	1.126	0.926	0.773

The Effect of Narrative in Supporting Creativity

As discussed in the earlier chapters, narrative and imagery affect the comprehension, memory, retrieval, and generation of new concepts. They share the literal, symbolic, associative, and constructive effects on information processing, and they both have an innate association with emotions. Narrative is also suggested to have a constructive effect on shaping and transforming the memories of one's experiences.

The general functions of narrative, which include the literal, symbolic, associative, and constructive effects, were verified by the quantitative data analysis based on the results derived from the content analysis. The independent variables that show evidence of group difference were representational method and application of mental imagery. The dependent variable was creativity. On the general effects of narrative, the hypothesis was that respondents who took the course in conversational narrative would yield higher scores on both measures in their responses to the open-ended questions than those who took the course in plain text.

Another task of the study was to find out if narrative had an incubation effect on the creativity of the respondents. In order to verify if there is an incubation effect, the study designed two comparisons. The first comparison was between the respondents who took the course in narrative in one section and those who took the course in plain text in another section; both sections of respondents were encouraged to use mental imagery while describing their past volunteer experiences. The second comparison was between two sections of respondents who took the course in narrative but only one section of respondents was urged to use mental imagery while describing the past volunteer

experiences. One of the assumptions was that if narrative had an incubation effect, the respondents in the narrative section would create inferences with a higher creativity level than those who took the course in plain text in the first comparison where respondents in both sections were encouraged to use imagery. Another assumption was that an incubation effect can be confirmed if there is no difference between the two sections in the second comparison where both sections were in narrative but received different instructions in using imagery. In other words, if there were an incubation effect, the encouragement to use mental imagery will not overcome the incubation effect of the narration because people automatically create imageries over the narrative content. The hypotheses of this design were:

1) Respondents in section 1 will yield higher scores on both measures in the responses to the essays than those respondents in section 3.
2) Respondents in section 2 will yield similar scores on both measures in the responses to the essays as those respondents in section 1.

Independent samples *t*-Tests with equal variance assumed were used to detect the group mean difference over the two measures of creativity. The three hypotheses, one on the general effects of narrative and two on the incubation effect of narrative were all supported. The results confirmed the significant difference between using narrative and

plain text in course design. Narrative was found to provide a positive effect in terms of supporting creativity. The results are summarized in the following tables.

Table 35

Group Statistics of Word_Total and Creativity_Total

	Sections	N	Mean	Std. Deviation
Word_Total	1.00	24	36.7500	7.73052
	2.00	35	37.3714	9.23894
	3.00	23	25.3043	7.49809
Creativity_Total	1.00	24	271.9583	124.75767
	2.00	35	274.8286	153.83882
	3.00	23	169.0870	119.92381

Note. Section 1 and 2 were in narration; section 3 was in plain text.

Table 36

Independent Samples t-Tests for Equality of Means between Sections on Word_Total and Creativity_Total

		Levene's Test for Equality of Variances				
Factor	Section	F	Sig.	T	*df*	Sig. (2-tailed)
Word_Toal	1 vs. 2	1.303	.258	-.271	57	.788
Word_Toal	1 vs. 3	.006	.937	5.149	45	.000
Word_Toal	2 vs. 3	1.507	.225	5.229	56	.000
Creativity_Total	1 vs. 2	1.443	.235	-.076	57	.940
Creativity_Total	1 vs. 3	.027	.871	2.880	45	.006
Creativity_Total	2 vs. 3	1.164	.285	2.784	56	.007

Note. Section 1 and 2 were in narration; section 3 was in plain text.

Factors Affecting the Learning Behaviors and Performance

The SEM data analyses followed a four-phase procedure. In the first phase, measurement models were examined using confirmatory factor analysis (CFA). In the second phase, sub-structural models were investigated in order to find causal effects between the paired latent constructs. In the third phase, based on the full sample data, the full structural model and optional models were measured for fit. Finally, separate structural models were tested for group difference. After the SEM procedures, regression analyses were conducted to investigate the moderating but main effects of immersive tendency and preference of visual design upon the major factors that are related to learning experience.

Phase I—Testing of the Measurement Models

The results of exploratory data analysis, using the PCA conducted before, implied the deletion of two variables, motivation and level of design, and the results also suggested freeing the variable of presence from one latent construct, favoring in a single association to the latent construct of perceived design quality. In order to confirm the loading of these indicator variables, SEM approach of confirmatory factor analysis (CFA) was applied to verify the individual measurement models. This allowed the conclusions in terms of modifying the proposed model.

Within the IB construct, the results exhibit that among the four measurement items, only motivation had a low path coefficient at 0.12 upon the IB construct, with a *t*-

value of 0.86. The overall model produced good model fit indices, with $X^2 = 1.19$ ($df = 2$), $p = 0.552$, RMSEA = 0.00, SRMR = 0.032, NNFI = 1.09, CFI = 1.00, and GFI = 0.99 (see Figure 43 in Appendix C). However, the results also confirmed that motivation failed to show convergent validity, given that factor loadings higher than 0.5 from the items upon the associate construct indicate convergent validity (Kline, 2005).

Within the OB construct, the results show that among the four measurement items, three of them converged highly upon the latent construct, and presence had a low to medium degree of path coefficient at 0.27 upon the latent construct, with a *t*-value of 2.29. The testing of the model also showed excellent model fit indices, with $X^2 = 0.93$ ($df = 2$), $p = 0.627$, RMSEA = 0.00, SRMR = 0.027, NNFI = 1.05, CFI = 1.00, and GFI = 0.99 (see Figure 42). However, the total variance explained by presence was only 7.2% (R^2), which is considered small.

For the PQ and PU constructs, the measurement models tests results also exhibit excellent model fit indices for both, with the exception of the variable of level of design, which is again proven in favor to be dropped. The factor loadings and their *t*-values for the modified individual measurement models are displayed in Table 46 in Appendix B.

Based on the results of testing of the measurement models, motivation and level of design were dropped, and presence that was previously allowed to be cross-loaded upon two constructs was confirmed as only measured by one construct, PQ, reflecting the sample data. The modified constructs were further tested for fit, and the changes drastically improved the four individual measurement models in terms of individual measurement model fit as well as achieving an overall parsimonious model. Discriminant

validity and convergent validity were confirmed because the results demonstrate that all measurement items had loadings above 0.70 and the indicators captured over half of the variance of the construct (Hair et al., 1998; Kline, 2005). In addition, the significant factorial loadings to the specific latent constructs also indicate that the measurement constructs also possessed nomological validity, provided that nomological validity is demonstrated when theoretically derived constructs are successfully measured (Cronbach, 1971).

To summarize the results, the modified measurement model favored that: the latent construct of intentional behavior (IB) was comprised of three dimensions, Vista time (T_W), self-reported time (T_S), and content page read (T_C); outcome behavior (OB) was represented by word count (W_T), creativity total (C_T), and emotional release (E_T); perceived quality of design (PQ) consisted of presence score (P_Q), enjoyment (E_Q), and design quality (D_Q); and finally, perceived utility of design (PU) consisted of aesthetic perceived (A_D), usefulness (U_D), and rate of design (R_D).

Phase II—Testing of the Sub-structural Models

After modifying the basic measurement models, structural models were tested. First, structural models including only two constructs were tested for fit. The advantage of analyzing the sub-structural models is that particular effects between the latent constructs are allowed to be investigated. This also supports the proposed model by detecting full and partial mediating effects between the constructs.

The estimation of the sub-structural model started with the construct of IB and OB, followed by the structural model of IB and PQ, OB and PQ, IB and PU, and then PU and PQ. Possible correlation of error variance was allowed because the measurement items used in the study imply substantial overlap. This is especially true of the indicators measuring perceived quality of design and perceived utility of design. These indicators had high correlation values, and they were nevertheless treated as belonging to two different constructs due to time of measurement as well as theoretical reasons.

The sub-structural models for IB-OB, OB-PQ, IB-PU, and PQ-PU all showed good fit indices. The model fit indices and path coefficients between the latent constructs as well as their *t*-values are summarized in Table 37. The graphic representation of the sub-structural models is provided in Figure 44 in Appendix C. The structural path coefficient between IB and OB was 0.42, with *t*-value at 3.20; the path coefficient between OB and PQ was 0.37, with *t*-value at 3.23; the path coefficient between IB and PU was 0.31, with *t*-value at 2.03, and the path coefficient between PU and PQ was 0.59, with *t*-value at 4.36. These significant causal effects indicate that the proposed structures between the constructs possessed nomological validity.

Table 37

Model Fit Statistics for Sub-structural Models, Correlations between Constructs and t-*Values*

Model	X^2	*p*	*df*	RMSEA	SRMR	NNFI	CFI	GFI	Cor.	T
IB-OB	3.67	.89	8	.00	.035	1.00	1.00	.94	.42*	3.20
IB-PQ_1	13.84	.086	8	.095	.059	.89	.94	.95	.18	1.24
PQ-IB_1	13.84	.086	8	.095	.059	.89	.94	.95	.18	1.24
IB-PQ_2	3.99	.78	7	.00	.043	1.05	1.00	.98	.25	1.63
PQ-IB_2	3.99	.78	7	.00	.043	1.05	1.00	.98	.25	1.63
OB-PQ	5.06	.752	8	.00	.031	1.03	1.00	.98	.37*	3.23
PQ-OB	5.06	.752	8	.00	.031	1.03	1.00	.98	.37*	3.23
IB-PU	12.04	.149	8	.079	.053	.93	.96	.95	.31*	2.03
PQ-PU	3.92	.864	8	.00	.021	1.03	1.00	.98	.59*	4.36

Note. In model IB-PQ_2, error terms correlations between time spent and presence was -0.23 (t = -3.11).

For the sub-structural model of IB-PQ, the initial model showed a less than excellent model fit, with $X^2 = 13.84$ (*df* = 8), *p* = 0.086, RMSEA = 0.095, SRMR = 0.059, NNFI = 0.89, CFI = 0.94, and GFI = 0.95. The results reveal that the two constructs were not sufficiently explained by the shared variance of the measurement items according to the specified model. The modification indices also suggested correlating one pair of error terms. The intercorrelations between error terms, however, are more likely due to correlated sampling errors than to low construct reliability. This can be confirmed by the medium to high degree of internal consistency tested by the standard alpha shown in the measurement scales. The model was re-tested for fit after modification by correlating the error terms between time spent and presence. Goodness-

of-fit was achieved with a marked improvement representing the data, as the indices exhibit excellent fit with $X^2 = 3.99$ ($df = 7$), $p = 0.78$, RMSEA = 0.00, SRMR = 0.043, NNFI = 1.05, CFI = 1.00, and GFI = 0.98. The correlation between IB and PQ was 0.25, however, with a still insignificant *t*-value of 1.63.

To summarize, except for the effect between IB and PQ, which showed an insignificant though medium low size of correlation, all effects between the constructs were significant and in the positive direction as proposed. The results indicate that OB was a mediator for the effect from IB to PQ, and PQ had a mediating function for the effect from OB to PU. In addition, OB and PQ partially mediated the effect from IB to PU. Again, the results of the sub-structural model indicate that the correlation between IB and PQ had a medium low but insignificant effect. Using this information, the proposed model was further trimmed, and the modified model is illustrated in the following figure. The dash-lines indicate the paths that were deleted.

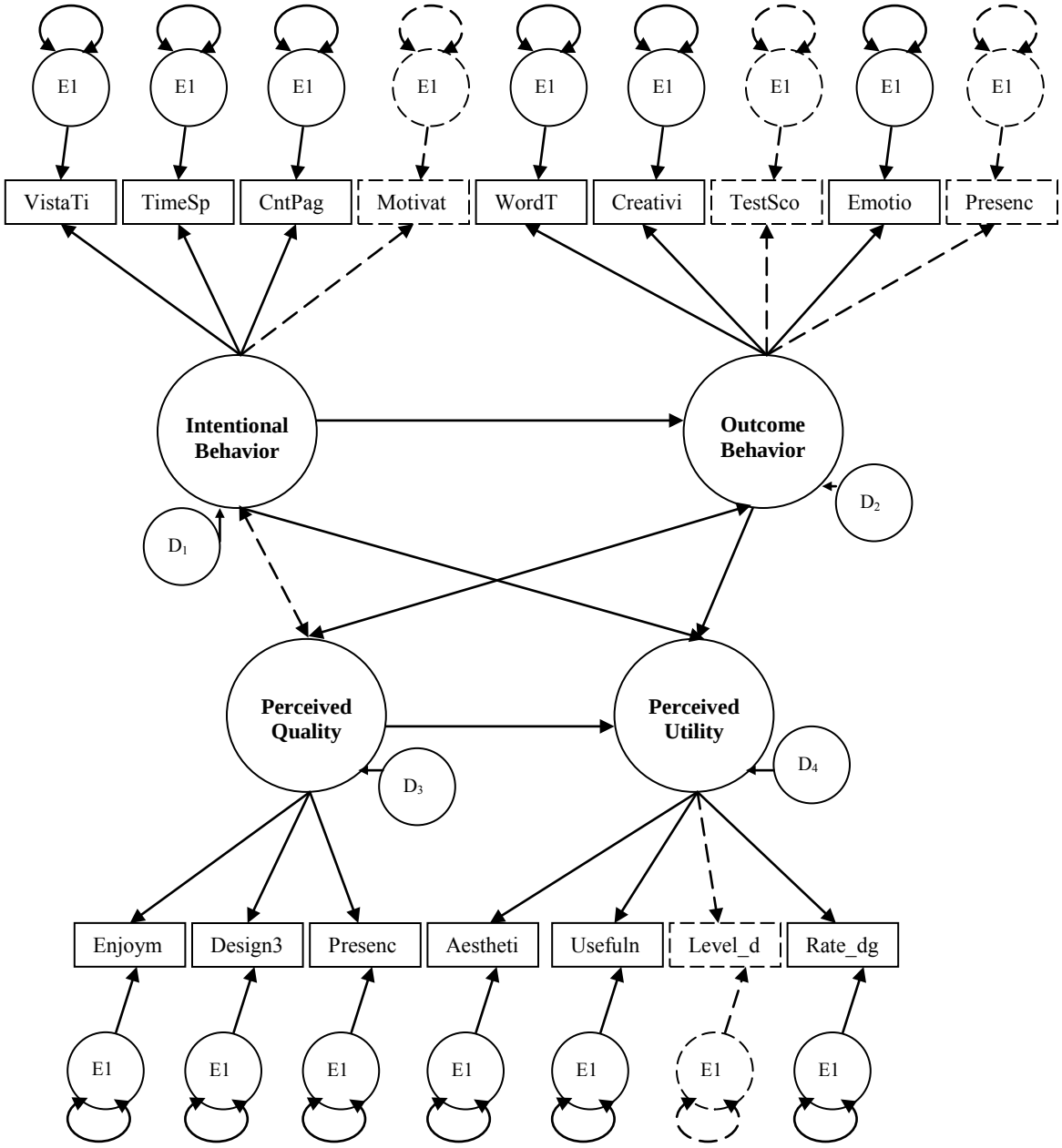


Figure 26. Modified proposed measurement and structural model.

Note. The paths including the one between IB and PQ in dash-line were deleted, and one correlation of error terms between time spent (T_S) and presence (P_Q) was added.

Phase III—The Testing of the Full Structural Models

The full model was generated according to the modified proposed model. The final model was accepted as a plausible representation of the covariance for the full sample data, with the goodness model indices of $X^2 = 31.67$ ($df = 47$), $p = 0.958$, RMSEA = 0.00, SRMR = 0.047, NNFI = 1.05, CFI = 1.00, and GFI = 0.94.

Again, the full model also favored unidimension of the measurement models, as no measurement items were suggested to cross-load upon more than one latent construct, and all measurement items converged to the latent construct with a high value. More than half of the factorial paths were higher than 0.70, and each was higher than 0.50 (see Figure 27). The results demonstrate that the hypothesized model showed a reasonable fit to the full sample data.

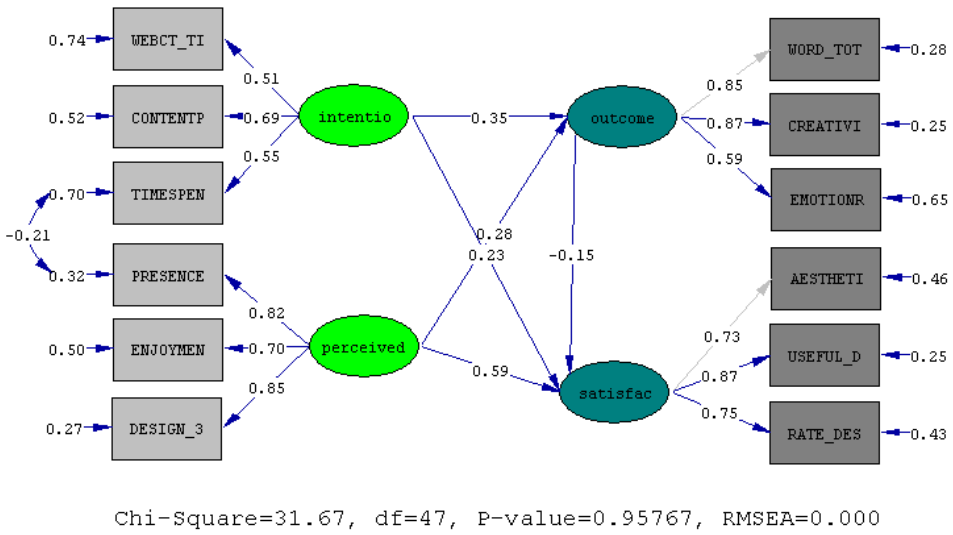


Figure 27. The final full model.

A review of the parameters estimated for the models suggest that IB significantly affected OB, and PQ significantly affected both OB and PU. In addition, IB had a medium but insignificant effect on PU, and OB had a small but insignificant negative effect on PU. The results suggest that PQ had a full mediating effect on the effect from OB to PU. The only surprise was that there was a negative small insignificant effect from OB to PU, which contradicted the proposed model. The standardized factor loadings and *t*-values for the model are displayed in Table 38. In addition, the internal consistency reliability of the latent constructs for the final model is provided in Table 39.

Table 38

Standardized Estimates and t*-Values for the Modified Full Model*

Path	Standardized Estimate	*t*-Value
LX (T_W, IB)	.51*	3.86
LX (T_C, IB)	.69*	4.99
LX (T_S, IB)	.55*	4.27
LX (P_Q, PQ)	.82*	8.69
LX (E_Q, PQ)	.70*	6.86
LX (D_Q, PQ)	.85*	8.84
LY (W_T, OB)	.85*	Fixed
LY (C_T, OB)	.87*	7.07
LY (E_T, OB)	.59*	5.28
LY (A_D, PU)	.73*	Fixed
LY (U_D, PU)	.87*	6.64
LY (R_D, PU)	.75*	6.21
GA (IB, OB)	.35*	2.35
GA (IB, PU)	.23	1.47
GA (PQ, OB)	.28*	2.16
GA (PQ, PU)	.59*	4.04
PS (OB, PU)	-.15	-1.01
TD (T_W, T_W)	.74*	5.18
TD (T_C, T_C)	.52*	3.25
TD (T_S, T_S)	.70*	4.83
TD (P_Q, P_Q)	.32*	3.95
TD (E_Q, E_Q)	.50*	5.39
TD (D_Q, D_Q)	.27*	3.53
TD (T_S, P_Q)	-.21*	-2.96
TE (W_T, W_T)	.28*	3.01
TE (C_T, C_T)	.25*	2.62
TE (E_T, E_T)	.65*	5.82
TE (A_D, A_D)	.46*	4.97
TE (U_D, R_D)	.25*	2.94

TE (R_D, R_D)	.43*	4.75

Note. $X^2 = 31.67$ (*df* = 47), *p* = 0.958, RMSEA = 0.00, SRMR = 0.047, NNFI = 1.05, CFI = 1.00, and GFI = 0.94; LX = the Lambda X concerns the paths going from the latent X variables to the observed X variables; LY = the Lambda Y concerns the paths going from the latent Y variables to the observed Y variables; GA = the Gamma specifies causal paths among different latent Y variables; PS = the Psi focuses on the latent residual terms; TD = the Theta Delta of measurement error is for the observed X variables; TE = the Theta Epsilon of measurement error is for the observed Y variables.

Table 39

Internal Consistency Reliability of the Four Major Latent Constructs

Constructs	Items	Alpha
INTENTION	3	.644
OUTCOME	3	.708
PERCEIVED_QUALITY	3	.825
SATISFACTION	3	.845

Exploring alternative models is a necessary step to fully understanding and representing the sample data. Without exception, alternative models were detected during the SEM procedures for the current study. From the testing of sub-structural models, the bi-directional effect between OB and PQ was confirmed as proposed, and the effect was significant in both directions. Since the structural equation modeling approach does not allow identification of the parameter between the two constructs in both directions at the same time within one model, the final full model identified only one direction of the

parameter. Therefore, an additional model was deemed optimal to further represent the other direction of the effect.

Also, the causal effect identified by the path from IB to PQ was deleted (as was the final full model) based on the fact that the effect was insignificant and medium low. Correlations of error terms were also allowed in the optional model testing. The test results of the final optional model reveal acceptable to excellent fit indices, $X^2 = 37.29$ ($df = 47$), $p = 0.84$, RMSEA = 0.00, SRMR = 0.051, NNFI = 1.02, CFI = 1.00, and GFI = 0.93. Therefore, it is fair to claim that this alternative model provided a fairly good fit representing the sample data (see Figure 36).

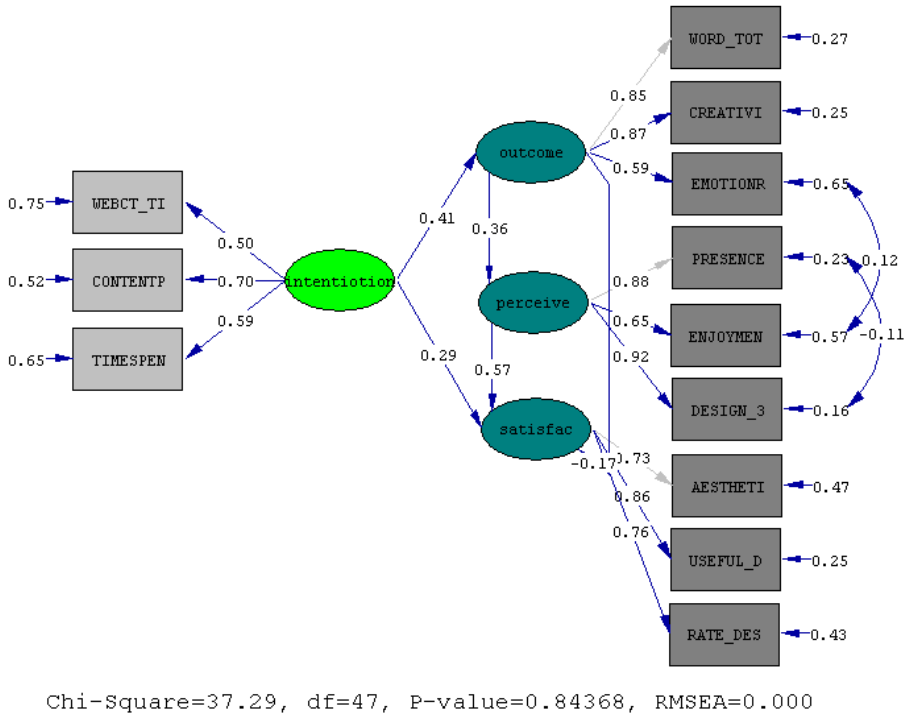


Figure 28. An alternative model.

Compared to the final model identified, the optional model shows that OB had a similar but still insignificant small negative effect on PU, with the path coefficient of -0.17 (t = 1.91). There was a small increased significant effect from IB to OB; the effect changed from 0. 35 (t = 2.35) in the final model to 0.41 (t = 2.78) in the optional model. There was also a slightly decreased significant effect from PQ to PU; the effect changed from 0.59 (t = 4.04) in the final model to 0.57 (t = 3.20) in the alternative model. Finally, there was also a slightly increased effect from IB to PU, with the new path coefficient of 0.29 (t = 1.91), while the effect remained insignificant.

More importantly, the alternative model identified a unique path from OB to PQ, with a significant path coefficient of 0.36 (t = 2.91). The results confirmed that, OB and PQ both functioned as the full moderators for the causal effect from IB to PU, and OB was the full moderator for the causal effect from IB to PQ. The standardized factor loadings and *t*-values for the optional model are provided in Table 40.

Table 40

Standardized Estimates and t*-Values for the Optional Full Model*

Path	Standardized Estimate	*t*-Value
LX (T_W, IB)	.50*	3.85
LX (T_C, IB)	.70*	5.09
LX (T_S, IB)	.59*	4.46
LX (P_Q, PQ)	.88*	Fixed
LX (E_Q, PQ)	.65*	4.23
LX (D_Q, PQ)	.92*	7.66
LY (W_T, OB)	.85*	Fixed
LY (C_T, OB)	.87*	7.19
LY (E_T, OB)	.59*	5.34
LY (A_D, PU)	.73*	Fixed
LY (U_D, PU)	.86*	6.63
LY (R_D, PU)	.76*	6.22
GA (IB, OB)	.41*	2.78
GA (IB, PU)	.29	1.91
GA (OB, PQ)	.36*	2.91
GA (PQ, PU)	.57*	3.20
PS (OB, PU)	-.17	-1.16
TD (T_W, T_W)	.75*	5.25
TD (T_C, T_C)	.52*	3.29
TD (T_S, T_S)	.65*	4.52
TD (P_Q, P_Q)	.23	1.41
TD (E_Q, E_Q)	.57*	4.79
TD (E_T, E_Q)	.12	1.69
TD (P_Q, P_D)	-.11	-.75
TE (W_T, W_T)	.27*	2.97
TE (C_T, C_T)	.25*	2.73
TE (E_T, E_T)	.65*	5.83
TE (A_D, A_D)	.47*	4.99
TE (U_D, R_D)	.25*	2.98

TE (R_D, R_D)	.43*	4.72

Note. X^2 = 37.29 (*df* = 47), *p* = 0.844, RMSEA = 0.00, SRMR = 0.043, NNFI = 1.02, CFI = 1.00, and GFI = 0.93; LX = the Lambda X concerns the paths going from the latent X variables to the observed X variables; LY = the Lambda Y concerns the paths going from the latent Y variables to the observed Y variables; GA = the Gamma specifies causal paths among different latent Y variables; PS = the Psi focuses on the latent residual terms; TD = the Theta Delta of measurement error is for the observed X variables; TE = the Theta Epsilon of measurement error is for the observed Y variables.

Based on the final full model and the alternative model, the structure of the latent constructs was finalized. Since the goodness-of-fit was achieved in both models, it means that the structural model was the plausible representation of the causal structure between the constructs (Steven, 2002). The graphical representation of the structural model based on the modified final full model is given in the following figure. The dash-line indicates that the effect was insignificant, with a *t*-value lower than 1.96 at the 0.05 level of statistical significance for a two-tailed test.

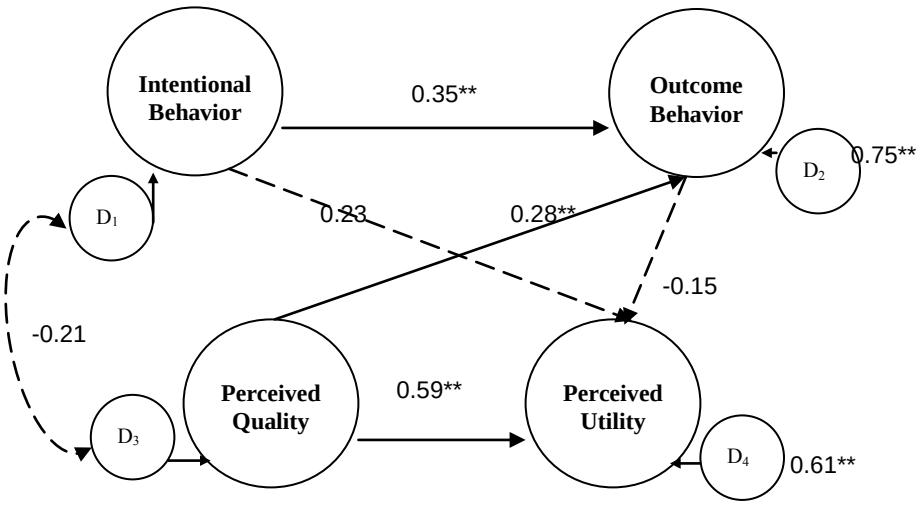


Figure 29. The identified structural model.

Note. This structural model is based on the final model. The dash-line indicates that the effect was insignificant. The causal effect from OB to PQ as proposed is also confirmed significant in the sub-structural models (path coefficient = 0.37) as well as in the alternative model (path coefficient = 0.36) though the values are not displayed in the diagram.

The path coefficient for the correlation between IB and OB was 0.35 (t = 2.78), between OB and PQ was 0.28 (t = 2.91), and between PQ and PU was 0.59 (t = 3.20). The results, therefore, exhibit that, OB and PQ were the full moderators for the causal effect from IB to PU, and OB was the full moderator for the causal effect from IB to PQ.

The results illustrate that intentional behavior (IB), which was measured by time related factually bound variables which are assumed directly lead to better outcomes, whereas the latter was also measured by factually bound variables—creativity scores and quantity of emotional distribution. In addition, perceived quality of design (PQ) that was measured by both presence and the affect bound perceived design quality significantly affected both outcome behavior (OB) and perceived utility and satisfaction (PU). In return, outcome behavior (OB) also directly affected perceived quality of design (PQ).

Surprisingly, a small negative effect from outcome behavior (OB) to overall satisfaction over the course design (PU) measured by aesthetic perceived, usefulness of the course, and the overall rating of the course was also found.

Phase IV—Testing of Separate Group Structural Models

The search for the fitting models for the separate groups was based on the final model shown in Figure 27. The two groups were defined according to whether the respondent was using the narrative design of the online course. Group 1 was in narrative consisting of respondents in sections 1 and 2; group 2 was in plain text consisting of respondents in section 3. The theory behind detecting separate models for different groups is to establish baseline models for each group in order to test factorial invariance between the groups. Baseline models are not necessarily identical across groups. In other words, parameters, which include factor loadings of indicator variables, path coefficient loadings of latent factors, and measurement errors, are not required to be fully constraint, though it is applicable to certain research situations. However, similarity of the factor structure and specification of parameters within the same factor or latent constructs must be equivalent across groups. This means having the same pattern of fix and free parameters across the groups in addition to the same measurement properties of the indicator variables.

The goodness-of-fit indices showed generally moderate to excellent results for group 1: $X^2 = 37.71$ ($df = 47$), $p = 0.832$, RMSEA = 0.00, SRMR = 0.067, NNFI = 1.04, CFI = 1.00, and GFI = 0.90. Compared to the full model, the only two values changed

were from 0.94 to 0.90 for GFI and from 0.047 to current 0.067 for Standardized Root Mean Squared Residual (SRMR); therefore, the model for group 1 did not greatly deviate from the final model representing the total sample data. Compared to the full model, the difference is that the negative influence from OB to PU disappeared, and the effect from PQ to OB became insignificant from the path value of 0.28 (t = 2.16) to 0.21 (t = 1.55), which is likely due to sample size, with all other estimated parameters remaining similar.

The attempt to form an individual model for group 2 was also conducted. It is important to acknowledge that the sample used in the model testing for group 2 was not adequate. When sample size decreases, sampling error tends to increase, and the power of effects decreases in which effects that are significant may turn insignificant (Kline, 2005). However, the most important concern was still if the data contain strong effects in the overall structure similar to the final model representing the full sample. Fortunately, the group 2 data did converge and generate an acceptable model with a similar structure to the final model based on the total sample.

With an inspection on the indices, three of the goodness-of-fit indices showed excellent model fit for group 2: $X^2 = 51.22$ ($df = 48$), $p = 0.387$, RMSEA = 0.044, but the other four indices became less adequate, with SRMR = 0.13, NNFI = 0.84, CFI = 0.88, and GFI = 0.73, which are likely due to sample size. Actually, with only an inadequate sample size for group 2, the results can become unstable. However, an inspection of the output of model indices and parameter estimates indicates that the results were quite reasonable, and the standard errors of all the estimates were very small. The proportion of the total amount of variance in the latent construct of intentional behavior (IB) explained

by the three indicator variables was 25%, 24%, and 63% for Vista time, content page, and time spent, respectively. The proportion of the total amount of variance in the latent construct of outcome behavior (OB) explained by the three indicator variables was 64%, 115%, and 45% for word count, creativity total, and emotional release, respectively (This figure for creativity total which is larger than 100% is due to sample size, as the error variance becomes negative in this equation). The proportion of the total amount of variance in the latent construct of perceived quality (PQ) explained by the three indicator variables was 83%, 34%, and 55% for presence, enjoyment, and design quality, respectively. In addition, the proportion of the total amount of variance in the latent construct of perceived utility (PU) explained by the three indicator variables was 63%, 85%, and 87% for aesthetic, usefulness, and overall rate of design, respectively. These results indicate that the latent constructs were successfully measured. Therefore, it is reasonable to claim that reliable results were generated. The difference between the models for group 1 and group 2 based on total sample data is that the negative influence from OB to PU disappeared.

The comparison between the two separate models exhibits that the factor structures of the indicator variables were the same in both groups. This includes the twelve factor loadings corresponding to the paths from the latent constructs, IB, OB, PQ, and PU to their indicator variables and the possible correlations between the twelve error variances of the indicator variables. The parameters for both group 1 and group 2 are summarized and displayed in Figure 30.

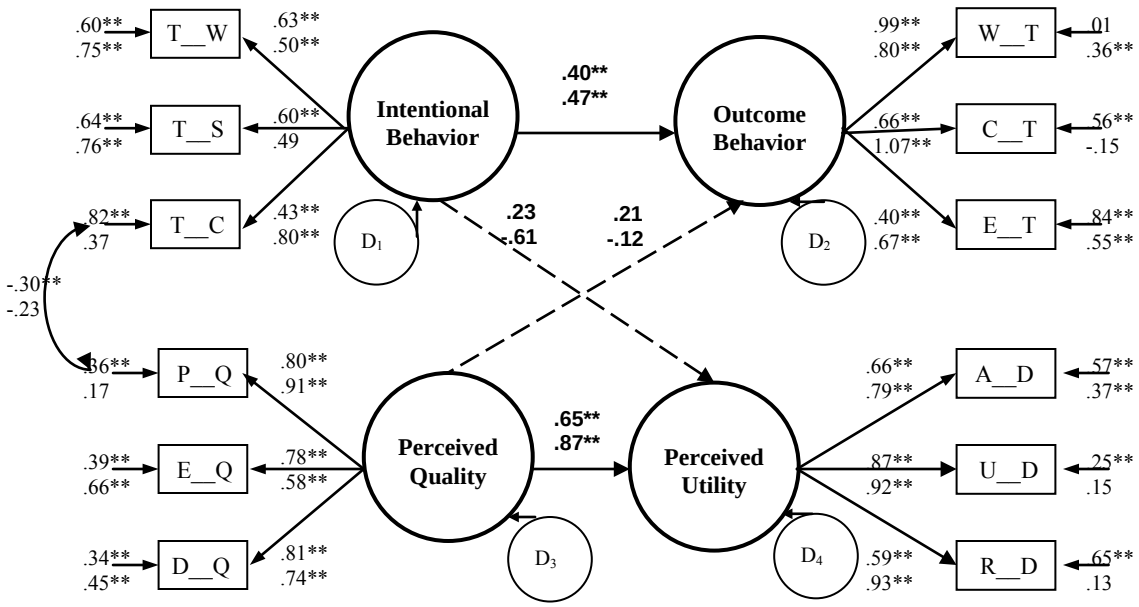


Figure 30. Estimates of groups 1 and 2 in the final model.

Note. The estimates for group 1 are on the top, whereas the ones are under them belong to group 2. The estimates with ** indicate significant effect. The path coefficients from OB to PU, which were .06 and .01 for group 1 and 2, respectively, were deleted from the diagram due to small effect.

Overall, the tests of the two separate models indicate a significant difference between the chi-square values of the indices, with $X^2 = (51.22 - 37.71) = 13.51$ and with one degree of freedom difference, which means that the data for group 1 fit the final model better than the data for group 2. Differences in the distribution of the latent variables were also found. Group 2 individuals, using the course in plain text, showed an insignificant but medium degree negative causal effect from IB to PU at -0.62. In addition, the relationship between OB and PQ was small and negative for individuals in

the plain text section of the online course, but there was a medium sized effect of 0.23 among individuals using the narrative section of the course. From these results, it is concluded that for group 2, OB stopped to function as a mediator for the effect from PQ to PU, though IB still had a medium sized direct effect on OB at 0.47 compared to 0.40 for group 1. All effects for group 2 were insignificant except for the effects from IB to OB and from PQ to PU, which are well due to sample size. The *t*-values of the estimates and the path values are also provided in Table 41.

To summarize, two separate individual baseline models for groups one and two were successfully identified based on the proposed and modified model. This means that the twelve factors and four latent constructs structure is applicable across the two groups separately. The difference between the two baseline models is apparent in terms of degree of correlations between the latent constructs.

Table 41

Standardized Estimates and t*-Values for Groups 1 and 2 Model*

Path	Group 1		Group 2	
	Stan. Estimate	*t*-Value	Stan. Estimate	*t*-Value
LX (T_W, IB)	.63*	3.78	.50*	2.36
LX (T_C, IB)	.60*	3.65	.80*	3.70
LX (T_S, IB)	.43*	2.94	.49*	2.36
LX (P_Q, PQ)	.80*	7.42	.91*	5.06
LX (E_Q, PQ)	.78*	6.68	.58*	2.94
LX (D_Q, PQ)	.81*	7.06	.74*	3.94
LY (W_T, OB)	.99*	Fixed	.80*	Fixed
LY (C_T, OB)	.66*	3.70	1.07*	5.52
LY (E_T, OB)	.40*	2.65	.67*	3.87
LY (A_D, PU)	.66*	Fixed	.79*	Fixed
LY (U_D, PU)	.87*	4.62	.92*	5.18
LY (R_D, PU)	.59*	3.81	.93*	5.24
GA (IB, OB)	.40*	2.52	.47*	2.09
GA (IB, PU)	.23	1.27	-.61	-.95
GA (PQ, OB)	.21	1.55	-.12	-.04
GA (PQ, PU)	.65*	3.63	.87*	3.63
PS (OB, PU)	.06	.44	.01	.06
TD (T_W, T_W)	.60*	3.20	.75*	3.19
TD (T_C, T_C)	.64*	3.49	.76*	3.20
TD (T_S, T_S)	.82*	4.71	.37	1.58
TD (P_Q, P_Q)	.36*	3.68	.17	1.04
TD (E_Q, E_Q)	.39*	4.03	.66*	3.23
TD (D_Q, D_Q)	.34*	3.65	.45*	2.81
TD (T_S, P_Q)	-.30*	-3.16	-.23	-1.83
TE (W_T, W_T)	.01	.06	.36*	2.90
TE (C_T, C_T)	.56*	3.91	-.15	-1.12
TE (E_T, E_T)	.84*	5.24	.55	3.34
TE (A_D, A_D)	.57*	4.46	.37*	2.97
TE (U_D, R_D)	.25*	2.07	.15	1.71

TE (R_D, R_D)	.65*	4.76	.13	1.45

Note. LX = the Lambda X concerns the paths going from the latent X variables to the observed X variables; LY = the Lambda Y concerns the paths going from the latent Y variables to the observed Y variables; GA = the Gamma specifies causal paths among different latent Y variables; PS = the Psi focuses on the latent residual terms; TD = the Theta Delta of measurement error is for the observed X variables; TE = the Theta Epsilon of measurement error is for the observed Y variables.

Main Effects of Individual Difference

Furthermore, regression analyses were conducted to find out how the variables of individual difference are related to the major constructs. Based on the prior *t*-Tests conducted on all the variables for group difference, the only variable that is significant across groups was immersive tendency related to individual difference.

The results indicate that, in addition to the relations between the four major constructs, two indicators of individual difference also had significant effects on the four constructs. The first was preference of visual design. Though it did not show difference between the two groups, it positively affected outcome behavior (on both measures of creativity) and perceived utility of design (on aesthetic felt, perceived usefulness of design, and rate of design). The second was immersive tendency that showed group difference in which participants in group 1 had a higher rate of immersive tendency compared to group 2. The results show that immersive tendency positively affected intentional behavior (on self-reported time spent on learning), outcome behavior (on creativity score), and perceived utility of design (on perceived usefulness of design). The results are provided in the following tables.

Table 42

Results of Different Variables Regressed onto the Individual Difference Variable of Preference of Visual Design

Dependent Variable	Standardized Coefficients	t	Sig.
	Beta	B	Std. Error
Creativity_T	-.295	-2.763	.007
E_aesthetic	.316	2.974	.004
E_innerSelf	.249	2.263	.026
Usefulness	.328	3.110	.003
Level_design	.318	2.997	.004
Rate_design	.308	2.900	.005

Table 43

Results of Different Variables Regressed onto the Individual Difference Variable of Immersive Tendency

Dependent Variable	Standardized Coefficients	t	Sig.
	Beta	B	Std. Error
Time_spent	.300	2.810	.006
Usefulness	.239	2.200	.031

9.6 Summary

This chapter presents the results of data analyses and discussions of the results on the effects of narrative and learning experience with respect to the three empirically related research questions. First, respondent profile was summarized. Demographic variables include age, education, year of work, and position in the library. Data analyses on narrative's effect on creativity as well as the factors that construct and affect the learning experience are presented. Data screening employed several steps, from simple scanning of missing cases, checking kurtosis and skewness of the variables, to detecting multivariate outliers.

All empirical research questions were explored. The first research question explored was the effects of using narrative as a representational method in online instruction, and whether using narrative supports creativity. All three hypotheses were supported by the findings.

The second research question explored the relations among the factors that comprise the online learning experience. The adequacy of the postulated theoretical model was tested using structural equation modeling approach, and before the SEM procedures, data preparation was conducted using principle component analysis. The model testing followed a four-phase procedure in which the measurement models, the sub-structural models, the full structural models, and the separate structural models for two separate groups were gradually verified.

Overall, the results demonstrate that the measurement and structural models possessed good convergent, discriminant, and nomological validities. The goodness-of-fit

indices for the final model and the alternative model were achieved with overall model fit, suggesting that the proposed model did not significantly deviate from the actual sample data. The causal effects from IB to OB, PQ to PU, and the one between OB and PQ were significant and were in the same direction as proposed.

The differences between group 1 and group 2 based on whether narrative was the representational method were apparent and were explained after the factorial structure invariance was confirmed upon the two separate models. Compared to the baseline model for group 1, the effect between OB and PQ disappeared in the baseline model for group 2, and there was an insignificant negative effect from IB to PU in the model for group 2.

CHAPTER 10

SUMMARY AND CONCLUSION

10.1 Overview

The main purposes of this study were to identify the functional effects of narrative and mental imagery and to discover the underlying relationship between them, to investigate the distinctive traits of narrative when semiotic resources are contested, and to develop a method to empirically test the effects of narrative in real learning situations. The study comprises both theoretical and empirical inquires. The theoretical inquiry used content analysis, using current literature as source and theoretical deduction as method. The empirical inquiry applied content analysis, using collected data and a latent variable approach to investigate the identified effects of narrative and the relations among the latent constructs of learning experience.

This chapter concludes this study with a summary of the findings of the research questions as well as problems encountered. Limitations for the study are also pointed out concerning both theoretical and empirical inquiries. Recommendations for future research and a discussion on the implications of the study are provided at the end of the chapter.

10.2 Summary of Theoretical Creation and Empirical Findings

This study contains three major phases. The first two phases are the theoretical investigations, and the last phase is the empirical investigation.

In the first phase, in order to achieve the research objectives, a content analysis of related literature was conducted to identify the functional effects of narrative and imagery as well as their relationship. The findings are the established objects of investigation between narrative, imagery, and creativity, which the empirical study later directly tested. These objects of investigation, therefore, also form a structure as well as a method for future researchers to empirically answer those questions posed by former researchers related to narrative and mental imagery.

The second phase is the theoretical creation, in which a new structure with hierarchically mapped artifacts was proposed. These artifacts build a structure representing how individuals cognize and relate to others under different contexts. Combining these artifacts with Halliday's (1978) linguistic functional theory, an analytical method that allows one to empirically investigate semiotic representations was developed, which forms a basis for thematic and functional comparisons between different types of representations. This also places the theoretical inquiry of narrative into a larger picture. Thus, the differences between narrative and other text types were further contrasted in later chapters that follow, and from which several research questions are explored, and the analytical method to investigate semiotic resources was applied in the development of a creativity assessment framework for storytelling that was used in the empirical study.

In the third phase, an empirical study was conducted in a real online instructional setting in which the identified functional effects of narrative and its relationship with mental imagery as contrast to creativity were verified. An empirical model with latent

constructs of learning experience was developed and tested for model fit. The proposed model of learning experience takes both affect response and factually bound behavioral outcome as measurement items, which support the evaluation of a more complex system. Content analysis using the proposed narrative analysis method was applied to yield a creativity score for the participants, measuring one of the outcomes. Structural equation modeling techniques were used in the testing of the fit models delineating relationships among the latent variables. The study created a background to empirically test the effects of narrative. The empirical results also answered important questions about the relationship between narrative and imagery, and whether using narrative promotes creativity in learning.

Findings for Theoretical Inquiries

The three theoretical inquiries (1a, 2a, and 2b, see Chapter 1) were answered by content analysis of current literature and deductive inference. The first research question (1a) intended to identify the differences between a synthetically designed learning situation that is typical to traditional education and a natural or semi-natural learning situation. By delineating a full learning process of four stages, a natural learning situation was defined and differentiated from a conventionally designed learning situation through several dimensions: nature of resource, structure of artifact, perception, embodiment, cognitive method, handling of errors, and effect on memory as summarized in Table 5 (refer to Chapter 6). The conclusions for this inquiry have theoretical implications for solving the context design issue in representation.

The second and third research questions (2a and 2b, respectively) were meant to investigate the units and structures of narrative in contrast to other text types, and how they affect a reader. Using a cognitive approach, how images and concepts are formed during perception in a symbolic system, especially how the four proposed cognitive artifacts—micro-object, macro-object, macrostructure, and raw data—function in image formation was discussed. The study concluded that the differences in the mapping of artifacts between narrative and non-narrative texts start from the basic units that comprise each, and the functional difference of these basic units can be explained by their image values or their effects created through one's perception.

More specifically, the study identified that the basic representational units in a narrative text are iconic, containing structures such as *micro-macro-object* and *micro-macrostructure*, and also for this reason, meaning and emotion are embodied with their physical properties in narrative texts. A narrative text and other text types can also be differentiated from two types of functional units that they are able to generate, the static and dynamic units. The static units in narrative and non-narrative texts are different. The narrative syntactic structure is able to provide much more complex statically associated units than non-narrative texts are. In addition, the dynamic units in narrative and non-narrative texts are different. The difference between narrative and non-narrative texts on how they map entities is also the reason for the different functions that they create for a spectator. In other words, they differ by their abilities of creating different perceptual experience for a spectator.

Findings for Empirical Inquiries

A preliminary model with dimensions of learning experience explored and identified in Chapter 2 was further developed into a conceptual model with more precisely defined constructs. This model was then tested, specified, modified, and retested for model fit, and the proposed relations between constructs were verified. All three empirical questions (1b, 1c, and 2c) were explored, and their results are concluded as follows.

The first empirical question (2c) was meant to verify the identified effects of narrative in a real online instructional setting. All three hypotheses were strongly supported by the results. Respondents who took the course in conversational narrative in sections one and two yielded higher scores on both measures in their responses to the two essays than those who took the course in plain text in section 3, with section 1 vs. section 3 at $t(1, 45) = 5.149$, $p < 0.000$ and section 2 vs. section 3 at $t(1, 56) = 5.229$, $p < 0.000$ on word count, with section 1 vs. section 3 at $t(1, 45) = 2.880$, $p < 0.006$ and section 2 vs. section 3 at $t(1, 56) = 2.784$, $p < 0.007$ on creativity total. In addition, respondents in section 2 yielded similar scores on both measures in their responses to the two essays as those respondents in section 1, with $t(1, 57) = -.271$, $p < .788$ on word count, and $t(1, 57) = -.076$, $p < 0.940$ on creativity total, indicating that narrative did provide an incubation effect that is similar to the function of mental imagery.

The second and third empirical questions (1b and 1c, respectively) were concerned with whether the proposed model can be applied to the sample data and investigated the relationships between the latent constructs. The measurement models

were verified by the confirmative factor analysis with the SEM approach. The results indicate that the latent constructs proposed were factorially indefinable. The model testing results of the sub-structural models that postulated the bi-direction path effects were all proven to be significant, with IB-OB at 0.42 (t = 3.20), IB-PU at 0.31 (t = 2.03), OB-PQ at 0.37 (t = 3.23), and PQ-PU at 0.59 (t = 4.36), except the insignificant effect for IB-PQ, which was at 0.25 (t = 1.63). These bi-directional paths indicate that the proposed constructs were causally related.

The proposed model in its modified form yielded a fairly good fit model representing the data, with the goodness-of-fit indices of $X^2 = 31.67$ ($df = 47$), $p = 0.9577$, RMSEA = 0.00, SRMR = 0.047, NNFI = 1.05, CFI = 1.00, and GFI = 0.94. The proportions of the total amount of variance in the latent construct of intentional behavior (IB) explained by the three indicator variables were 26%, 48%, and 30% for Vista time, content page, and time spent, respectively. The proportions of the total amount of variance in the latent construct of outcome behavior (OB) explained by the three indicator variables were 79%, 70%, and 16% for word count, creativity total, and emotional release, respectively. Then, the proportions of the total amount of variance in the latent construct of perceived quality (PQ) explained by the three indicator variables were 68%, 50%, and 73% for perceived presence, enjoyment, and design quality, respectively. Finally, the proportions of the total amount of variance in the latent construct of perceived utility (PU) explained by the three indicator variables were 54%, 75%, and 57% for aesthetic, usefulness, and overall rate of design, respectively. These results indicate that the latent constructs were successfully measured.

The structural model representing the full sample data indicates that IB significantly affected OB with a path coefficient of 0.35 (t = 2.35); IB also had an insignificant but a medium effect on PU, with a path coefficient of 0.23 (t = 1.47). The insignificant effect from IB to PQ was deleted after the sub-structural models were tested. The proposed effect from PQ to OB was significant at 0.28 (t = 2.16), and so was the effect from PQ to PU, which was 0.59 (t = 4.04). However, the results show that there was an insignificant negative effect from OB to PU at -0.15 (t = -1.01).

The results show that IB and PQ were significant predictors of OB, and they explained 25% of its variance. OB, IB, and PQ were significant predictors of PU, and the two together explained 39% of its variance. The overall predictive power of the exogenous variables to the endogenous variables can be represented with these two structural equations:

Outcome = .35* Intention + .28* Perceive

Satisfaction = -.15 Outcome + .23 Intention + .59* Perceive

An optional model based on the full sample data was also generated with good model fit indices of $X^2 = 37.29$ ($df = 47$), $p = 0.84$, RMSEA = 0.00, SRMR = 0.051, NNFI = 1.02, CFI = 1.00, and GFI = 0.93. This optional model also confirmed the causal effect from OB to PQ at 0.36 with a *t*-value of 2.91.

To summarize, the results based on the full sample data provided reliable support to the hypothesized assumptions that intentional behavior and perceived quality of design are factors that affect the participant's outcome behavior and satisfaction. However,

measurement items for interest of the topic, test scores, and level of design were not significant according to the model, nor were indicators related to individual difference, such as constraints and preference of design, with the exception of immersive tendency.

Furthermore, the separate models for group 1 (which comprises individuals in sections 1 and 2, with both in narrative) and group 2 (which comprises individuals in section 3 in plain text) were successfully generated. The parameter estimates generated from group 1 showed a similar pattern to those for the total group, except for the disappearance of the negative effect from OB to PU. The moderating effects of OB and PQ to the overall effect from IB to PU were slightly higher in group 1 than in group 2, though the predictive power from IB to the latent construct OB of the two groups were similar.

For group 1, which was similar to the final model based on the full sample data, IB and PQ were predictors for OB, and the two together explained 22% of its variance. IB and PQ were also the significant predictors for PU, with a decreased predicted power from OB compared to the model based on the full sample data, and the three together explained 53% of its variance. The overall predictive power of the exogenous variables to the endogenous variables for individuals using the narrative design in group 1 can be represented with these two structural equations:

Outcome = .40* Intention + .21 Perceive

Satisfaction = .06 Outcome + .23 Intention + .65* Perceive

For group 2, IB was the solely significant predictor of OB and explained 23% of its variance. IB and PQ were also significant predictors for PU but with a decreased predicted power from OB to PU compared to the full model, and together they explained 37% of its variance. The overall predictive power of the exogenous variables to the endogenous variables for individuals using the narrative design in group 2 can be represented with these two structural equations:

Outcome = .47* Intention + (-.12) Perceive

Satisfaction = .01 Outcome + (-.61) Intention + .87* Perceive

From the results, it is evident that there were clear differences on the causal relations among the four latent constructs between the two groups. The individuals who took the course in plain text showed an insignificant but medium-degree negative causal effect from IB to PU at -0.61 compared to the degree of effect of 0.23 for the individuals who took the course in narrative. (This medium-large but insignificant effect, however, was due to an inadequate sample size for group 2.) This means that more time spent on learning might result in more negative rating to the design utility perceived if the individual takes the course in plain text. However, more time spent on learning while taking the narrative section of the course will bring a more positive attribution to the perceived design utility and the overall rating of the design. In addition, the relationship between OB and PQ was nearly non-existent for individuals who took the course in plain text. Therefore, it can be concluded that OB stopped functioning as a mediator for the

effect from PQ to PU for group 2 individuals, though IB still had a medium predictive effect on OB and PU, respectively.

10.3 Limitations

With a theoretical foundation in representation, narrative, mental imagery, multimodality, and learning context, the study crosses the boundaries between textual resources and non-textual resources and between the mental world and the material world. As with many complex concepts and theories involved, the study has to draw them to a finite context in order to investigate them and the scope of this study is therefore limited by several factors.

One framework with a small number of levels of artifacts, as in the proposed model for semiotic resources, is limiting because knowledge representation contains complex structures of many interrelated dimensions. Elements of modality, genre, and domain; interrelations between quantity and quality of information; the symbolic and structural meanings underlying every representational text; as well as the natural affordances and the pragmatic and actual functions of the representation all demand extensive and intricate interpretations. Though the theorization of the proposed artifacts intends to embrace this complexity, this study is still far beyond the scope of the whole enterprise of representation.

The semiotic analysis method that this study proposed is only one orientation to explore sign practice and eventually human social communication. It neither exhausts the interpretation of signs of all sciences or coded fields nor is immediately applicable to

every cultural and academic discipline, except for the proposed narrative assessment framework for storytelling when creativity is evaluated, which is a specifically developed tool and was applied in the current empirical study. Nevertheless, the proposed framework and the analytical method of semiotic resources are the first steps to extend the study of semiotics from mere subjective interpretation widely appeared in the current literature to a more unified theoretical practice. Also, it has to admit that the theorizing and interpreting in the study itself still shows a process with many contentions of ideas rather than a finished product. Therefore, the proposed framework needs further development and substantial applications for each part.

In addition, since the theoretical work has taken up far more resources than originally planned due to the nature of the study, it can be seen as a weakness that few examples were presented to further interpret the theory in a very explicit manner. For example, there are many cases that the researcher believed could be improved by delineating the process of the inference first rather than giving the theorizations or conclusions directly. Also, in the theoretical inquiries, though this study is fully aware the rich philosophies under the topics of representation, nature, materialism, aesthetic, and emotion, as well as the rich concepts associated to narrative, plot, suspense, etc., it is nevertheless further limited by the brief account of these backgrounds that may influence the study.

The study also shows numerous areas for improvement in the empirical study. Some of them are well-recognized issues to a specific research domain that may be inherently difficult. For example, the effort to measure individuals' creativity traits was

not successful. Even though the study applied several measurement items—self-reported personality traits, self-assessment of creativity levels, self-organization skills, and time management skills—to form the construct, the overall scale of creativity traits suffered low reliability.

A similar difficulty was also encountered in measuring motivation. The researcher was aware of the complexity of this construct and collected several sources to constitute a scale, such as interest in the topic, new questions discovered during learning, and reasons to take the course. These measurement items, however, yielded a low reliability score.

In addition, future studies in this area should strive to increase the number of subjects. More data will improve the statistical analysis in terms of increased power and having less potential of encountering technical difficulties. (For this study, however, this will create more burdens for the meticulous content analysis applied and may extend the time in order to complete.) Relatively, the empirical study is also limited to a very specific population. As a consequence, the results might only be generalizable to a limited population and not to other populations.

Another difficulty in this study was the lack of a full-scaled pilot study. The brief pilot test provided some useful but very limited information for improvement. A full-scale pilot study may collect enough information on how to revise the existing measurement items that belong to the construct of intentional behavior (IB). Thus, a full-scale pilot study will likely enable the final empirical model to keep more indicator variables and constructs as originally proposed, therefore maintaining a more complete model.

The study is also limited by the fact that the participants were not strictly assigned into the three sections randomly over the whole period of data collection despite a plan to do so. This, however, may be inevitable due to the course administrative issues. As a result, this may make inferences related to group difference susceptible to a validity threat.

Finally, the data collected for the content analysis in the empirical study is mono-semiotic in nature. This can be seen as a limitation in the aspect of testing the proposed theory of semiotics because it would be more persuasive if the experimental study amplifies this proposed theoretical framework by analyzing a text that combines different semiotic resources. This, however, would require an additional detailed analytical framework similar to the one proposed for narrative analysis.

10.4 Implication of Research Findings

The investigations of the functional effects of narrative and its relationship to mental imagery were based on the background that a single body of knowledge about this topic does not exist prior to this study. This is also true for a unified semiotic resource analysis. For this reason, the theoretical inquiry and creation conducted are particularly valuable.

First, since the major tasks of this study were to identify the functional effects of narrative and imagery and their theoretical implications, the methodology proposed for the creativity assessment for storytelling and the semiotic resource analytical framework are therefore deemed as having more prominent values. More rigorous empirical

applications should be conducted to further improve and confirm these theoretical frameworks.

Second, the identified functional effects of narrative should be supported by further empirical studies. This includes both the general and the incubation effects of narrative when creativity is evaluated. More empirical studies should further validate and compare the two sets of effects proposed for narrative as a general genre and for conversational narrative as a special genre, and verify if the distinctions of the two do hold in terms of their impacts upon the user.

Third, the study regards the theoretical inquiry and the creation of an analytical method for semiotic resources as an ultimate goal that have far more theoretical and empirical implications. The proposed degreed artifacts, their functions, as well as the structural relationships between the artifacts, in addition to the defined unit of analysis are especially valuable which all invite further investigation and interpretation.

The measurement scales applied in the empirical model also have valuable implications. The scaling methods that measure design quality, creativity scores, and presence were all successful. The Cronbach's alpha values of these scales showed high scores for reliability. They therefore provide useful tools for future studies.

The empirical results indicate that learning time and other factually bound indicators associated to intention do predict outcome behavior as well as affect the overall user satisfaction. This suggests that, first, system design must ensure that user’s motivation of using the system is activated, and second, the system must be able to engage the user with an extended time as well as require an effort from the user. This

effort may include but not be limited to activities like reading enough content, spending enough time using the system, and preventing interruptions during study.

In addition, as the perceived design quality directly affects both outcome behavior and satisfaction, system designers should ensure a high quality of design in order to increase user enjoyment as well as perceived presence. This design quality may include measures concerning content quality, underlying structure of the content, and interface layout.

The study found a small but insignificant negative effect from outcome behavior to perceived utility of design over the total sample data. As outcome behavior was measured by creativity scores rather than by content acquisition, this may eventually not be a surprise at all. This may imply that those individuals who had higher creativity scores over the essays rated the overall design less favorably than those who had lower creativity scores over the essays. This further implies that factors related to individual difference, such as creativity traits and level of motivation may be valuable in the evaluation of outcome behaviors, which this study was unable to pursue further. Additional indicators that measure direct learning behavior should be identified and integrated into the evaluation of performance.

The results regarding group difference indicate that individuals who were in the plain text section tend to become less satisfied with the course if more time is spent on learning and/or if more content pages are read. This significantly contrasts those individuals who were in the narrative section. The individuals who used the narrative text felt more satisfied about the course with increased learning time. This means that more

time spent during learning in the narrative section may be because the content really engaged the user, and more content page read did lead to a positive effect on learning experience. This confirms the existence of the functional effects of narrative proposed.

To summarize the implications from the empirical results, the difference of the effects between the two groups was large, and more indicator variables should be applied to the existing model to further differentiate the effects that are due to the method of design and those that belong to other variables, especially those are associated with intentional behavior. This conclusion is also based on the fact that the measurement item, "reason to take the course," was detected as slightly significantly correlates with several endogenous variables, but because this measurement item suffered low reliability and explainability it was not used in the model.

10.5 Recommendations for Future Research

The study created a unique body of knowledge investigating the effects of narrative, as well as proposed a functional method for semiotics analysis. The identified effects of narrative should be further supported by content analysis applied in various fields to see how these narrative effects are embodied in each context, such as social sciences, politics, natural sciences, and arts.

Moreover, though the creativity assessment framework for storytelling is a direct application of the proposed framework of semiotics analysis, the narratives are uni-modal in nature, which is a limitation. More initiatives should be carried out to further develop specific analytical frameworks that can be directly applied into in-depth investigations for

each of other types of representation, such as picture, cartoon, music, dance, and combination of different modalities of representations, such as architecture, advertisement, and film. The proposed fundamental narrative assessment method and the advanced narrative assessment method including three prototypes for creativity evaluation can be applied to other standard test beds of texts similar to that which the Text Retrieval Conference (TREC) document sets to support the research of automatic semantic retrieval.

The empirical study is more theory driven than data dependent, and it intended to introduce a method to practically evaluate learning experience as well as to extend its concepts. The four latent constructs proposed, identified, and successfully verified by this study are intentional behavior, outcome behavior (or performance), perceived design quality (or affect measure of design), and satisfaction of design (or utility measure of design). However, this study of detecting factors that affect learning experience is still exploratory in nature. Further research is needed to determine whether the causal relationships among the constructs established would hold. More research is invited to further extend the current measurement and structural models.

Of primary concern with the empirical model, more indicator variables should be identified for the construct of intentional behavior. This is also true of outcome behavior that was measured by motivation and learning time. The use of a difference score based on pretests and posttests to measure content acquisition suffered from low reliability that deterred its application to the model. Future studies need to examine how to use test

scores as a method to measure outcome. This may even require a meticulous validity study over the designed tests.

Also, more investigation needs to be performed identifying constraints and to understand whether individual differences have an interaction effect with creativity. Again, future researchers of learning experience may consider using a larger sample. If using a large sample, other procedures such as weighted least squares (WLS) and more stringent multi-group investigations can be processed in SME to further differentiate group difference based on any variable.

Time of measurement is also proven to be a factor that affects learning results that is due to representational method applied. For example, Trabasso and his colleagues (1984) found that with delay in terms of measurement time, the influences of overall text structure, such as script structure of narrative and/or hierarchical structure of expository text, increase with delay, whereas the surface properties, such as referential and casual relations among basic unit of representation of sentences or paragraphs, decrease. As such, future research design could further test if this is the case and if so it should strive to embrace this as important factors in the evaluation of performance and its explanations. Moreover, social issues that result from using new method of system design should not be ignored.

Detecting the relations among the factors that comprise learning experience in online instruction is essential to an effective delivery of instructional materials and creating an ultimate learning satisfaction. In addition, theoretical understandings and empirical studies tend to conclude that recent behavioral experience significantly impact

one's attitude towards an object and greatly influence one's future behavior as well, which implies a great significance of learning. Therefore, the assessment of behavioral experience of the individual has an obvious appeal to system design. As more complex learning environments are designed, evaluation of learning experience becomes more challenging as dimensions of affect and behavior notably overlay each other in the process of system use.

Furthermore, because system designers are increasingly focused on user experience, the borders between the concepts of behavior, outcome/performance, affect, attribution, and satisfaction will become less distinctive. The relations between being interested and motivated and having intention and motivation will supersede each other and in return define user behavior and satisfaction. As a consequence, in order to assess individual learning experience one has to comprehend this complexity by not only taking these many dimensions into consideration, but also finding a way to differentiate them according to specific learning contexts.

Extending the measurement models of this study, information quality can be assessed as document attributes for content or files preserved in a database. Seddon and Kiew (1994) argue that in order to measure an information system's success, a model should include user involvement, system quality, and information quality. Therefore, it would be worthwhile to calculate the information quality of the content as an indicator when representational method is investigated. Following this, another construct that can be assessed along with the measurement models is the information needs of the user prior to system use. In this case, learning can also be seen as a process of information retrieval.

Therefore, the experience of using the system becomes an information-seeking process with a clear picture of both the user and the document.

In essence, future studies are recommended to identify and design new measurement items and constructs as well as to detect associations among constructs that are related to learning experience. Extending the model to include more document traits and information needs of the user may enrich and divert the current study into a field of information retrieval.

APPENDIX A

SCREEN SHOTS OF THE DIFFERENT SECTIONS OF THE ONLINE COURSE

(FIGURES 31, 32, 33, & 34)

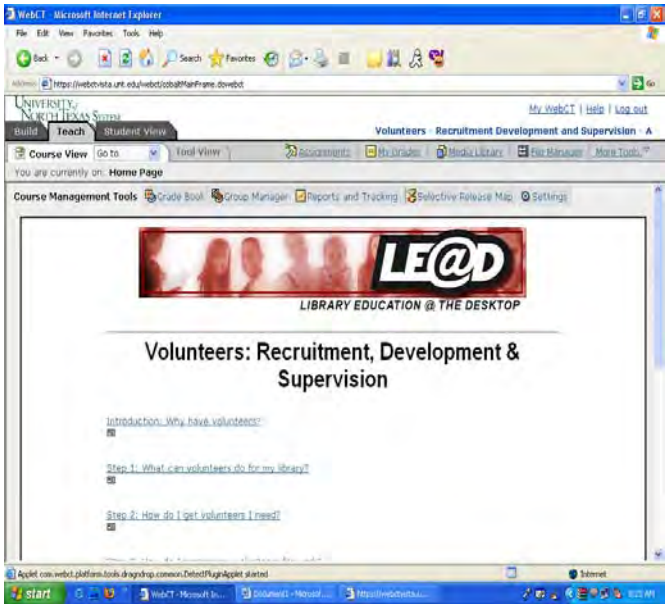


Figure 31. Interface of the courses in both versions in Vista.

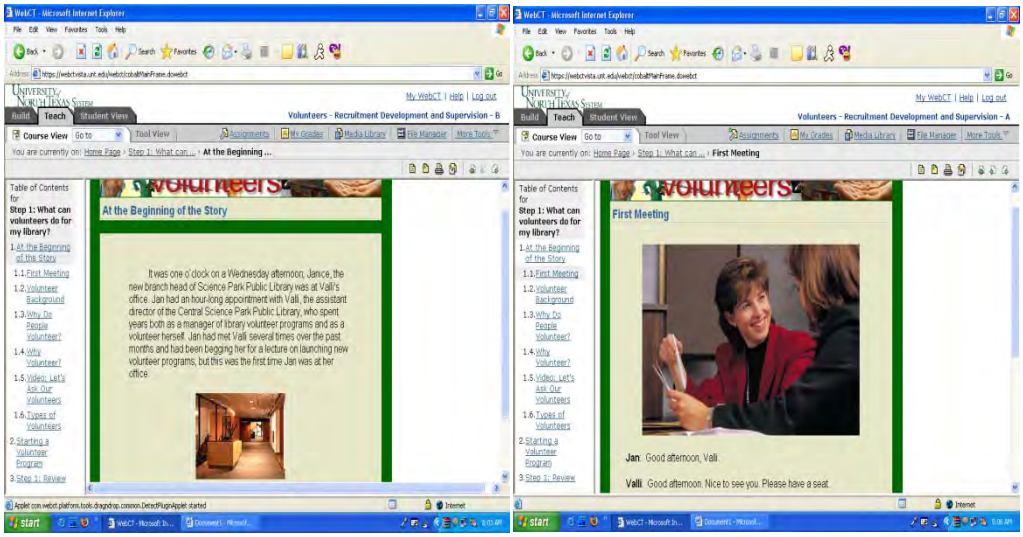


Figure 32. The beginning of the course in narrative form.

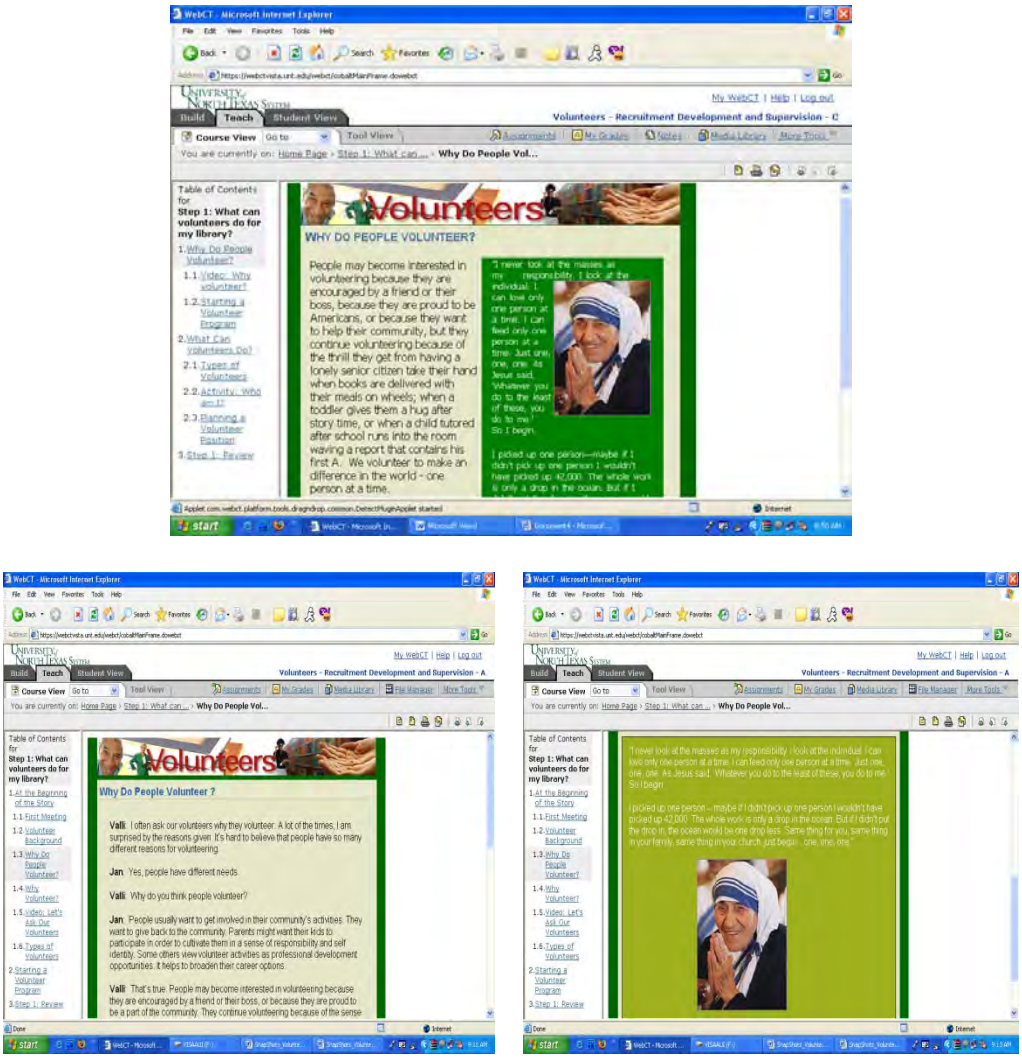


Figure 33. Screen shots of the original design vs. the transformed design 1.

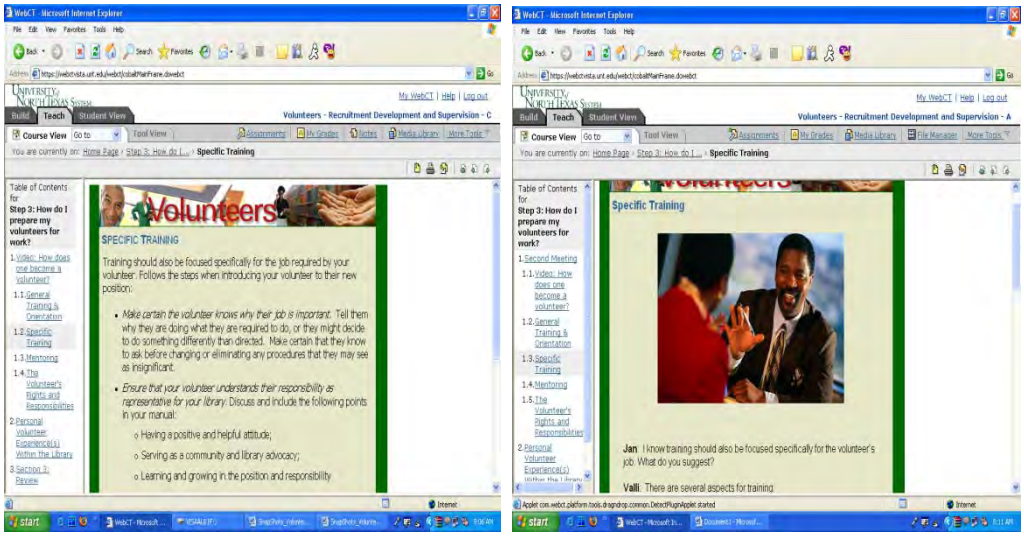


Figure 34. Screen shots of the original design vs. the transformed design 2.

APPENDIX B

RESULTS IN TABLES (TABLES 44, 45, & 46)

Table 44

Inter-Item Correlation Matrix of First Essay

	Event	Interact	Emotion	Descript	Contrast	Evaluation
i_Event						
i_Interact	.807					
i_Emotion	.343	.537				
i_Descript	.347	.334	.413			
i_Contrast	.440	.368	.291	.236		
i_Evaluation	.211	.383	.515	.321	.211	
i_Function	.489	.536	.536	.362	.358	.766

Table 45

Inter-Item Correlation Matrix of Second Essay

	Event	Interact	Emotion	Descript	Contrast	Evaluation
o_Event						
o_Interact	.508					
o_Emotion	.533	.490				
o_Descript	.610	.378	.472			
o_Contrast	.532	.345	.575	.272		
o_Evaluation	.435	.453	.559	.350	.475	
o_Function	.573	.459	.567	.524	.476	.773

Table 46

Factor Loadings and t*-Values for Measurement Models*

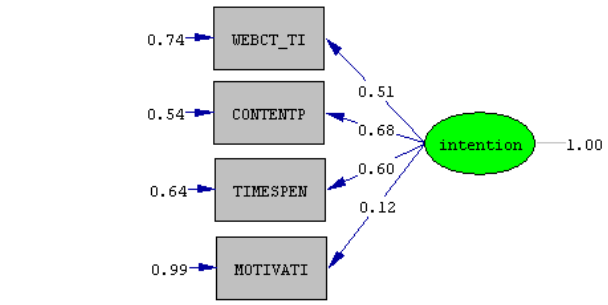
Construct	Indicator	Standardized Estimate	*t*-Value
IB	T_W	.50	3.66
	T_S	.67	4.34
	T_C	.61	4.13
OB	W_T	.84	7.96
	C_T	.88	8.30
	E_T	.58	5.33
PQ	P_Q	.84	8.23
	E_Q	.71	6.74
	D_Q	.82	8.07
PU	A_D	.85	8.33
	U_D	.73	7.00
	R_D	.76	7.31

Note. IB = Intentional Behavior, OB = Outcome Behavior, PD = Perceived Design Quality, PU = Perceived Design Utility;

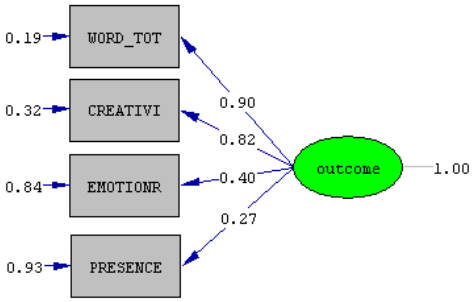
APPENDIX C

DIAGRAMS OF MEASUREMENT MODELS AND SIMPLE STRUCTURE MODELS

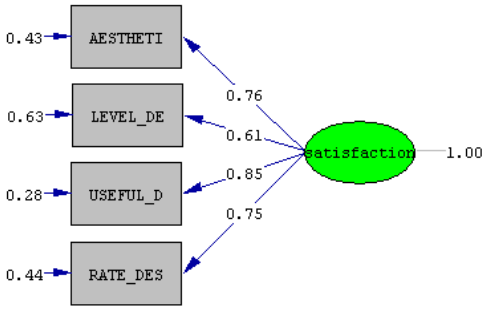
(FIGURES 35 & 36)



Chi-Square=1.19, df=2, P-value=0.55213, RMSEA=0.000

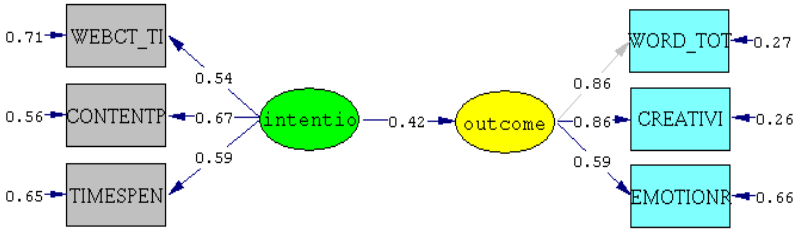


Chi-Square=0.93, df=2, P-value=0.62663, RMSEA=0.000



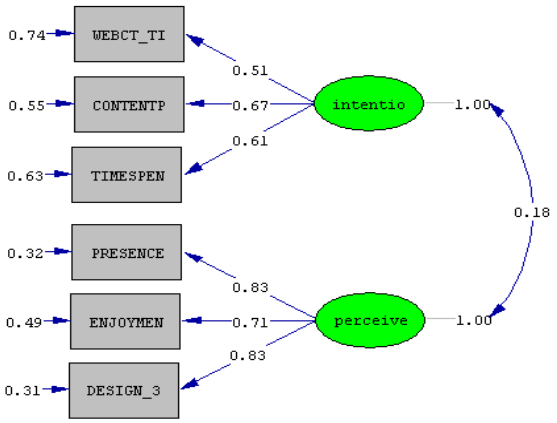
Chi-Square=1.74, df=2, P-value=0.41987, RMSEA=0.000

Figure 35. Initial individual measurement models.



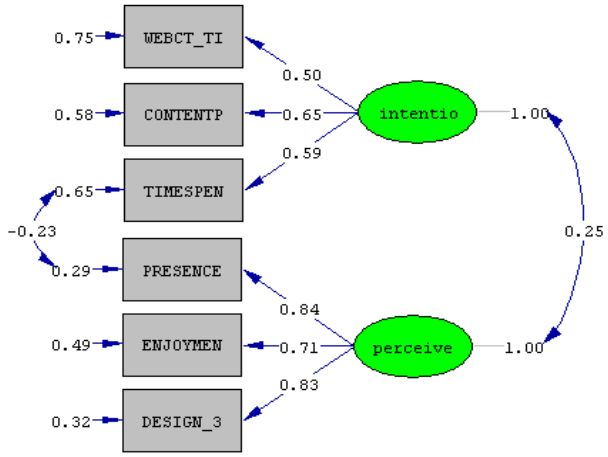
Chi-Square=3.67, df=8, P-value=0.88548, RMSEA=0.000

IB-OB



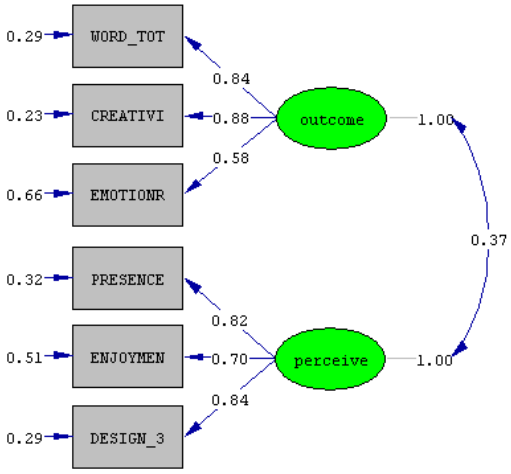
Chi-Square=13.84, df=8, P-value=0.08603, RMSEA=0.095

IB-PQ_1 and PQ-IB_1



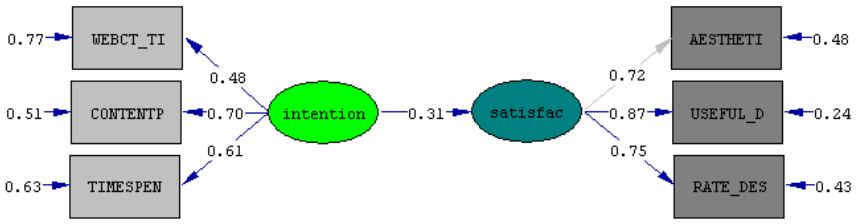
Chi-Square=3.99, df=7, P-value=0.78115, RMSEA=0.000

IB-PQ_2 and PQ-IB_2



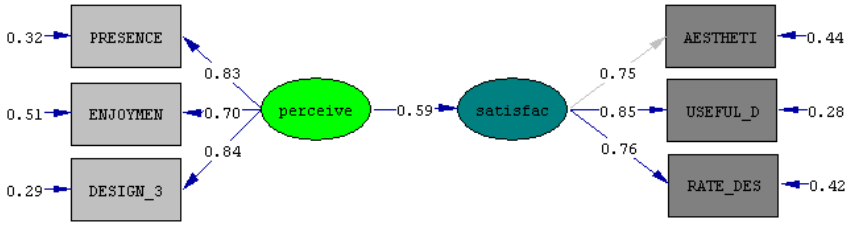
Chi-Square=5.06, df=8, P-value=0.75156, RMSEA=0.000

OB-PQ and PQ-OB



Chi-Square=12.04, df=8, P-value=0.14926, RMSEA=0.079

IB-PU



Chi-Square=3.92, df=8, P-value=0.86433, RMSEA=0.000

PQ-PU

Figure 36. Summary of sub-structural models.

APPENDIX D

THREE OPEN-ENDED ESSAY QUESTIONS

1. Describe Personal Volunteer Experiences within the Library

Technique you can use:
Try to rebuild mental images of the scene(s) of the experience. After you create the images, spend a moment thinking it over.

Please describe as much as you can. You may include the following questions:
Within a library, what is/was your experience as a volunteer? Where do/did you volunteer?
How were you recruited? What do/did you do as a volunteer? On average, how many hours per week do/did you spend as a volunteer?

If you have never participated in volunteer work in the library, but observed others involved in their volunteer work either as a supervisor or as an outsider, please describe the experience from an outsider's perspective.

2. Describe Personal Volunteer Experiences outside the Library

Technique you can use:
Try to rebuild mental images of the scene(s) of the experience. After you create the images, spend a moment thinking it over.

Please describe as much as you can about your volunteer experiences outside the library.
For example:
What did you do at the Boy Scout, service clubs, churches, civic and art events, etc?

3. Describe the Future of Volunteering

Please express your view for the future of volunteer work.

APPENDIX E

QUESTIONNAIRE 1

1-9 I. Volunteer Experiences - In the tutorial, you are asked to describe your volunteer experiences. "Your volunteer experience" refers to the one you described in your answers in the tutorial.

1. When did the volunteer experience within the library that you described in the tutorial occur?

1. Within the past 3 months
2. Between 3 months and 1 year
3. Between 1 and 5 years
4. Between 5 and 10 years
5. More than 10 years
6. Not apply

2. How clearly do you remember your volunteer experience within the library? Please rate the vividness of the memories of your volunteer experience within the library.

1. Extremely vivid
2. Vivid
3. Weak
4. Very weak
5. Not apply

3. How important to your career development is your volunteer experience within the library?

Please rate the importance of your volunteer experience within the library to your past career development.

1. Most important
2. Very important
3. Important
4. Somewhat important
5. Not important
6. Not apply

4. When did the volunteer experience outside the library that you described in the tutorial occur?

1. Within the past 3 months
2. Between 3 months and 1 year
3. Between 1 and 5 years
4. Between 5 and 10 years

5. More than 10 years
6. Not apply

5. How clearly do you remember your volunteer experience outside the library?
Please rate the vividness of the memories of your volunteer experience outside the library.
1. Extremely vivid
2. Vivid
3. Weak
4. Very weak
5. Not apply

6. How important to your career development is your volunteer experience outside the library?
Please rate the importance of your volunteer experience outside the library to your past career development.
1. Most important
2. Very important
3. Important
4. Somewhat important
5. Not important
6. Not apply

7. How did your past volunteer experiences affect your personal beliefs on volunteering?
Please rate the influence of your volunteer experiences (both within and outside the library that you described in your answers in the tutorial) on your personal beliefs.

1. Very high
2. High
3. Medium
4. Low
5. None
6. Not apply

8. Before you describe your volunteer experiences, did you use the technique to build mental images of the scenes as suggested?
1. Yes, very much so. I created images first.
2. Yes, slightly so.
3. Yes, I tried, but I cannot create images anyway.

4. No, I saw the suggestion, but I didn't follow it.
5. No, I didn't see the suggestion at all.
6. No, I didn't see the suggestion, but I did create clear images before I wrote.
7. Not apply

9. Your additional comments on your volunteer experiences
In the tutorial, you are asked to describe your volunteer experiences both within and outside the library. Do you have anything that you would like to explain? Or any comments on the above questions?

10-23 II. Tutorial Learning Experience

10. To what degree were you interested in the topic before using the tutorial?
Please rate the degree of your interest in this topic.

1. Very high
2. High
3. Medium
4. Low
5. None

11. Did you find new questions and ideas during taking the tutorial?
I found out that I had more to learn than I expected.

1. Strongly agree
2. Agree
3. Slightly agree
4. Neutral
5. Slightly disagree
6. Disagree
7. Strongly disagree

12. How much time did you spend on learning the tutorial both online and offline?
Please indicate the time you spent learning this tutorial both online and offline.

1. More than 5 hours
2. Between 3 and 5 hours
3. Between 2 and 3 hours
4. Between 1 and 2 hours
5. Between 30 minutes and 1 hour
6. Less than 30 minutes

13. Did you encounter one or more of the constraints while taking the tutorial? (check all that apply)

1. Limited access to computers
2. Physical discomforts (including impairment or illness)
3. Lack of technical skills
4. Limitation of time
5. Interruption(s) during study
6. None

14. Please select all of the emotions that you experienced while taking the tutorial. (check all that apply)

1. Excitement
2. Okay
3. Boredom
4. Complacency
5. Happiness
6. Sadness
7. Enjoyment
8. Too many to express
9. None

15. How much did you enjoy the experience of taking the tutorial?
I enjoyed learning the content.

1. Strongly agree
2. Agree
3. Slightly agree
4. Neutral
5. Slightly disagree
6. Disagree
7. Strongly disagree

16. In what manner did you take the tutorial?
Which of the following best represents the process that you used in taking the tutorial?

1. I took the tutorial chapter by chapter, and then took the post-test and questionnaires.
2. I first browsed everything in a certain amount of time, then took the tutorial

chapter by chapter, then took the post-test and questionnaires.
3. I attempted to answer the post-test (and/or questionnaires) first before taking the tutorial chapter by chapter.
4. I took the tutorial randomly in a non-sequential fashion first, and then took it again in sequential fashion.
5. I took the tutorial randomly in a non-sequential fashion.
6. None of the above

17. Do you have more to say about your learning process?

18. Were there times during taking the tutorial that the content was realistic to you?
The content makes me to think about real life.

1. Strongly agree
2. Agree
3. Slightly agree
4. Neutral
5. Slightly disagree
6. Disagree
7. Strongly disagree

19. Please rate the degree of your sense of presence in the scenarios.
I had a sense of being there in the scenarios described by the tutorial.

1. Strongly agree
2. Agree
3. Slightly agree
4. Neutral
5. Slightly disagree
6. Disagree
7. Strongly disagree

20. How memorable is the content of the tutorial to you?
I can clearly recall the scenarios presented in the tutorial.

1. Strongly agree
2. Agree
3. Slightly agree
4. Neutral
5. Slightly disagree

6. Disagree
7. Strongly disagree

21. How thought-provoking is the content of the tutorial to you?
The content allows me to imagine and think more.

1. Strongly agree
2. Agree
3. Slightly agree
4. Neutral
5. Slightly disagree
6. Disagree
7. Strongly disagree

22. Did you have trouble to associate one part of the tutorial content to another?
I think the content is presented coherently.

1. Strongly agree
2. Agree
3. Slightly agree
4. Neutral
5. Slightly disagree
6. Disagree
7. Strongly disagree

23. How easily could you relate the tutorial content to yourself (either in work or in personal life)?
I think that I could easily relate myself with the content.

1. Strongly agree
2. Agree
3. Slightly agree
4. Neutral
5. Slightly disagree
6. Disagree
7. Strongly disagree

24-30 III. Individual Characteristics

24. What are your characteristics?
Please select those characteristics that best represent you. (check all that apply)
1. Drawn to complexity

2. Need a lot of solitude
3. Independent in thinking (see things differently)
4. Highly sensitive
5. Persistence
6. Discontent (fault-finder)
7. Stubborn
8. Radical
9. Odd (have unusual habits)
10. Highly self-confident
11. Ambitious
12. Highly persevering

25. How creative are you?
Please rate the degree of your creativity compared to other individuals.

1. Highly creative
2. More creative
3. Normal
4. Less creative
5. Least creative

26. H ow do you r ate your s elf-organization s kills (monitoring a nd e valuating of information, time management, goal setting, etc) on learning in general?

1. High
2. Slightly high
3. Medium
4. Slightly low
5. Low

27. How easily do you get emotionally involved when you read or hear some stories?
I think that I could easily get emotionally involved.

1. Strongly agree
2. Agree
3. Slightly agree
4. Neutral
5. Slightly disagree
6. Disagree
7. Strongly disagree

28. How easily do you identify yourself with the characters in a story?

I think that I could easily identify myself with the characters in a story.

1. Strongly agree
2. Agree
3. Slightly agree
4. Neutral
5. Slightly disagree
6. Disagree
7. Strongly disagree

29. How easily do you enable yourself concentrate on a task?
I think that I could easily concentrate myself on a task.

1. Strongly agree
2. Agree
3. Slightly agree
4. Neutral
5. Slightly disagree
6. Disagree
7. Strongly disagree

30. How do you think others perceive you as an online communicator?
Please select the one that best describes how you think others see you as an online communicator.

1. I prefer to ask than to tell; I prefer to control than to express.
2. I prefer to tell than to ask; I prefer to express than to control.
3. I prefer to ask than to tell; I prefer to express than to control.
4. I prefer to tell than to ask; I prefer to control than to express.

31-36 IV. Demographic Information

31. Gender:
1. Male
2. Female

32. Age:
1. - <= 30
2. - 30-39
3. - 40-49
4. - 50-59
5. - >= 60

33. Ethnicity:

1. African (black)
2. Asian
3. Caucasian (white)
4. East Indian
5. Hispanic/Latino
6. Middle Eastern
7. Native American
8. Pacific Islander
9. Other

34. Highest level of education completed:

1. Elementary School
2. High School or equivalent
3. Vocational/Technical School (2 year)
4. Some college
5. College Graduate (4 year)
6. Master's Degree
7. Doctoral Degree (Ph.D)
8. Other Professional Degree (MD, JD, etc.)

35. Position at the library is:

1. Director
2. Professional Staff
3. Paraprofessional Staff
4. Library Board Member
5. Volunteer
6. Other

36. How long have you been working in a library professional position?

1. Never
2. Less than 1 year
3. 1 to 2 year
4. 3 to 5 year
5. 6 to 10 year
6. More than 10 years

APPENDIX F

QUESTIONNAIRE 2

1. How do you rate your learning experience as an aesthetic response to the content?
The tutorial content created an aesthetic response in me.

1. Strongly agree
2. Agree
3. Slightly agree
4. Neutral
5. Slightly disagree
6. Disagree
7. Strongly disagree

2. How do you rate your learning experience as an experience of the inner self connects to the outer world?

The tutorial content touched me personally.

1. Strongly agree
2. Agree
3. Slightly agree
4. Neutral
5. Slightly disagree
6. Disagree
7. Strongly disagree

3. Select the chapter(s) that interested you most. (Select all that apply)

1. What can volunteers do for my library? (Includes why do people volunteer; starting a volunteer program, types of volunteers, and planning a volunteer position.)
2. How do I get volunteers I need? (Includes writing job descriptions; volunteer qualifications; recruiting methods, interviewing and hiring volunteers.)
3. How do I prepare my volunteers for work? (Includes training, mentoring, volunteer's rights and responsibilities.)
4. How should I supervise and evaluate my volunteers?
5. How do I offer recognition for my volunteers' work?

4. Were there different stages of your learning the tutorial? What were they?

For example, you browsed some part of the tutorial, reflected on some sections, checked and retrieved some part of the tutorial, etc.

5. How do you think using more visual tools in formal education for adults?

I am positive about it.

1. Strongly agree
2. Agree
3. Slightly agree
4. Neutral
5. Slightly disagree
6. Disagree
7. Strongly disagree

6. How do you think using more narrative in formal education for adults?

I am positive about it.

1. Strongly agree
2. Agree
3. Slightly agree
4. Neutral
5. Slightly disagree
6. Disagree
7. Strongly disagree

7-12 Tutorial Content

7. How advanced was the level of content in this course?

The information offered in this course was:

1. Complex
2. Slightly complex
3. Appropriate
4. Slightly simple
5. Simple

8. How useful was the information?

a. Very useful
b. Useful
c. Slightly useful
d. Neutral

e. Slightly lacking
f. Lacking
g. Seriously lacking

9. Did you use the additional components offered in this tutorial?

(For example, streaming video, audio files or interactive [Flash] animations)

1. Yes
2. No
3. Not Applicable

10. Did you find the additional content (i.e. video or interactivity [Flash]) beneficial to your understanding of the material?

It was beneficial to me.

1. Strongly agree
2. Agree
3. Slightly agree
4. Neutral
5. Slightly disagree
6. Disagree
7. Strongly disagree

11. How would you rate the tutorial overall?

a. Excellent
b. Good
c. Fair
d. Poor

12. How could this tutorial be improved?

Please offer suggestions as they will be used for revisions and future courses.

13-14 Personal Requirements

13. Why did you take this tutorial?

Select all that apply:

1. Continuing education credit
2. Management requirements
3. Interested in this topic
4. Other

14. How important is the availability of education via distance learning to your skill development plan?

a. Very important
b. Important
c. Somewhat important
d. Not important

15. What are topics you would like to suggest for future online training?

List all subject areas.

16. Are there any positive &/or negative experiences you would like to share concerning your learning experience?

Please be specific.

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