The Power of Intertextuality: A Vygotskian Way of Connecting Pedagogy with Design Activities

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ABSTRACT
The purpose of this paper is to provide a framework of understanding of the interrelationship between the diverse design learning activities and the principles of constructivist pedagogy. To be able to enhance a student’s sociocultural learning process one must recognize and understand the connection between theory and practice. This paper recognizes and uses intertextuality as a useful tool to identify and measure students’ cognitive and sociocultural learning capabilities. Two case studies will be discussed to emphasize the significance of understanding the cognitive process of sociocultural learning in design studios. Based on a review of Vygotsky’s pedagogical literature we will use the analysis of students’ cognitive development in design studios from two case studies to develop the following:

(1) To conceptualize design studios as a multi-dimensional space where a variety of student writings are created, blended and intertwined to construct an intricate web of intertextuality.
(2) To investigate design learning through the development and interpretation of intertextuality.
(3) To identify how a student and group members interact and interweave their texts, and how they also create a cultural learning system.
(4) To connect the social processes on cognition and the internalized process of learning through Vygotsky’s theory of Zone of Proximal Development (ZPD).

Keywords: intertextuality, design learning, Zone of Proximal Development (ZPD), design discourse

I. Introduction
Modern design has been identified as positivistic, rationalistic, and universal with the belief in rational planning of social orders, and the standardization of knowledge and production. The conventional design thoughts and methods based on positivism, however, are not adequate to deal with the rapid and fundamental changes in the post-industrial society. Postmodern researchers have produced a revised justification for knowledge. Unlike the modernists’ thought on knowledge as a value-free and context-free entity, the postmodernist believes that knowledge is not value neutral and that knowledge is the result of a way of knowing. Postpositivism, naturalistic inquiry or postmodernism is an emerging and alternative paradigm that guides inquiry in different ways from positivism. The paradigm shift toward postmodernism has also opened a new debate on the acquisition of design knowledge and the presentation of education. The importance of understanding this paradigm shift will
be presented as a new pathway to design thinking and design learning in this study.

Generally, a paradigm shift is deeply related with epistemology. As a subdivision of philosophy, epistemology concerns itself with the basic assumptions in our way to gain knowledge of the world we are living in. Epistemology in design deals with the several basic questions: What is knowledge? How does one come to know and understand design? What kinds of knowledge and techniques shall be taught to design students, and how shall it be taught? Escaping from the positivistic epistemological structure, the current studies in the literature on design education have emphasized the postpositivist approach to deconstruct and to reconstruct the nature of design knowledge.

The purpose of this paper is to gain a better understanding of the postmodern learning theory and to provide a framework of constructing the interrelationship between the diverse design learning activities and the principles of constructivist’s pedagogy within the classroom. Constructivism is an umbrella term covering diverse theories based on postpositivism, and primarily centered on the nature of knowledge and the cognitive subject (Schwandt, 1994). Constructivist pedagogy considers “a matter of creating the developmental condition that allows students to generate their own ideas effectively, in essence to develop their minds, their voices, and themselves” (Baxter Magolda, 1999, p.8). In order to connect constructivist pedagogy within the design learning environment, this paper recognizes and uses intertextuality as a useful tool to identify students’ cognitive and sociocultural learning processes. Two case studies were conducted to identify how a student and their peer group members interact and interweave their texts, and also how they create a cultural learning system through the use of these texts. It is a premise of this paper that once pedagogy and design activities are interconnected through the learning process, educators and designers can play a key role in enhancing successful knowledge management within a studio/company’s culture that will improve its overall performance.

II. Intertextuality
2.1. Text and intertextuality

Cognition is defined as “the act or process of knowing,” and learning is “the act or process of acquiring knowledge or skill” (Webster, 1989). In the field of learning theories, one of the challenging problems is how to bring about improvement in cognitive strategies, so that every learner is working up to potential. Gagné (1985) defined cognitive strategies as “the skills by means of which learners manage their own internal processes of attending, learning, remembering and thinking” (p. 55).

To identify a student’s internal process of thinking and learning, this study apply the concepts of text, its textuality, and intertextuality to the context of a design studio course. Texts are culturally produced objects and are interpreted as part of the social practice. Barthes (1977) defined a text as a multi-dimensional space in which a variety of writings blend and clash. The text is what is read, and textuality or textualities is how it is read. It means a reading of the text occurs through its textuality or textualities. Through its textuality, the text makes itself understood in a particular way. It is the textuality of a text that produces knowledge about the text.

Text linguistics, which deals with texts as communication system, takes into account the form of text and textual communication. To create textual communication, there are seven standards of textuality: cohesion, coherence, intentionality, acceptability, informativity, situationality, and intertextuality. Among the seven standards, intertextuality concerns the factors, which makes the
utilization of one text dependent upon knowledge of one or more previously encountered texts (Searle 1983).

The concept of intertextuality was formed using poststructuralist perspectives on language and knowledge. As textuality is a process and practice, intertextuality is the process whereby one text plays upon other texts. As Barthes (1977) explained, “the intertextual in which every text is held is not to be confused with some origin of the text” (p. 160). Rather, it generates and refers to further elements within the realm of cultural production. For poststructuralists, intertextuality is understood in the context of the relationship between knowledge, power, and change.

2.2. Language and languaging in design learning

Design and culture maintain a special relationship because design can naturally connect the daily practice with the discipline under the original characteristics of pluralism, practicality, and applicability. In this structural frame, designing and learning activities are understood and interpreted from the sociocultural learning theory. It is important to take into account how students can recognize and use language in their studios and lives. This recognition and use of the language is linked with the ways in which they construct their learning world.

Based on postmodern learning theory, this paper uses textuality and intertextuality as a research tool to read and interpret a student’s learning progress. This includes the relationships between the reader and the writer, and between the students and their instructors. The following research questions were asked within the analysis of the studies. What is the role of intertextuality and why is it important in design education? How do students make intertextual connections in the design learning process?

Klaus Krippendorff (1995) takes design to be constituted in processes of languaging. He strongly recommends that design educators acknowledge that design takes place in discourse “by talking and by listening to the voices of ‘Others’, through writing and reading ‘Others’ writings, and by commenting on and rearticulating what is made available to us (p. 157).” He emphasizes that design discourse surfaces in textual matter, which is continuously “(re)read, (re)written, (re)produced, (re)searched, (re)articulated, elaborated or rejected. A community continually (re)generates its textual matter and acquires the character of a dynamically connected diversity…Members of a discourse community continually test each others’ commitments to it, learn from each others’ practical successes and failures and generate motivation for their participation” (p. 142).

Writing is one way of languaging, a formal system of representation. Writing represents, persuades, and reflects on the relationship between that text and other texts. Writing reports or journals in design courses generate the text and therefore can be used as the object of social/pedagogical studies. Writing reports or journals has been emphasized in design education research. For example, Giard and Gilles (2001) suggest writing a learner’s report as a co-operating tool between the instructor and students. By writing a learner’s report, the student begins to reflect on the process of designing, and enhances and reinforces the design experience. Through this cognitive experience, “students become aware of inconsistencies, misinterpretations, and gaps in information…the learner’s report is a tool that assists the student in learning to learn” (p. 167).

Writing a report/journal in design education unfolds its internal relations to the design process and internalizes the writer’s thinking procedure. To use intertextuality as a research tool, this study
considered important aspects of writing related to intertextuality as follows.

- Recognition of appropriate vocabularies as texts, which helps structure the basis of design knowledge
- Use of appropriate citations or references to intertextualize the text
- Connection with ‘Others’, including experts, instructors, and students to reinforce a knowledge building community
- Richness of data included within the text (quantity and quality)

In this study, intertextuality is defined and used as the process of making connections between current and prior text. The following sections investigate constructivist learning theory and pedagogy in order to identify the relationship between intertextuality and their cognitive and psychological impacts on design learning.

**III. Constructivist Pedagogy**

**3.1. Vygotskian pedagogy**

Lev Semenovich Vygotsky denied the objectivist epistemology and emphasized social interaction rather than the subject-object interaction. Vygotskian thoughts are summarized in the following three assumptions (Petraglia.1998. p. 43):

- A developmental approach to cognition is required to understanding human learning
- An individual's mental functioning is derived from social interaction. A learner's cognitive behavior is an internalization of the social practices that he or she has experienced
- Sociohistoricism is closely tied to the belief that social practices are mediated practices that are dependent on the physical and mental tools and symbols that the learner uses to engage in them

These three assumptions express that the basic assertion of the Vygotskian theory is in the social learning. Internalization is one of the most important Vygotsky's concepts relevant to social determination of learning. This concept can be expressed fully within Vygotsky's two famous constructivist learning theories, “interaction of social and psychological/cognitive planes” and “Zone of Proximal Development (ZPD).”

Vygotsky created a concept of Zone of Proximal Development (ZPD) representing the distance between two conceptual levels of cognitive zones: the real level of development and the potential level of development. Vygotsky (1978) defined the ZPD as “the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers” (p. 86). As an example of child development, ZPD becomes the cognitive zone in which children can work with more knowledgeable peers to perform tasks that they can go on to perform independently. Another significant contribution of Vygotskian theory is its embodiment of learning in everyday cultural practices. Vygotsky linked formal and informal learning environments by the promotion of social interaction, which connected the student with the student’s life outside the classroom. Contemporary cultural-historical scholars have elaborated on Vygotsky’s ideas by adding
the other contextual dimensions and expanding the concept of context in relation to cognitive activity.

3.2. ZPD in the constructivist design learning

Applying the concept of ZPD to design learning can be powerful, because the ZPD theory has been recognized as an “aid for developing higher order functions and behaviors from the social level, and subsequently influencing the individual level” (Hung, 2002, p. 207). For the development of the research methods for this current study, we interpreted the ZPD theory in two ways. The ZPD represented (1) the distance between a student’s potential level of development and actual/real level of development, and (2) the internalization process from the social level to cognitive/psychological level (Figure 1). Students’ collaborative interactions and instructors’ feedback can support the internalization of design knowledge and experiences, and can influence and determine the actual development of new design learning.

Figure 1. Internalization of new design learning based on Vygotsky’s ZPD theory

The concept of ZPD representing the distance between two conceptual levels of the cognitive zone provides a useful framework to understand and interpret intertextuality in the context of design learning. The following case studies explore the applicability of intertextuality and the effectiveness of applying the concept of ZPD as a tool for the interpretation of intertextual data and the contextualization of students’ learning processes. For this purpose, this study investigates two cases studies conducted in two design schools, one in the US and another in Korea. Although language and languaging is crucial in this study, the influences of using different language are not considered in the research boundary. Instead, this study focuses on the textual matter and intertextual issues surfacing during the learning processes.

IV. Case Studies of Intertextuality in Design Studio Courses

A case study refers to a choice of what is to be studied. The rationalization for using case studies in educational research is illustrated by Stake in the following, “case studies are of value for refining theory and suggesting complexities for further investigation, as well as for helping to establish
the limits of generalization” (Stake, 2000, p. 448). The following case study uses as a tool an “instrumental case study,” This type of case study tool is mainly used to provide insight into an issue or help redraw generalizations.

This study used two groups of students enrolled in design studio courses from two countries and two different levels of design skills. Among several courses which were taught under the same educational philosophy and methodology, the selection of these two cases are purposeful and appropriate, because the differences and similarities that occurred in intertextuality can address the fundamental issues of design learning procedures without language barriers. Both cases used computer supported learning programs as a supplementary learning tool, where all textual matters could be written, read, elaborated, and regenerated. In order to increase the validity and credibility of the data analysis, this study triangulated diverse data resources: on-line information posted on the computer supported learning program, a student’s personal weekly journal/report, the design problem solving process and its outcomes, and collaborative learning activities.

4.1. Intertextuality in the second-year design studio

This case study was conducted with a design studio course containing second-year industrial design students at the University of Houston, Houston, Texas. This course was designed to develop fundamental design knowledge and skills with an emphasis on creative design problem solving. Students completed three projects, which were not complex design issues, but appropriate enough to integrate design fundamentals into design problem solving. A centralized university based WebCT program was used as a supplementary instructional medium which acknowledged the importance of textual matters in required readings (handed out to the students and placed on line) and additional knowledge development during the three projects. Students were encouraged to read ‘Discussion’ boards related to the topics and write critics on their readings on the WebCT. The significance of working with and learning from ‘Others’ in the design process was emphasized many times in the face-to-face lectures to promote the students’ active participation in their cognitive knowledge development. Writing weekly journals was also required to narrate students’ daily learning activities. They were asked to reflect upon their development and actions in the context of the design problem solving process on a weekly basis. Data gathered for the analysis of intertextuality are:

- Weekly Journals: number of written journals, texts in journals (design vocabulary, references used, connection with writers/experts or information within the field, design knowledge and skills, understanding of the processes in their learning activities)
- Reading and Writing on the ‘Discussion’ board: design topic/issues in relation to the design project, intertextuality engaged in other writers’ text, preference of data collection during the three projects.

Based on this qualitative data gathering from these diverse sources, the intertextual processes were conducted throughout a sixteen-week semester. Entries from the ‘Discussion’ board showing each student’s preferable text and his/her intextuality were captured and formed into a map to visualize the boundary of intertextuality. The following illustrates the intertextuality that occurred within the ‘Discussion’ board (Figure 2):

- The map illustrates the text generated in the three projects and the development of
intertextuality interrelated with other texts.

- The distance between the clustered texts indicates a variety of text issues and their relative connections to the design problem solving.
- All texts are sequentially linked from the data source of written time, the writer, and his/her textuality (when, by whom, for what).

![Figure 2. The Development of Intertextuality for Three Projects](image)

The width and the depth of the intertextual boundary illustrated in Figure 2 are limited and restricted. This could reflect the level of the design class (second year), which did not require a high order of knowledge construction, or it could reflect the students' lack of educational background in constructivist learning environments. The student’s engagement in journal writing, the number of journals written by students varied from twelve to five, also indicated a significant difference between individuals in their dimension of intertextuality development. It was also found that there was a measurable significant correlation between the quantity of journal writings, the quality of the text and their intertextuality in journals.

4.2. Intertextuality in the fourth year design studio

This case study was conducted with a senior industrial design studio course at the KAIST (Korea Advanced Institute of Science & Technology) in Daejeon, South Korea, using a newly developed Web-Based Design Learning (WBDL) program. This course was developed around a group project, which entailed the design of a complex subject matter, a “wearable computer design.” A “wearable computer design” was a symbolic theme, which expanded the design scope by blurring the boundaries between the discipline of design and other disciplines such as electronic, electrical, mechanical engineering, and fashion. The objectives of the course are summarized as: (1) to establish
cross-fertilized knowledge bases for solving technology-oriented design problems with a theme of “wearable computer design”; (2) to create social learning communities among students, experts, and instructors; (3) to explore diverse design issues and contextualize them in the design problem; and (4) to demonstrate and evaluate design outcomes of “wearable computer designs” and its problem-solving processes.

The WBDL program provided a database to record each student’s activities for knowledge construction and their diverse learning activities. The administrative data such as dates of information posted and number of visits in the menu of WBDL program were used as useful resources to identify the intertextuality and the quality of knowledge construction shared by the whole class.

The data referring to a group’s intertextuality showed a wide difference in participation and use of the WBDL program among the eight student groups. For example, in the menu of ‘Design Table,’ the frequency of posting information and exchanging ideas showed a frequency range of participating group members from 108 hits to 21 hits. The sequence of information posted on ‘Design Table’ also illustrated how the learning occurred within the each of the systems where the students and instructor interacted with each other, with materials, informational and conceptual resources concerning the subject matter of ‘wearable computer design’.

From the point of view of intertextuality, the student’s quantitative participation data in the menu of the ‘Class Board’ could be interpreted differently. For instance, one information/text uploaded by a student who wrote few texts on ‘Class Board’ was reviewed and retrieved 42 times by other students; this was scored as the third highest visited site. This impact factor of interpreting raw data represents the effectiveness of applying intertextuality as a tool to crosscheck the reliability of data, and to interpret the meaning through the iterative induction.

Unlike the previous case with the second-year students, this case showed a broader, deeper level of intertextuality. The complex design problem along with the more experienced students created a learning environment which was more interactive, collaborative, and inter-responsible. The dynamics and the amount of correspondences showed a significant pattern of intertextuality participated in by all group members.

Following constructivist’s theory, the student group members were expected to help each other with the review process through dynamic correspondence. The documented intertextuality can be interpreted as good evidence of a good collaborative learning environment with a level of understanding that the group work was performed socially and collaboratively. The social constructivists have provided a perspective that the different levels of social communication and interaction influence the quality of learning. Therefore, it was assumed at the start of the study that each student’s frequency and level of participation in intertextuality would impact the quality of his/her learning progress and the final design outcome.

V. Findings and Implications

In both cases, the importance of intertextuality is acknowledged as a learning tool as well as a research tool. Writing a personal journal/report is recognized as an effective cognitive strategy to enhance a student’s self-authorship and self-esteem by reflecting on their process of designing and learning practices. The text written in personal journals can be associated with the student’s other text written within the computer-based environment, and its intertextuality externalized a student’s
cognitive learning process. The intertextuality was initiated and developed initially from a small set of
texts, but it established a big social dialogue at the end of learning period. To accomplish successful
social communication and intertextuality, intentional and cohesive actions were required to encourage
each correspondent’s learning process.

Through the analysis of the intertextuality in the two cases, it was assumed that a student’s
social learning as well as cognitive processes played a major role in the change of the students’
academic performances and cognitive developments. The discussion concerning academic
performance and the learning processes should be developed further using Vygotsky’s Zone of
Proximal Development (ZPD) theory. Questions such as, “How could ZPD extend each student’s
performance progress while being assisted by a self learning process and the ‘Others’?” should be
asked.

The progress of each student’s academic performance with inter-personal and intra-personal
activities can be analyzed within the scope of intertextuality related to the two conceptual levels of the
cognitive zones. The distance between the real level of development and the potential level of
development can be analyzed and contextualized with: (1) the relationship between the final design
outcomes and the intertextuality with the development of a variety of texts (width) and their interrelated
correspondences (depth); (2) the relationship between the final design outcomes and the
participation/guidance of more knowledgeable peers/experts through the design problem solving
process; and (3) the relationship between collaborative work with more advanced, capable peers and
the individual tasks performed independently.

As we consider the group and class intertextuality based on the ZPD theory, the group
performance can be structuralized with the zone of dynamic correspondences formed with texts and
its intertextuality. A group of students can explore a variety of design issues and can develop strong
intertextuality using frequent and dynamic correspondences that create several intertextual zones to
be developed for the final design outcome. In the second case study, one group developed three
intertextual zones and these intertextual zones became evidence of the group’s learning progress
from its potential development to the actual one related to the ZPD theory. Therefore, this case study
demonstrated that the generation of dynamic correspondence and intertextuality facilitates a group’s
learning progress from the beginning of the problem solving by enhancing the mutual trust and social
relations among group members. The more group members generate the intertextual zones, the more
their collaborative learning can be promoted.

The establishment of knowledge communities, which can invite experts from a variety of
design areas from outside of the campus, strengthens the intertextuality. As an example, in the
second case study, one student group built two knowledge communities; one from within a medical
service and one from within the fashion industry during the problem-solving process. There is no doubt
that the power of intertextuality developed with those experts was reflected in the strength and quality
of the performance of those groups and their final design outcome.

Furthermore, as students begin to understand the concepts of the constructivist pedagogy
and the ZPD theory used during their learning progress, they can utilize the strengths of these theories
to create a positive and active environment for individual and group design learning. From the
comparison analysis of the different groups’ performances in case study two, it was apparent that the
most successful group was more aware of and more concerned with each other’s learning processes.
V. Summary

The case analysis and their interpretations in this study show that the fundamental characteristics of communication, collaboration, and construction of intertextuality in the learning process are highly influential for the quality of design education. The application of intertextuality to the design education research was found to be effective and promising in implementing and enhancing the design learning theory and pedagogy.

This study takes into account 'languaging' and 'text' of a primary research data gained within preliminary case studies. The possible influence of language and the instructional medium for (re)reading and (re)writing text was not included within this initial research boundary. As a foundational study, the emphasis of this research was to integrate the constructivist learning theory into the design learning process. Once the cognitive and social aspects of the design learning processes are analyzed and their interrelationships with intertextuality and pedagogical theory are generalized, it will be possible then to expand the research boundaries of future studies. We will explore how a more in-depth study using 'languaging' and 'text can be constructed using more diverse student groups from several different cultures.

This initial study documented, through the analysis of two different groups of students from two different cultural backgrounds that personal, individual differences are easier to identify and more important than cultural differences when used to construct intertextuality in design learning. Based upon these findings advanced case study research will be developed which will further the creation of a more fully grounded theory in constructing a cognitive and a social learning zone with intertextuality.

References