From Knowledge Expression to Knowledge Construction: My Exploration on the Concept of “Writing to Learn”

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Development of research interest in writing-to-learn

In 2011, I graduated from the University of Pennsylvania as a master student in TESOL. At that point, I did not have a specific research interest, but I clearly knew that I would focus on second language teaching, especially academic language, and that was derived from my prior experience. As a learning instructor at the Weingarten Learning Resource Center and an English language learner (ELL), I had plenty of opportunities to interact with international students whose native language is not English. Through extensive observations and my personal experience as a non-native English speaker, I developed an understanding towards how challenging it is to master academic English. I found that despite a strong research experience and professional knowledge, many ELL students perform below their cognitive ability, or perform less satisfactorily than their native peers because of insufficient language proficiency (Dlaska, 1999). When I applied to the Educational Theory and Practice doctoral program, I planned to do research on academic English teaching, in order to help ELL students achieve academic language proficiencies that will support their professional growth.

Since my first year in the ETAP department in School of Education, my knowledge of language education has been broadened through the coursework, and my research skills have been becoming more mature through working as a graduate assistant. In Dr. Applebee’s class, I first recognized that language and literacy played significant roles in one’s cognitive development. As Nelson (2007) argues that children make sense of the world through language
learning, language not only serves as a vehicle for expression, but also a tool for intellectual
growth. Moreover, language is not neutral, because it leads children to the “community of
minds” where people “evaluate actions on the basis of intentions, beliefs, goals, plans, and other
mental properties, requires both experience with the social and cultural world” (Nelson, 2007).
These principles can also be applied to adolescent or adult learners of a second language, who
attempt to engage in an unfamiliar “cultural community of mind”. Language is not only the final
product or demonstration of participating in a new cultural community, but more importantly, a
path to acknowledgement, understanding, and engagement in that culture.

Also in that class, I read Vygotsky’s (1986) *Thoughts and Language*, and first
encountered sociocultural theory, which shaped my current conceptions of language teaching and
learning. Compared with Piaget’s notion of cognitive development, Vygotsky stressed on two
points in the language learning process. Firstly, he places more emphasis on the role of language
as a tool of intellectual adaptation, and thus language can be used by adults through systematic
instruction to promote children’s mental ability into a new level (Vygotsky, 1986). Secondly,
learning happens through collaboration and social activities in a cultural context, and cannot be
separated from children’s prior knowledge and experiences, which is named as “Zone of
Proximal Development” (ZPD). Therefore, teachers need to keep in mind of students’ cultural
and epistemic background when giving instruction. In other words, even though English is the
objective language for ELL students, their original cultures and thinking schemas need to be
acknowledged and valued, because they are the foundations for further knowledge construction.

These readings changed my initial thought of academic English education and offered me
a new perspective of language and literacy. Language teaching is not simply a bag of techniques
or a series of training for ELLs to memorize linguistic features and conventions, and to
reproduce them for appropriate communication. Rather, it is a cognitive growth process, where ELLs internalize content knowledge through thinking in the second language. It is not only for ELL students, but also for L1 students, as they will finally enter a professional field, and need to adopt a new “community of mind” and community discourse, which may be very different from colloquial English. As I wrote in the final project for Dr. Roger’s class, learning happens through self- investigation and personal reflection, rather than mechanical repeating. What students need to achieve is not the ability to reproduce existing knowledge and language, but the competence to construct knowledge and contribute to the field through language.

In addition to my growth in professional knowledge, I also strengthened my research skills for both qualitative and quantitative study. In Dr. Wilcox’s research seminar, I completed my first research, and learned various methodologies for qualitative research, from framing research questions to interpreting results. As a graduate assistant, I worked on the NSWI project, which offered me access to students’ writing samples. When I read the data, I realized that these students’ writings for science classes were very limited, when compared with their writings for other subjects. With a new perspective on language and thinking, I was curious about the role of writing in science learning, and how students, especially ELL students acquired scientific writing and thinking skills. With great help and encouragement from Dr. Wilcox, I finally framed two research questions and started a study embedded in the NSWI project: a) What kinds of writing do adolescent students produce for their science classes? b) What levels of epistemic complexity are reflected in adolescents’ scientific writings? I referred Salmon’s definition of epistemic complexity, and that is students' efforts to produce not only descriptions of the material world, but also theoretical explanations and articulation of hidden mechanisms central to the nature of science (Salmon, 1984). When the research questions and schedule was set up, I started to review
relevant literature for theoretical framework. Meanwhile, I took Dr. Oliveira’s course, *Science and Mathematics Discourse*, looking for an appropriate schema to analyze educational research data and interpret study results. In this course, my understanding toward scientific discourse analysis has been fully developed, through being exposed to a good amount of popular notions and latest studies on science education.

**Exploration on sociocultural and sociocognitive theory**

In my second semester in ETAP, I started the scientific writing project with a close examination on relevant theories and literature, aiming at acquiring a deep understanding of literacy activities as tools for knowledge acquisition and intellectual adaptation. To situate this study and my own framework for science learning through writing, I followed Lemke’s proposition of taking a sociocultural perspective on science education. This proposition put forth that “viewing science, science education, and research on science education as human social activities conducted within institutional and cultural frameworks” (Lemke, 2001). This gives substantial theoretical weight to the role of social interaction, which is perceived to be central and necessary to learning as in Vygotskian tradition (cited in Lemke, 2001).

Sociocultural theory emphasizes the interdependence of individual development and social contexts. Three major themes were identified and further elucidated in Vygotsky’s writing (Wertsch, 1995). The first theme is that individual development, including higher mental functioning, has its origins in social sources (Wertsch, 1995). Learners acquire knowledge and strategies through participating in different aspects of social life. These joint social activities work together and affect an individual’s learning process. The second Vygotskian theme that Wertsch (1995) proposes is that all social activities are conveyed through semiotics, and language is the major one in all kinds of semiotics. He points out that language serves as a
medium realizing the possibility of social contexts, where individual cognitive growth happens. Lastly, learning occurs through productive social interactions, which refer to the instruction orient toward the ZPD (Wertsch, 1995). The last theme places stresses on the value of guided participation and communication in discourse, and therefore, serves as a foundation for a number of studies on collaborative learning.

Specifically for writing instruction, sociocultural theory serves as the cornerstone for the writing-to-learn movement, which was highlighted by a growing body of literature. Writing-to-learn is “based on the observation that students’ thought and understanding can grow and clarify through the process of writing” (Little & Bethel, 2005, p.57). It was originally proposed by James Britton (1975), who also identified three functional types of writing: transactional, poetic, and expressive. As expressive writing is used for generating and organizing ideas, it resembles the notion of “inner speech” identified by Vygotsky (Little & Bethel, 2005).

Advocates of writing-to-learn believe that good writing and careful thinking always go hand in hand. Therefore, writing can be utilized in the development of critical thinking and problem-solving skills (Bereiter & Scardamalia, 1987; Chuy, Scardamalia, & Bereiter, 2012; Hand, Wallace, Yang, 2004; Langer & Applebee, 1987; MacArthur, Graham, & Fitzgerald, 2006; Moje, 2011). According to Applebee (1984), four major functions are attributed to writing: a) the permanence of text allows writers to reorganize and revise with careful thinking; b) the explicitness in writing remains a constant meaning beyond contexts; c) the conventional forms of discourse shape new ideas and experiences; and d) the active nature of writing offers a medium to explore implications. Being instructed through writing-to-learn pedagogy, students’ retention and understanding of subject matter content will be greatly enhanced, and their higher cognitive skills and ownership of knowledge will be more fully developed.
As I explored the writing to learn movement, I encountered another significant theory that was expanded from socioculturalism: sociocognitive theory. Similar to sociocultural theory, sociocognitive theory embraces acknowledgement of previous knowledge, communication with group members, and recognition of group diversity (Glaveanu, 2011). Despite these consonances, sociocognitive is different from sociocultural theory as the former posits that learning occur in one’s own mind, while the latter emphasizes that learning happen in the in-between space of intersubjectivity (Glaveanu, 2011). From a sociocognitive lens, after absorbing social and cultural input, an individual is able to complete the process of knowledge conceptualization as a personal activity, rather than interacting with other members in social activity.

Capsulated in sociocognitive theory, Scardamalia and Bereiter (1987) examined writers’ cognitive process in writing activities, and distinguished two learning models: knowledge-telling and knowledge-transforming. In a knowledge-telling model, immature writers retrieve existing content knowledge and discourse knowledge from memory, operating in combination with topical cues to generate content without external support. One major feature of this model is that it makes use of “readily available knowledge…and relies on already existing discourse production skills in making use of external cues and cues generated from language production itself” (p. 9). In contrast to the knowledge-telling model, the knowledge-transforming model will initiate mature writers to work on problems of modifying central concepts, which may keep changing in the writing process. Through a two-way interaction between continuously developing knowledge and continuously developing text, mature writers are able to go beyond what they know, and reconstruct existing knowledge in order to create new content. As a higher level of cognitive complexity is acquired, the knowledge-transforming model allows writers to
review old knowledge and learn new knowledge through producing more coherent, organized, and convincing written text.

Both sociocultural and sociocognitive theories recognize that students’ thinking ability will be improved through reorganization of old ideas and generation of new concepts in writing activities. My next step is to measure students’ improvement in abstract thinking ability by reading their writing samples. I started with a 5-scale epistemological nature of knowledge (Hakkaraine, 1998; Zhang, Scardamalia, Reeve, & Messina, 2009). Upon a review of Salmon’s (1989) categorization of scientific knowledge, Hakkaraine (1998) highlights the fundamental role of explanatory knowledge for conceptual understanding. Compared with description from direct observation, explanation allows people to develop theories that make reference to unobserved entities (cited in Hakkaraine, 1998), and thus, intellectual satisfaction and epistemic change is achieved. The 5-scale epistemological nature of knowledge classifies descriptive knowledge and explanatory knowledge, and thus makes it possible to quantify students’ cognitive development reflected in writing (Hakkaraine, 2003).

Although this 5-scale coding schema offers a definition and an example for each level, students’ rhetorical moves in a writing statement are unobservable. Since students’ writings vary from these examples, they may not fit into any of the five categories. Therefore, I referred to another instrument, and combined the two to design a new one.

The second instrument employed in this study derives from the notion of concept map, which was first used by Chi (1982). Chi constructed the concept-mapping procedure, in order to determine the knowledge organization of experts’ and novices’ schemas by using semantic node-link networks of key terms mentioned by the subjects in their elaboration protocols. Based on Chi’s work, Fellows extended the application of concept map, and transformed students’’ writing
transcripts into representations of their knowledge structure (1994). In combining the two coding instruments, I was able to visualize the relationship among components in a writing statement, and then quantify it into a 5-scale epistemic complexity.

By the end of my second semester, I completed coding work for part of the data, and identified evident patterns. In June 2013, I presented the ongoing study and current results on the 25th Annual Ethnographic & Qualitative Research Conference. On the conference, my presentation received attention from scholars from other universities and research institutes. With a common interest, we discussed potential opportunities for students to acquire knowledge and intellectual growth through disciplinary writing. As my first presentation, this conference offered me a chance to associate with people in the field as well as the possibility to collaborate with them for future study. Moreover, I became acquainted with a variety of qualitative research methods from other scholars’ presentations, which offered me some new ideas for the present study.

**Future research plan on literacy education**

As I explored how students’ writings for their science class shaped and reflected their thinking, my research interest gradually became clear. Writing is not the final product of thinking and learning, rather, it functions as a medium for knowledge construction and idea organization. For academic language education, it is not enough to offer students the techniques to present their rationale, logic, and opinions by identifying and memorizing the established linguistic features. More importantly, they need to know how to think in a scientific, mathematical, historical, or poetic style through reading others’ articles and producing their own.

Although literature shows a confidence in writing-to-learn as pedagogy for content learning (Giroux, 1978; Hand, Wallace, Yang, 2004; Langer & Applebee, 1987; Moje, 2011;
practical application of writing to improve students’ epistemic complex is still not widespread at school settings. Studies investigating disciplinary writing indicate that it is primarily used for assessing students’ retention of material and ability to reproduce content rather than for conceptualizing knowledge and promoting critical thinking about content (Rivard, 1994; Tsai, 2010). Meanwhile, studies that explore what kinds of writing and what writing instruction will assist students’ knowledge construction and intellectual growth are limited in content writing research.

To address the gap, I would like to do research on the implementation of disciplinary writing from three perspectives through a sociocultural lens. First of all, I will investigate how different genres of writing affect students’ learning processes and learning outcomes. It has been controversial that some scholars advocate that students should be trained for traditional writing, while the others argue that students should engage in heuristic writing. Also, teachers’ instruction plays an important role in students’ writing processes, as it may either elicit creative ideas or constrain one’s personal thoughts, depending on what it aims at and how it is structured. Meanwhile, teachers may need to differentiate writing instructions for different student groups, with awareness for their cultural and personal backgrounds. Lastly, writing cannot be used separately from other literacy activities, such as reading and class discussion. I would like to explore the interplay of writing and other classroom activities, and how they work together to relate to students’ cognitive development.

From a retrospective view of my first year in the program, I have recognized the interdependence between language and thinking, and the possibility to use language as a medium to construct thinking ability. Starting from courses and research work, I have developed my interest in examining how literacy activities at school settings relate to students’ knowledge
acquisition and cognitive growth. Rooted in sociocultural theory, I would like to focus my research on integrating students’ individual backgrounds and needs in literacy instructions and activities, through which students will not only master language for intercommunication in a field, but more importantly, acquire thinking skills for self-realization in a whole lifetime.
References


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