

DIALOGIC CONCEPT MAPPING IN THE ZONE OF PROXIMAL DEVELOPMENT

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Abstract. Dialogic concept mapping uses a sociocognitive perspective for metacognition of the zone of proximal development in the present (cf. Valsiner & van der Veer, 1993). Cognitive theories of mental model (Johnson-Laird, 1983), concept mapping (Novak & Gowin, 1984), cognitive load (Sweller, 1994), and psychological distance (Sigel, 2002) are synthesized in dialogic concept mapping for operationalization in the sociocultural ZPD framework in the metacognition or “seeing” of ZPD instances. Case studies of student academic writers’ dialogic concept maps are analyzed in this paper for the metacognition of ZPD instances. The results indicate there is a shifting collaboration in metacognitive ZPD-concept maps.

1 Introduction

Education is frequently divided between objectivism and subjectivism, or cognitive versus sociocultural learning theories. Traditionally, students had been taught from the cognitivist perspective that facts, like those presented in science and math, were the ruling principles in a pedagogy built upon Cartesian philosophy. Sociocultural theory (Vygotsky, 1978), however, emerged to posit the primacy of a social pedagogy mediated through tools, language, and culture. Our time is now an interesting mix of multimedia and multiculturalism mediating society through the Internet and culturally diverse viewpoints. Teaching-culture, in turn, is called upon to be open to the different perspectives and subjective ways of knowing that lie outside of traditional education. According to Giroux (1994),

Indeterminacy rather than order should become the guiding principle of a pedagogy in which multiple views, possibilities, and differences are opened up as part of an attempt to read the future contingently rather than from the perspective of a master narrative that assumes rather than problematizes specific notions of work, progress, and agency. (¶20)

A step towards Giroux’s indeterminacy or movement towards different ways of knowing can be taken through a *sociocognitive* perspective on learning. A sociocognitive perspective can counter-balance Cartesian beliefs of cognitivist objectivity with Vygotskian beliefs of cultural subjectivity. For example, the belief that cognitive and sociocultural perspectives of language learning are incommensurable or have incommensurabilities (e.g., Dunn & Lantolf, 1998) can be balanced with the belief that compatibilities exist between the perspectives and can lead to cross-fertilizations between the fields of learning (e.g., Sfard, 1998). These compatibilities can lead to cultivating understanding between the different metaphors of learning (acquisition and participation), instead of cultivating specious hegemonies over whose metaphor should be allowed to grow (e.g., Lantolf, 1996). A sociocognitive perspective on learning would mediate better understanding of the multiplicities of perceiving and knowing Giroux describes. Taking a sociocognitive perspective for epistemological insights into language learning and teaching help us to gain insights into mythified metaphors of learning such as the zone of proximal development (ZPD) (Vygotsky, 1978), which we might not otherwise see from hegemonic perspectives (see Lantolf, 1996, regarding mythification of metaphors).

The site of learning is an important case in point as it has been a major area of contention, creating hegemony between the sociocultural and cognitive fields. In sociocultural theories learning happens in the metaphorical site called the ZPD. Here, learning takes place in the relationship between the learner’s “*actual developmental level*” and the learner’s “*level of potential development*,” when her performance is scaffolded by a more able mediator or expert (Vygotsky, 1978, p. 86). Second language acquisition researchers, such as Donato (1994), Ohta (2001), and Swain (2000), have operationalized the construct to investigate how the interactions between novice and expert lead to learning in the ZPD, but the ZPD in sociocultural theories has not been an easy construct to define. Much has been written about the ZPD and there are definitions of not only what it is, but also by what it is not; how it cannot be defined except in retrospect; what it could be; what it should be; how to create it; how to scaffold learning within it; how to add to its effect; how it is being used; how it should not be used; and how it is realized. Whereas, in cognitive theories learning is what happens within an individual’s mind. The current state of cognitive research idealizes learner metacognitive awareness of their learning. However, this poses a problem in sociocultural theory, since learning in the ZPD is defined in the prospective, but examined in the retrospective (Valsiner & van der Veer, 1993). Therefore, how can the learner examine her learning in the present tense? We often come up against this problem with our writing students who say, “How can I know what I mean until I see what I’ve said” (Bartholomae, 1982, p. 35). Through

sociocognitive theories of learning it is possible to append to Valsiner and van der Veer’s (1993) argument, and add that learner metacognition of her ZPD can be described in terms of the present using cognitive theories of: mental model (Johnson-Laird, 1983), concept mapping (Novak & Gowin, 1984; Greca & Moreira, 2000; Kinchin, 1998), cognitive load (Sweller, 1994), and psychological distance (Sigel, 2002) in the sociocultural ZPD framework. Specifically, student academic writers can know what they mean, when they *see* what they want to say, through shifting collaboration in the dialogic concept mapping of their ZPD.

The following sections describe the dialogic concept mapping process, and the shifting collaboration that can scaffold the metacognitive seeing of the ZPD. In section two, the theoretical framework of dialogic concept mapping is outlined. Section three is an overview of the research process with a short analysis of some of the factors influencing the participants’ concept maps of their ZPD, that is, their ZPD-concept maps. Two ZPD-concept maps from case studies are analyzed: the first with ZPD-metacognition, and the second without ZPD-metacognition. Dialogic concept mapping is then summarized in section four.

2 Dialogic concept mapping framework

2.1 Visualization of the ZPD

Mental models represent our current understanding of a concept (Johnson-Laird, 1983). Consequently, they can represent our actual developmental level (ADL) through what we understand of a concept, and our potential developmental level (PDL) by what we could understand of a concept. We can externally represent mental models through concept maps (Novak & Gowin, 1984; Greca & Moreira, 2000; Kinchin & Hay, 2000): The cognition, categorization, and propositions of a mental model (Johnson-Laird, 1983) can be illustrated by the correlating *concepts*, *hierarchies*, and *relationships* in a concept map (Novak & Gowin, 1984). For example, my mental model of an ideal breed of dog for an apartment is the Pomeranian, because it is small, docile, and does not need a lot of space for exercise. Figure 1 is a concept map of this mental model:

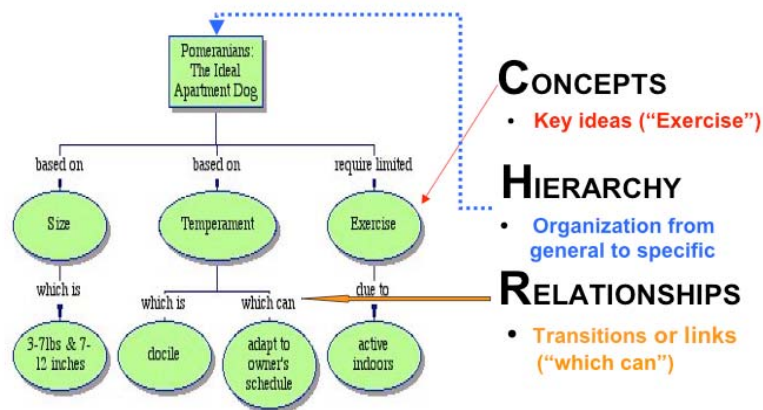


Figure 1. Concept map of my mental model of the ideal apartment dog.

Concept maps represent what we know and have yet to know by what is present or missing (i.e. *gaps*) in the map (Novak & Gowin, 1984). That is, what we know is our ADL, and what we have yet to know is our PDL. Thus, when the novice is scaffolded by an expert to see this gap in her concept map, then the concept map can represent her ZPD (see Kinchin, 1998, about concept map as ZPD). This is adduced from Vygotsky’s (1978) definition of the ZPD, which is that the more capable peer or expert scaffolding the novice to reach her PDL from the ADL forms a ZPD.¹ These maps of the ZPD can be termed: *ZPD-concept maps*.

2.2 Metacognition of the ZPD

ZPD-concept maps allow the academic writer to *see* what she wants to say. However, the ZPD is a metaphorical zone defined in the prospective and examined from the retrospective (Vygotsky, 1978, pp. 86-87). And so, for the novice to also *know* what she means from seeing what she wants to say would require *metacognition* of her ZPD. But at the same time this seems impossible to have in the *present*: Valsiner and van der Veer (1993) say of the ZPD that “there is no way in which anybody can study that process directly, within the present” (p. 46). The ZPD is described as “that latter process—the constant forward move from what can be known in the present to what cannot yet (but might) become known in the next moment that has been difficult for psychologists to

conceptualize” (Valsiner & van der Veer, 1993, p. 35, cited in Lantolf & Thorne, 2006, p. 266). But yet, conversely, cognitive tools like Sigel’s (2002) *psychological distancing* have helped us study the ZPD within the present (e.g., see the research published in Cocking & Renninger, eds., 1993), by viewing the ZPD through distance created within the mind.

Distance created within the mind is a “psychological space” (Sigel, 2002, p. 193) where we have room to take a metaphorical step back within the present to see the PDL and do problem-solving (i.e., learning). This psychological space is created through psychological distance, which consists of distance, discrepancy, and dialectics (Sigel & McGillicuddy-De Lisi, 2003): *Distance* is the (metaphorical) separation of self from the present (Sigel & McGillicuddy-De Lisi, 2003); *discrepancy* is the relationship between what is known and yet to be known (Cocking & Renninger, 1993); and *dialectics* is dialogue involving inquiry and reflection (Sigel & McGillicuddy-De Lisi, 2003). These three components work together to create psychological distance, which address Valsiner and van der Veer’s (1993) problem of retrospect, by making it possible to have a distanced perspective that allows the ZPD to be seen within the present. Therefore, student academic writers can “know” what they want to mean by “seeing” what they want to say for their writing, because a ZPD-concept map allows them to see their ZPD, while psychological distance allows them to study the ZPD within the present.

Consequently, this research uses a *dialogic concept mapping* process, which uses distance, discrepancy, and dialectics to create psychological distance to study the ZPD-concept map within the present. In dialogic concept mapping an expert concept map-maker (i.e., *mapper*) scaffolds a novice concept map-maker (i.e., *mappee*) to make a ZPD-concept map to be examined within the present via psychological distance.² This psychological distance in dialogic concept mapping can be created through:

1. Distance: (a) when the expert concept mapper draws the concept map (CM1) *for* the novice concept mappee; and also (b) when the mapper blocks the CM1 from the mappee’s view as it is being drawn.
2. Discrepancy: (a) from the mappee seeing the gaps from omissions/misconceptions in the CM1, (N.B., the CM1 gets redrawn into a new concept map [CM2] with the gaps of the CM1 now rectified in the CM2); and also (b) from the mappee seeing the differences between the CM1 and CM2.
3. Dialectics: (a) from the mappee relating the concepts for the CM1 (i.e., monologic discourse, Wells, 2007); (b) from the mappee being questioned by the mapper to clarify the propositions of the CM1 (i.e., dialogic discourse, Wells, 2007); (c) from the mappee seeing the gaps in her knowledge; (d) from the mappee explaining the changes made for the CM2 (monologic discourse); and (e) from the mappee discussing the differences between the CM1 and CM2 (dialogic discourse).

In this dialogic concept mapping process psychological distance is created for the mappee, so that she can study her ZPD-concept map within the present. The (metaphorical) distance lets the mappee study her ZPD; the discrepancy between her ADL knowledge and PDL knowledge helps her notice new knowledge; and the dialectics with the mapper helps the mappee to internalize this new knowledge. Learning is occurring for the mappee in the moving between internal and external knowledge via psychological distance, and integrating (or representing) the new knowledge within the mind (Cocking & Renninger, 1993).

2.3 Mediating tools: Translation, and shifting collaboration

Learning through dialogic concept mapping involves a high level of “element interactivity” or a high level of cognitive load (Sweller, 1994, p. 309), however. The learning, concept mapping, and metacognition required in dialogic concept mapping are each high element interactivity processes, but scaffolding in the forms of *translation* and *shifting collaboration* reduces element interactivity for the mappee, as well as promotes psychological distance. These mediating tools of translation and shifting collaboration are described in sections 2.3.1 and 2.3.2, as follows.

2.3.1 Translation of the concept map

In dialogic concept mapping, the mapper “translates” the mappee’s mental model information into knowledge and externally represents it through a concept map for the mappee.³ The mapper reduces the element interactivity for the mappee by organizing the mappee’s concepts and their hierarchy and relationships into a concept map, which the mapper draws *for* the mappee. Being the mappee’s “translator” in this manner helps to reduce the mappee’s cognitive load to free up the mappee’s mental processes, so she can “know” what she means (in her writing). That is, the mappee is scaffolded to enable her to better focus on metacognition of her ZPD-concept map, in the present.

2.3.2 Shifting collaboration

During the translation, the dialogue between the mapper and mappee is *monologic* and *dialogic*. According to Wells (2007), the monologic mode of communication is associated with authority and expert knowledge types of discourse, and does not require a rejoinder. Whereas, the dialogic mode of discourse (like Giroux's non-master narratives): allows for multiple valid perspectives; is collaborative; and makes knowledge-building possible by eliciting questioning and thinking in the discourse (Wells, 2007, p. 256). Having both types of discourse creates the psychological distance needed to learn in the dialogic concept mapping process: "This discrepancy between two perspectives for interpreting the world is termed *psychological distance*" (Cocking & Renninger, 1993, p. 5).

Through collaborative dialogue (Swain, 2000)⁴ to create the ZPD-concept map in the dialogic concept mapping process, the expert and novice roles shift via: collective scaffolding (Donato, 1994)⁵ and a type of pooled expertise (Ohta, 2001).⁶ The shifting between the monologic and dialogic modes also allows for the roles of expert (i.e., associated with authoritative-discourse) and novice (i.e., associated with learning-discourse) to shift between the mapper and mappee. This shifting of expert and novice roles is termed here as *shifting collaboration*. Shifting collaboration can also occur when the mapper is novice in the knowledge-building (i.e., learning) about the mappee's mental model and then shifts to mapper as the expert in concept map-making of the mappee's mental model. Correspondingly, the mappee shifts from the novice in concept map-making of her mental model, and also to the expert in the knowledge-building of her mental model. To restate this, the mapper is expert of making concept maps and the mappee is the expert of her ADL. Though, even when there are situations where both are in the novice roles, collective scaffolding (and pooled expertise) makes it possible for the dyad to help each other to learn despite there sometimes being incomplete knowledge from incomplete, even erroneous, mental models of a concept.

3 Dialogic concept mapping process

The materials used in dialogic concept mapping are blank paper, black and red ink pens, and a clipboard to use as a temporary divider to initially block the CM1 from the mappee's view. The ten iterative steps for dialogic concept mapping are: (a) mapper asks mappee open-ended questions to elicit key points about mappee's writing topic (dialogic mode); (b) mappee relates her mental model (monologic mode); (c) mapper confirms information by restating to mappee (monologic mode); (d) mappee agrees, or corrects mapper's mental model (dialogic mode); (e) mapper draws⁷ (hidden) CM1 in black ink; (f) mapper reveals CM1; (g) mapper and mappee dialogue on any conflicts within CM1 (dialogic mode); (h) mapper and mappee collaborate and mapper draws (unhidden) CM2 in red ink; (i) possible, further conflicts (i.e. gaps) result in further changes to CM2 (steps [c], [d], [h], and [i] can be repeated); and (j) mapper questions mappee about the visible ZPDs to scaffold changes between mappee's CM1 to CM2, and in result, the mappee can exhibit her *metacognition* of the ZPD(s), which makes the CM2 a metacognitive ZPD-concept map (for sample questions, see Kim, 2008).

3.1 ZPD-concept maps

As a part of my research for a metacognitive writing process, I had student academic writers participate in dialogic concept mapping sessions as a way for them to know what they mean by seeing what they want to say for their writing assignments. In the cases of Zara and Fiona (pseudonyms), they were both writing a Master's thesis. The sessions resulted in a series of their concept maps, and the following are examples of: Zara's ADL, and ZPD-concept map with shifting collaboration; and Fiona's static ZPD-concept map (see Kim, 2008, for complete data).

Zara's mental model of her writing topic on second language acquisition in foreign contexts is translated into her CM1 below (Figure 2), and visually represents her ADL on this topic:

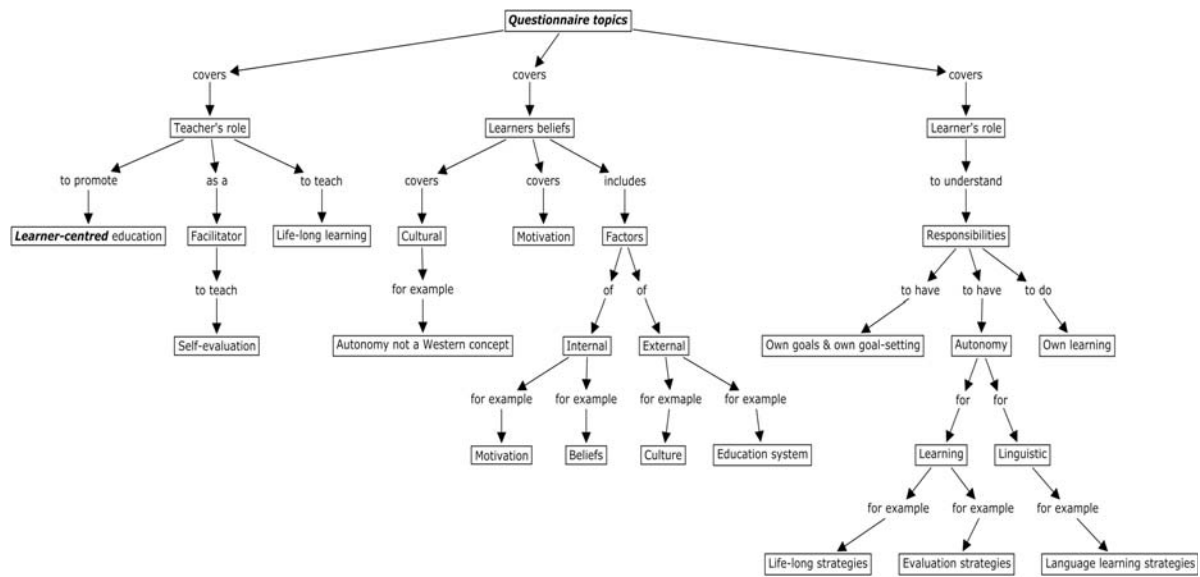


Figure 2. Translation of mental model to ADL: Zara's CM1.

She saw discrepancies within this CM1 (Figure 2) of what *was* understood about her thesis by the mapper versus what she *wanted* understood about her thesis as the mappee, and thus a subsequent ZPD-concept map (Figure 3) was created dialectically between mappee and mapper to represent the PDLs. For example, Zara changes her general topic of *Questionnaire topics* (which is positioned as the first, over-arching concept in her CM1, in Figure 2) to *Learner autonomy* (Figure 3). She also sees better, through the collaboration, what she wants to say and adds 15 new concepts. These changes are highlighted with the new concepts in oval:

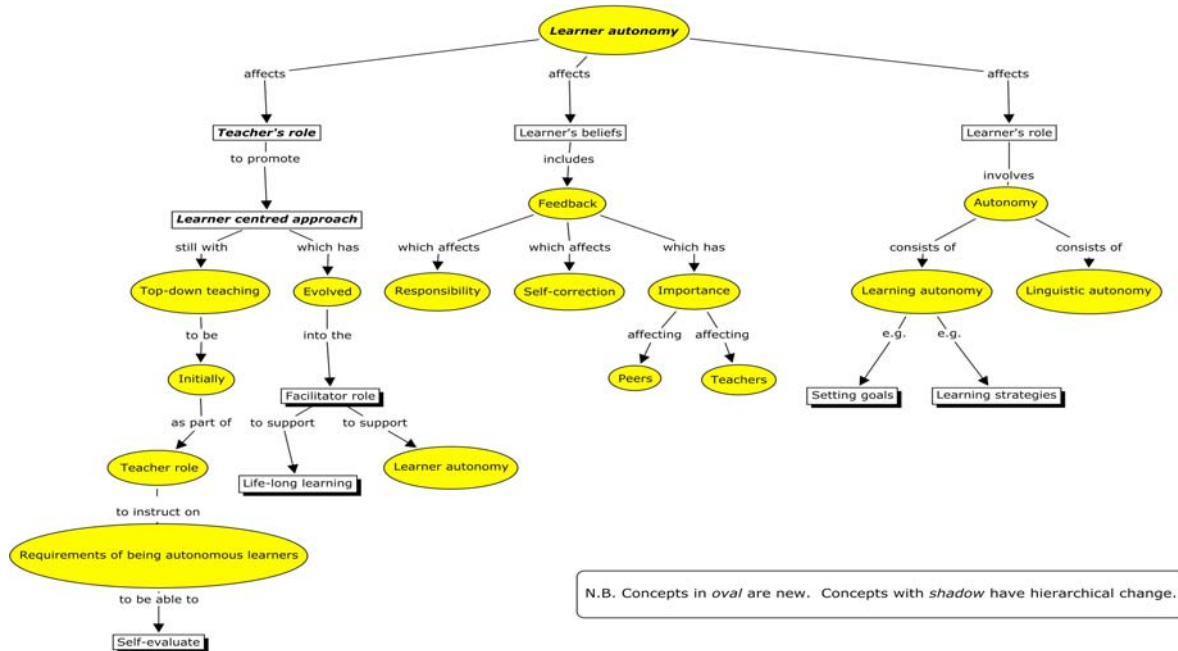


Figure 3. Zara's metacognitive ZPD-concept map.

Most notably with Zara's ZPD-concept map, she "sees" that *learner centred approach* is an important concept in the *teacher's role* to promote her main topic: *Learner autonomy*, and she collapses other concepts to be subsumed by the learner centred approach concept. During the session, I asked Zara why she made the change and she explained that the map helps her to literally *see* the direction she needs to go in. This noticing within the present through psychological distance appears to have scaffolded a *metacognitive* ZPD-concept map.

Zara's concept mapping session was collaborative, and the monologic and dialogic modes shifted between mappee and mapper. At times the mappee was expert scaffolding the mapper to understand, and other times the mapper was the expert scaffolding the mappee about what was being understood. The dynamic changes in Zara's several concept maps during the session reflected the movement between monologic and dialogic

discourse and created a shifting collaboration of expertise, which created discrepancies in knowledge and scaffolded Zara’s metacognitive ZPD-concept map or study of her ZPD within the present.

3.2 Static ZPD-concept map

Similar to Zara, Fiona is writing about language learning, but on the topic of background French language experience: *French Immersion Experiences* versus *Francophone Influence*, as factors in French language ability. The left-hand side concept map in Figure 4 is Fiona’s CM2, and it is not in the typical hierarchical form of more general concepts positioned higher up and subsuming more specific concepts such as examples, which are positioned hierarchically lower in concept maps. Therefore, the *Mapper’s version* (right-hand side concept map) in Figure 4 was suggested to the mappee as a PDL, since it would scaffold the (linear) academic writing format of a Master’s thesis. However, the mappee was adamant against any further changes (i.e., further PDLs) being possible with her CM2 at the time and rejected the Mapper’s version.

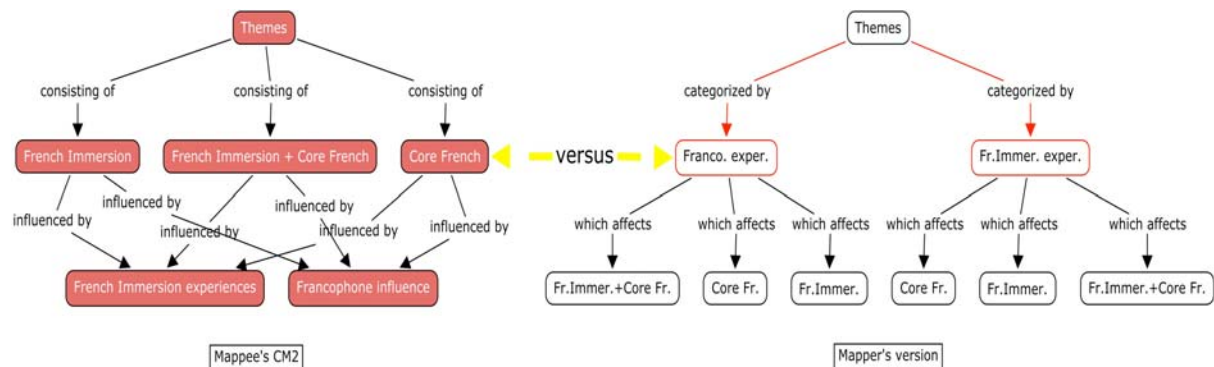


Figure 4. Mappee’s CM2 versus mapper’s CM2.

This session had a ZPD-concept map, in the form of the *Mappee’s CM2* (left-hand side concept map; Figure 4). However, Fiona maintained an unmoving monologic stance: she engaged in monologic discourse without shifting into dialogic discourse, and the expert role did not dynamically shift in the dyad. Due to this the mapper was not allowed to shift into the expert role and scaffold the mappee to “notice” or acknowledge discrepancies with the mappee’s CM2. Psychological distance (i.e., distance, discrepancy, and dialectics) to scaffold a metacognitive ZPD-concept map was not created, because the dialectics of questioning the mappee on potential discrepancies were absent. So, shifting collaboration, and thus collective scaffolding and pooled expertise (e.g., Donato, 1994; Ohta, 2001), in order to scaffold knowledge building was limited, which meant collaborative dialogue to negotiate discrepancies (Cocking & Renninger, 1999) or metacognitive knowledge building (Swain, 2000) was absent.

Distance was created in the mappee’s concept mapping session through the mapper’s act of translating the mappee’s mental model into a concept map of her ADL. However, the dialectics and discrepancies that are part of psychological distance and scaffold the seeing of PDLs for ZPD-metacognition within the present were absent from this session. Fiona’s CM2 was of a ZPD that was static for that concept mapping session and represented the “unshifting” expert-novice roles during the session. Collective scaffolding or pooled expertise was absent, though a *static* ZPD-concept map was present.

4 Conclusion

Dialogic concept mapping makes it possible for instances of the ZPD to be examined within the present, which appends to Valsiner and van der Veer’s (1993) argument that the prospective ZPD is only examinable in the retrospective. These ZPD instances are visually represented through concept maps created through dialogue and collaboration in the ZPD (cf. Ohta, 2001; Donato, 1994; Swain, 2000) via shifting expert-novice roles. Shifting collaboration occurs between an expert, the “mapper”, and a novice, the “mappee”. The mappee relates her mental model of a concept through dialogue with the mapper, and the mapper “translates” the mental model into a concept map of the mappee’s ADL. Translating for the mappee creates psychological distance for the mappee by distancing her from her map to create a metaphorical space (Sigel, 2002) and scaffold a metacognition of her ZPD in the present, which typically occurs through the distance created in retrospect. Translating for the mappee can also reduce cognitive load, that is, free up the mappee’s mental processes for the metacognition of any PDL(s) in her concept map.

The mappee's concept map visually represents the ZPD (Kinchin, 1998), and in this research the mappee's mental model is directly correlated to the ADL, and "gaps" in her concept map reflect a PDL. Therefore, from Vygotsky's (1978) definition of the ZPD as forming from the more capable or expert scaffolding the novice to reach her PDL from the ADL, moments or instances of the mappee's ZPD are examinable, because the mappee's concept map represents her ZPD when both the ADL and PDL are present. When the mappee "sees" that there is something missing, or that she knows what she means from seeing what she wants to say, a metacognitive ZPD-concept map can be created.

Analysis of these instances reveals a shifting collaboration as roles of expert and novice shift within the mapper-mapping dyad. For example, this occurs when the mapper is novice in meaning-making or learning about the mappee's mental model, and then the mapper is expert in map-making of the mappee's mental model. In corollary, the mappee is novice in map-making of her mental model, and then the mappee is expert in meaning-making of her mental model. In the translation of mental model into a concept map, the mapper is expert of making concept maps and the mappee is the expert of her ADL, and the roles of who is the expert-scaffolding-the-novice shift as both collaborate in the dyad to create a ZPD-concept map.

The dialogic concept mapping process is used in my case studies of academic writing students' ZPD-concept maps, as part of my research on scaffolding a metacognitive-zone writing process. Dialogic concept mapping, in addition to representing mental models, focuses on creating psychological distance and reducing the cognitive load for the mappee, through the collaborative translation of the mappee's mental model into a concept map of her ADL. The sociocognitive compatibilities between psychological distance and the ZPD are used to foster cross-fertilization between the acquisition and participation fields of learning (Sfard, 1998). Cognitive theories of: mental models, concept mapping, cognitive load, and psychological distance are synthesized for operationalization in the sociocultural ZPD framework to scaffold metacognition of the ZPD in the present, instead of metacognition of the ZPD in the retrospective.

Notes

¹ Artemeva defines the ZPD as: "ZPD is the PDL minus the ADL," (N. Artemeva, personal communication, March 26, 2007).

² *Mappee* and *mapper* terminology suggested by D. Woods, personal communication, March 26, 2007.

³ Grove-Ditlevsen (2007) discusses these maps made by language translators as the transforming of information into knowledge, or mapping information into knowledge.

⁴ Swain (2000) describes how *collaborative dialogue* occurs when learners participate in metacognitive "knowledge-building dialogue" (p. 97); they discuss and negotiate to problem-solve, and create new knowledge by reflecting on what they say. Metacognitive learner-dialogue is significant, because it allows for the creation of new knowledge for the learners.

⁵ Donato (1994) observes that *collective scaffolding* allows novices to scaffold each other to derive correct knowledge from "incomplete and incorrect knowledge" (p. 45). Although, the learners may be "individually novices," they each possess knowledge that make them "collectively experts" and able to collaboratively scaffold each other (Donato, 1994, p. 46).

⁶ Ohta (2001, p. 76) builds upon collective scaffolding, and explains how learning in peer interactions is possible, because of *pooled expertise*. No one peer is necessarily the expert in the scaffolding; the peers are able to scaffold each other when their cognitive processes (Ohta refers to working memory) are freed up. Three factors during peer dialogic interactions work together to allow (non-expert) peer learners to scaffold each other: (a) possessed knowledge, (b) capacity to apply their knowledge, and (c) ability to project or predict in interlocutions. The combination of these factors allows learner's working memory to focus on and be able to scaffold other learners, despite being novices themselves.

⁷ The concept maps are drawn by hand during the concept mapping sessions, but were converted afterward with CmapTools software for post-session analyses.

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