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SCAFFOLDING BY MEANS OF SCIENTIFIC CONCEPTS: A TEACHER-GUIDED PEER RESPONSE ACTIVITY

Abstract: The paper analyzes the performance of a university student on a peer response activity which is part of an assignment in a writing course for second-year students of English philology. With Vygotsky's (1987) doctrine of *scientific concepts* as a lens, it looks at how in the course of the peer response activity the teacher and the students support one another in their respective attempts to teach and learn writing. Teacher support on tasks, known as *scaffolding* (e.g. Stone 1998), is based on the idea that instruction should provide for transfer of responsibility for a complex task from teacher to student (Vygotsky 1978; Wood, Bruner, & Ross 1976). Adopting the Vygotskian perspective, I explain how in a teacher-guided peer response activity, student writers learn to verbalize their procedural how-to-write knowledge and to talk about their writing in order to regulate one another's writing performance so that it meets the requirements of the assignment. The data help to substantiate the claim that experience in regulating others is the basis for the development of self-regulation by indicating how the language (scientific concepts) provided for use by students in the peer response activity can contribute to developing their self-regulated writing. For the teacher, a student's performance on the peer response activity is a source of information on how to further assist the student in her/his development of the *scientific concepts* that mediate writing development.

Key words: writing instruction, peer response, scaffolding, scientific concepts, cognitive mediation

Introduction

"Teach the process, not the product" emerged in the 1970s as a rallying slogan of the new generation of American writing teachers and researchers who reacted against the then dominant language-centered practices of traditional writing instruction, specifically against the teacher acting solely as a final judge

of the correctness of the finished product/text instead of intervening earlier in the development of student papers to assist and support the students in the very process of composing their texts, which is where instruction is needed to teach them how to write. This *process revolution* (Hairston 1982) in writing instruction brought about the key instructional change in the form of the multiple-draft assignment with between-the-drafts teacher-guided peer activities intended to provide procedural support throughout the complex task of composing the successive drafts of a paper. Thus, teaching revision has become a central component of writing instruction with peer response as one of the key methods of prompting students' revision.

The shift in writing instruction since the 1970s has taken place in parallel with the tremendous research effort undertaken in order to understand, first, what cognitive processes are involved in text production and, later, the role of the socio-cultural context in shaping those processes. A significant role in this *social turn* in composition studies and instruction (Trimbur 1994) has been played by Vygotsky's sociocultural theory of learning.

Peer Response: The Vygotskian View

As Hodges (1982) shows, the view that revision has a central role in writing was really no more than some practitioners' belief until the 1970s when the development of cognitive research on writing resulted in the concept of revision being given a theoretical status as a key feature of a mature writing process (Flower & Hayes 1981; Scardamalia & Bereiter 1985). Given this shift in theoretical perspectives on writing, it is understandable that in the 1980s researchers and teachers of writing started to direct so much attention to fostering students' learning of revision in writing. Consequently, feedback/response to student writing acquired a whole new dimension. Feedback is considered to be crucial for learning, and its importance has always been recognized in the field of composition studies and instruction, where the term *response to writing* has often been used instead (Hyland & Hyland 2006).

As already mentioned, research on writing took a social turn when attention was no longer paid just to the cognitive processes of writing themselves but to those processes in connection to the sociocultural contexts in which they take place. The influence of the work of the Russian psychologist Lev Vygotsky on writing research in this respect has been constantly growing since the 1980s. I will begin by briefly introducing some key notions in Vygotsky's sociocultural theory of learning as they are instrumental in the following analysis of student interactions in a peer response activity taking place under teacher guidance as part of a multiple-draft writing assignment. The theoretical discussion in this section will gradually be given more substance in subsequent sections.

Vygotsky's (1978, 1987) sociocultural learning theory is relevant to writing instruction as it focuses on how humans learn by means of *psychological tools*, which are signs of all kinds and so are also referred to as *semiotic tools*. Vygotsky sees human learning as *mediated* rather than *direct*, which means that rather than there being direct interaction between learner and environment, for humans the nature of the interaction is changed by the presence of (a) external/material tools, (b) internal/psychological tools, and (c) more competent others. These are the three kinds of agents mediating between the learner and the environment (Kozulin 2003). Because of the presence of these mediating agents, for Vygotsky "the learning process was not a solitary exploration [...] of the environment; rather, it was a process of appropriation [...] of the methods of action existent in a given culture," as Kozulin and Presseisen (1995: 67) explain.

Vygotsky (1981) claims that the so-called *higher mental processes* are specific to humans because they are mediated by psychological/semiotic tools used by humans, primarily human language. Consequently, there is another, very crucial mediating agent involved in the development of higher mental functions: they are learned through interaction with more competent others. Karpov and Haywood (1998) make a distinction between two types of mediation present in Vygotsky's theory: metacognitive and cognitive. Metacognitive mediation facilitates the acquisition of cognitive control processes commonly referred to as self-regulative. According to Vygotsky, such processes originate in interpersonal communication when a more competent other uses semiotic tools to regulate a learner's behavior. Such semiotic tools are later internalized and used for self-regulation. Cognitive mediation is based on Vygotsky's (1986) doctrine of *scientific* and *spontaneous* concepts. Spontaneous concepts are the result of implicit and inductive learning from everyday personal experience, and as such are typically unsystematic and likely to lead to inaccurate, if not plain wrong, generalizations due to limited experience. Most importantly, such concepts by themselves will not support the generalized and abstract kind of thinking characteristic of the school context. Thus, schooling means systematic cognitive mediation. In other words, the domain of school is the teaching of scientific concepts (Karpov 2003). Scientific concepts are "cognitive tools that are necessary for solving subject-domain problems," as Karpov and Haywood (1998: 28) argue and as my analysis will demonstrate.

Mediation is the main mechanism of human learning. One current trend in instruction, which is directly relevant to metacognitive mediation (Karpov & Haywood 1998), is that teaching should be organized as collaborative student activity under peer control (e.g. Brown & Campione 1994). This instructional principle is in full agreement with Vygotsky's claim that regulating the behavior of others (i.e., metacognitive mediation, or exercising cognitive control over an activity shared with another) is an important intermediate stage in the transition from being regulated by others to becoming self-regulated. Mutual regulation

has its natural place in peer collaboration but not in teacher-student interaction. As Forman and Cazden (1995: 344) pointedly observe, “children never give directions to teachers.” This explains the need for and the value of peer response activities in the writing classroom.

Another trend in instruction is *guided discovery* (Brown & Campione 1994). This principle of organizing students’ learning as teacher guided discovery stands in clear opposition to Vygotsky’s views on the cognitive mediation process which starts in school and is carried out by means of scientific concepts. In sharp contrast to the idea of guided discovery, Vygotsky (1987) claims that scientific knowledge should be taught directly and not discovered by students because students’ empirical discoveries will result in spontaneous, inductive knowledge which may be wrong. He argues that students must not be expected to develop an understanding of the world by trying to rediscover what their culture has already discovered. Scientific concepts should be taught directly in the form of verbal definitions. Vygotsky (1987: 165) admits that “the weakness of the scientific concept lies in its *verbalism*.” However, a verbal definition is just the starting point of the formation of a scientific concept. Vygotsky (1987) explains that scientific concepts only start to be learned when the word meaning for the new concept is learned. Instruction should aim to support this developmental process by grounding such concept formation in the process of mastering relevant problem-solving procedures that involve using the concept while working on tasks, a point which is fundamental to my later discussion. Scientific concepts must thus be linked to specific ways of disciplinary acting and thinking in instruction that offers ready-made definitions of scientific concepts followed by methods of action that utilize the concepts. Scientific concepts are not acquired through the teaching of verbal definitions but through teaching specific procedures that are to be internalized in the course of using them in culturally-relevant problem-solving activities. In academic writing instruction, as I will argue, teacher-guided peer response activities provide an opportunity for teaching such academically-relevant problem-solving procedures that utilizes scientific concepts.

Data Collection

The data for this paper come from a writing assignment used in a class I taught to second-year students of English philology. The course followed the multiple-draft approach to address different aspects of the complexity of composing in successive drafts of student papers. It was a general-academic composition course, which means that it aimed to teach the underlying intellectual stance which defines academic discourse as a whole, particularly playing the role of a self-conscious argument-maker (Elbow 1991). Graff (1999:

140) discusses various reasons why students “feel deep reservations about assuming” such an academic/intellectual stance. He points to the considerable gap separating the academic/intellectual culture of teachers from the mass/pop culture of students. In this context, he points out that to uninitiated students, the academic preoccupation with problems and *problematizing* appears strange, “at best mysterious and at worst perverse” (1999: 141). As Castle (2007: 320) explains, problematizing refers to textual and social phenomena which involve “contradictions or gaps in logic, sudden discontinuities or juxtapositions, inequalities or asymmetries – that, when taken together, suggest an opportunity for critical intervention.” By raising our students’ awareness of such conflicts, we initiate them into the academic practice of problematizing and into the academic discourse community, which cherishes such conflict awareness. Thus, the aim of the writing assignment which is the source of data for this paper is to raise students’ conflict awareness, which is understood as a crucial aspect of the academic stance and so academic discourse practices.

As explained above, for Vygotsky, learning meant appropriation of “the methods of action existent in a given culture” (Kozulin & Presseisen 1995: 67). In other words, learning involves appropriating culture-specific ways of behaving and thinking. To achieve the goal of academically-relevant learning in a general-academic writing course, we need to present our students with academically relevant tasks and we need to introduce them to academically accepted ways of dealing with those tasks. The writing assignment, by focusing on teaching conflict awareness as explained above, presents a task relevant to the academic community. As for teaching academic ways of dealing with the task, the specific problem-solving procedure being taught must be linked to specific scientific concepts. As Karpov and Haywood (1998: 28) explain, scientific concepts are “cognitive tools that are necessary for solving subject-domain problems.”

The scientific concepts that are fundamental to working on writing problems in an academic writing class include the notion of *the rhetorical situation* together with its two key constituents, namely, *audience* and *purpose*. These are important notions in the academic disciplines of rhetoric and composition studies (e.g. Bitzer 1968; Flower & Hayes 1981). These concepts were explicitly introduced to the students in my writing class together with the assignment; however, in view of Vygotsky’s (1987) admonition about verbalism (see above), the students were not expected to memorize the definitions. As explained above, concepts only start to be learned when the word meaning denoting the new concept is presented in a definition. Instruction must aim to foster the developmental process of concept formation by grounding a concept in the process of mastering relevant problem-solving procedures that involve using the concept while working on tasks. Teacher guidance of collaborative problem-solving in a peer response activity is an opportunity to foster scientific concept formation. The two scientific concepts being developed in this case are the

correlated notions of the *audience* and *purpose* of a rhetorical act, which is understood as discourse intended to solve a specific problem by inducing the audience, that is, those who can ameliorate the problem situation, to take a specific course of action. Teacher guidance means that the learning activity is *scaffolded* in what Daniels (2007: 317) sees as a “crucial” aspect of the technical sense of the term, namely, the learner’s role in the task is simplified while the overall nature of the task itself does not change. In the teacher-guided peer response activity, the teacher does not change the target task of detecting, identifying, and offering solutions to writing problems. Instead, the teacher offers questions that focus students’ attention on specific aspects of writing so that the overall task of commenting on writing problems is simplified. The specific aspects are those connected to the scientific concepts of audience and purpose that the students have been familiarized with when introduced to the assignment. The peer response activity under discussion, taking place when the students have composed their first drafts, focuses on problems with the most fundamental aspects of constructing a rhetorical situation according to the requirements of the assignment: this means a focus on audience and purpose.

Analysis and Discussion

The data include (a) the first and the second *drafts* of one student’s paper, (b) written *peer response* (PR) the student received to her first draft, (c) written response the student gave to another student, and (d) her written *response to the peer response* (RPR) she received. Here is how the student’s introductory paragraph changes from draft 1 to draft 2:

Draft 1

Everyone who lives in Mrowisko dormitory knows Radio Sygnaly. The problem that I would like to present is the loud music constantly coming from the radio's loudspeakers. The music is heard in very corner in the dorm. The radio's workers must finally face the fact that it really makes a lot of noise all day long and is quite disturbing for the students who pay for their rooms in order to have suitable conditions for studying and resting.

Draft 2

Everyone who lives in Mrowisko dormitory knows Radio Sygnaly. One of the problems that I would like to present is the loud music constantly coming from the radio's loudspeakers which are situated in front of the students' hostel. The music which starts in early afternoon and lasts until the evening is heard in very corner in the dorm. What is more, the music presented is slightly monotonous.

The assignment asked to define, explain, and provide a solution to a problem encountered at school. In revising her paper, the student again falls short of defining the problem and explaining its importance. By failing to situate her

original problem of loud music in the dorm within the global problem of noise pollution, she fails to make the paper appear important rather than trivial. More importantly, her revised version foregrounds the additional problem of the music being monotonous, which amounts to setting a different goal for the paper requiring a redefinition of its audience.

The questions posed by the teacher to guide the PR which are relevant to our discussion are Question 1 (about the problem being adequately described), Question 4 (about what needs further explanation), and Question 5 (about the introduction setting up the paper and the conclusion providing a sense of closure). Here are some comments our subject received from another student:

PR Question 1

It is not difficult to guess what the problem is but more information could be included. [...] it is not mentioned where exactly the speakers are placed. Similarly, the time when the noise starts and ends is not given...

PR Question 4

Solutions to the problem of noise could be stated. I can understand what the author is trying to say but more information should be provided.

PR Question 5

In fact the beginning is misleading. There are different aspects of the matter mentioned, e.g., monotonous music. [...] the purpose stated in the introduction is not achieved as the closure is connected with the quality of the radio program rather than with the noise the loudspeakers make.

Here are excerpts from the student's response to the comments:

RPR Question 1

The comments were very helpful. The presentation of the problem was quite poor and it needed some necessary additional information.

RPR Question 4

The Reviewer only repeats his comments about further development of the solution. The phrase "I can understand what the author is trying to say but..." is not really needed. I was not writing for the reviewer. I am not interested in his strictly personal opinions.

RPR Question 5

The reviewer made a good point about the introduction (only one problem is introduced and in the conclusion two problems are solved). I don't agree with the negative opinion about the closure--I think that the conclusion fits the whole text.

The student does not follow peer advice uncritically. However, her use of peer advice and her RPR point to her problem with constructing a rhetorical situation that meets the requirements of the assignment, i.e., the fundamental rhetorical problem of purpose and audience. In her revision, she only adds, deletes or shifts around a few clauses and sentences. These are local syntactic

changes that do not address the global rhetorical problem raised by her peer in PR Question 5: the purpose stated at the start being about the loud music does not match the final conclusion about the music being monotonous. Following the suggestion in PR Question 1 to add the where-when information, she adds two clauses to the introduction. Then, she moves the last sentence (the original problem statement) from the introduction to the following paragraph, in its place adding a sentence introducing the problem of monotonous music in an attempt to make the introduction fit the conclusion. The comment about the need to discuss solutions to the problem of noise only triggered an angry reaction (RPR Question 4). Following up on this comment would have required a global revision of the purpose and audience for the paper. At one point, the writer barely mentions the conflict between those residents in favor and those against the loud music. This conflict requires addressing the residents themselves, while the problem of monotonous music calls for a different audience, the managers of the radio station. Her clearly inadequate understanding of the rhetorical concepts of purpose and audience makes the writer incapable of conceptualizing her personal experience of the problem situation in terms of these basic rhetorical constraints to fulfill the assignment.

My goal in looking at this peer response activity is to examine the kind of support the teacher and the students under his guidance offer to one another. Following Vygotsky's (1987) theory, I see the scientific concepts (*rhetorical situation, audience, purpose*) offered by the teacher in the peer response activity (he thus provides cognitive mediation) as tools to be used by the students on tasks specified in the PR questions. What is crucial is that students develop their understanding of these tools through working on their problems. The starting point is the verbal definition of a scientific concept presented together with the assignment. However, the problem situations the students are focusing on in the assignment are the ones they have encountered at school. Thus, they are dealing with personal experience. In Vygotsky's (1987) terminology, this is *everyday knowledge/concepts*. Such concepts are unsystematic, concrete/specific rather than abstract/general, and implicit rather than explicit. As Vygotsky (1987: 165) explains, "the weakness of the everyday concept lies in its incapacity for abstraction, in the child's incapacity to operate on it in a voluntary manner." By contrast, we are consciously aware of *scientific concepts* and can make deliberate use of them. In the context of this difference, Vygotsky (1987: 159) claims that "the formation of concepts develops simultaneously from two directions: from the direction of the general and the particular." Everyday concepts move from the particular "upwards toward abstraction and generalization" (1987: 164) while scientific concepts move from the general toward "saturation with the concrete" (1987: 165). In view of this developmental dependency, as Daniels (2007: 312) points out, instruction must bring the two types of concepts "into the forms of

relationship within which they both develop.” This is exactly what the peer response activity under discussion is designed to achieve.

As Mercer and Littleton (2007) show, the quality of the language in peer interaction impacts on the quality of learning. Thus, the goal of the peer response activity is to have students use scientific concepts to focus their attention on key aspects of their writing performance, help them verbalize their procedural how-to-write knowledge, and get them to talk about their writing in order to regulate one another’s writing performance to fulfill the assignment. The peer response activity gives each student an opportunity to provide metacognitive mediation (which means assistance involving exercise of control in the shared activity of identifying and solving writing problems) as a steppingstone to achieving self-regulated performance. As we could see above, the data confirm that peer collaboration (giving and receiving advice) leads students to making their own decisions by freeing them from the authoritative presence of the teacher. However, the revisions made by our subject show that she cannot analyze her problem situation (everyday knowledge) by applying to it the scientific concepts of audience and purpose in order to construct a rhetorical situation (scientific knowledge in the sense of an explicitly organized system of relations). The PR our subject gave to another student on this assignment helps us to better see her problem with getting to understand the rhetorical concepts central to the task. Here are some comments she gave to a writer discussing the problem of insufficient physical education at the university:

PR Question 1

The presentation of the problem is adequate. The writer identifies with the audience, e.g., “As we entered the university...”

PR Question 2 (about audience)

The paper is written for the students because it deals with the problem which concerns them [...] the sentence: “We all know how undesirable and unhealthy lack of physical exercise is for a young man or woman” is not convincing.

PR Question 7 (about what to add/leave out)

The phrase “I am convinced” should be left out. The rest of the text is impersonal and the author should stick to it. What we need is to know the problem and how to solve it. Personal opinions are not convincing. Ways of appealing to decision-making organs should be added.

PR Question 8 (about purpose)

The purpose is not in fact clearly stated. The author wants to convince students to have gym classes because it would be good for their health [...], but I don’t find a statement which says so.

Her comments make clear that the student has a problem with the concept of audience. Statements like “The writer identifies with the audience” (implying students), “The paper is written for the students” and “The author wants to convince students” clash with the advice: “Ways of appealing to decision-

making organs should be added.” The student’s problem is that convincing students about the importance of physical education and appealing to appropriate decision-makers for more physical education at the university are two different purposes and two different audiences, requiring different arguments, and mixing the two is against the requirements of the assignment. The student exhibited a similar confusion in revising her own paper, not being able to see that the problems of loud music and monotonous music called for different audiences in order to be solved. The student’s problems with the assignment are due to her problems with understanding audience and purpose.

Our subject’s problems can help us appreciate the value of the PR activity under discussion. The abstract rhetorical concepts of audience and purpose (as people to be moved by the writer to take action in order to solve a problem as it is perceived by the writer) are introduced in the form of verbal definitions as part of the assignment. As Vygotsky (1987) explains, concept formation is a long and complex process. As was pointed out above, the students are expected to develop their understanding of these new cognitive tools (rhetorical situation, audience, purpose) through working on their problems with the assignment. In the course of the PR activity, the concepts are enriched with detail as they are repeatedly applied to different problem situations discussed by each student in the peer group. Working in a peer group, the students get a chance to use the rhetorical concepts of purpose and audience as tools to construct different rhetorical situations by applying them to shared experience (problems encountered at school). Understandably, the students do not get everything right the first time. Importantly, the PR activity gives the opportunity to hone their use and understanding of the key conceptual tools in constructing different rhetorical situations. The assignment grounds the rhetorical concepts in the students’ shared school experiences dealt with in their papers, which allows for *saturating* (Vygotsky 1987: 165) the abstract rhetorical concepts with concrete everyday knowledge and move the students on their way to scientific concept formation.

Learning and teaching being interactive processes, the purpose/audience-related problems our subject exhibited in her revisions and responses constitute specific feedback to the teacher to offer more focused tasks for all the students in her peer group to help them reassess their construction of the rhetorical situation. In revising her paper, our subject did not see that the problems of loud music and monotonous music (which she chose to discuss) called for different audiences in order to be solved. Such problems with constructing a rhetorical situation need to be explicitly stated by the teacher and presented for discussion by the students in the peer group as a follow-up activity. The goal of this activity is the same as that of the PR activity, namely, to provide students with a problem and the relevant problem-solving tools (the scientific concepts of purpose, and audience) which are to be developed as they are being used in peer collaboration on the problem. The scientific concepts are developed as they are applied to and thus saturated with the

students' everyday experience to transform it into more systematic and organized knowledge. Through collaborative peer activities, such concepts gradually become efficient tools in the students' self-regulated writing performance.

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