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Article

Research Diary: A Tool for Scaffolding

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Abstract

Diaries have long been seen as tools for reflection in learning languages, and learning about teaching. Despite this recognition of the importance of narratives in diary writing, little attention has been paid to the role of research diaries in the process of learning about research, and learning how to be a researcher. During the author's own research into the construction of teaching knowledge by pre-service trainees, she became aware that her research diary was scaffolding her own construction of research knowledge. In this article the author discusses the role of a research diary based on a socio-cultural theory of learning. The diary acts as the expert other in the scaffolding of research knowledge by the novice researcher. The discussion of the nature of the scaffolding and the role of diary writing draws on examples from the author's research diary written during her doctoral studies.

Keywords: dialogue, knowledge construction, novice researchers, research diaries, scaffolding, socio-cultural theory

Introduction

> Since these are conversations with myself trying to articulate thoughts, in fact this diary is an insight into my construction of research knowledge rather than my trainees' knowledge. So in fact, this diary is a scaffolding tool for my learning and development". (RD,[1] 28.10.09)

Diaries have long been seen as tools for reflection in learning languages (Eton 2008; Parkinson, Benson, & Jenkins. 2003), and learning about teaching (Altrichter, Posch, & Somekh, 1993;

Gomez, 2009; Jarvis, 1992; McDonough, 1994; Smith & Sela, 2005). Research into how diary writing specifically scaffolds teacher learning are many (Golombek & Johnson, 2004; Johnson, 2007; Marcos, Sanchez, & Tilleman, 2008; Syh Jong, 2007). Diary writing is seen as an opportunity for reflection and inner dialogue. The articulation of thoughts becomes the catalyst for change in beliefs and practice, thus the narrative inquiry of diary writing is a tool which mediates teachers' professional development. Through the narratives and self-dialogues in the journal, teachers externalize their knowledge and then re-internalize knowledge and concepts about teaching (Golombek & Johnson, 2004; Johnson, 2007).

However, despite the great emphasis given to diaries as a prompt for reflection and development in language learning and teacher learning, there has been little study of how a research diary can support researcher learning (Borg, 2001). A research diary is often described in research methodology literature as a way to log decisions made and write down reflections on the research process (Gibbs, 2007; Silverman, 2005). While this is a crucial part of the research process, there has been little examination of the role of the research diary as a learning tool in the development of research knowledge for novice researchers.

Based on a socio-cultural theory of learning and development, I discuss how a research diary can be viewed as a scaffolding tool in the construction of both research knowledge and identity as a researcher. I will begin by outlining some previous diary studies in both teacher development and in research contexts. I will then outline the major features of a socio-cultural theory of learning, placing the diary as a scaffolding tool at the centre of the framework. I will discuss the terms scaffolding and deconstruct the terms zone of proximal development and reflection in a socio-cultural framework. I argue that research diaries have a more central function than as a repository for thoughts and logging decisions. I suggest that in the same way that diaries are used in the development of teachers, a research diary can be an integral part of a researcher's knowledge development.

Research into diary studies in teaching and research

Johnson (2007) bases her examination of a teacher diary on socio-cultural theory and discusses how journals provide a meditational space for the teacher to make connections between the emotions and cognition (Golombek & Johnson, 2004). Journals provide a mediator in the form of an *expert self* with whom the teacher communicates, interacts and works on an intrapsychological plane. Benefits of such work include reflection, personal and professional development (Golombek & Johnson, 2004).

How then can research diaries support novice researchers? In the context of a qualitative research course, Gerstl-Pepin and Patrizio (2009) write of a research diary acting as a repository for personal reflection. Students taking a course in research methods were encouraged to keep a diary as they carried out some initial research. The aim of the diary writing was to support understanding of the role of reflexivity in qualitative research. The writers view the journal as a tool to facilitate the development of qualitative researchers. Their premise is that writing down thoughts and decisions can document changes in thinking. These notes then invite the sharing of memories in a group discussion further on in the course.

The main point of these scholars is that it is all too easy to forget feelings and decisions made at a particular time in the past. A journal serves as an anchor for these thoughts, feelings and decisions. They argue that the journal can then act as a catalyst for discussion which leads to "epistemological awareness" (Gerstl-Pepin & Patrizio, 2009, p.300) as the diary writer realizes how their own knowledge is created. Within a socio-cultural framework, the study of knowledge

construction is scaffolded by the journal.

Altrichter et al. (1993) discuss the role of a diary in an action research project as fundamental to the research process as "it makes visible both the successful and (apparently) unsuccessful routes of learning and discovery so that they can be revisited and subject to analysis" (p.12). Their argument is that in the research process, data collection should not be separated from reflection and analysis, as all processes feed into each other. Reflections involve writing about the process of research. This includes analysis of strengths and weaknesses of each stage of the research, as well as personal thoughts on the research process. Examples of such reflections are narratives on learning points, interesting observations, useful reading texts and responses to actions and events.

Borg (2001) writes of his own experiences keeping a research journal and outlines the benefits of such a journal in terms of process and product. Process benefits include defining a conceptual framework, resolving fieldwork anxiety, dealing with negative feedback and writing up. Product benefits include serving as a reminder of past ideas and events which guided subsequent action. This article is a refreshing and honest account of the rationale and benefits of a researcher diary, pointing to how it supported both the doing of the research and his development as a researcher.

Socio-cultural theory

The premise of this article is that all learning takes place in a particular social and cultural context. Vygotsky and other researchers in socio-cultural theory postulate that learning is mediated by cultural tools (Daniels, 2001; Lantolf & Thorne, 2006). Socio-cultural theory (SCT) is a "theory of mediated mental development" (Lantolf & Thorne, 2006, p. 4).

One major feature of SCT is the relationship between word and thought. Vygotsky (1986) was particularly concerned with this relationship. "Thought is not merely expressed in words; it comes into existence through them. Every thought tends to connect something to something else, to establish a relation between things" (p. 218). In other words, talk is not just a result of our thinking; the talk also guides our thinking. I will extend this notion to include writing as a more dialogic guide for thinking. Rapley (2007) summarizes, in general terms, the crucial place of writing in the thinking process:

> Writing is thinking. It is natural to believe that you need to be clear in your mind what you are trying to express first before you can write it down. However, most of the time the opposite is true. You may think you have a clear idea, but it is only when you write it down that you can be certain that you do. (p.25)

Scaffolding refers to the help given by the teacher or more able peer in an educational setting. Bruner (as cited in Mercer, 1995) writes of scaffolding as"(it) refers to the steps taken to reduce the degrees of freedom in carrying out some task so that the child can concentrate on the difficult skill she is in the process of acquiring" (p. 73).

Scaffolding is generally thought to be given by the teacher, or more expert other. In narrative writing, I believe this expert other can be the writer. Writers develop and learn during the research process, and become the expert other as their research experience evolves. The expert other can also be the literature with which the writer is interacting and the other interlocutor then becomes the co-constructor of knowledge in the dialogue. In a researcher diary, the dialogue is with a "cruel partner" (Canetti, as cited in Altrichter et al., 1993, p.12) as there is no interlocutor to make you feel better and de-fuse the frustration or criticism. Reflection as part of self-dialogue can be honest and open.

Wertsch (1991) reminds us that conscious reflection is an important part of development within mediated action. Reflection itself acts as a mediator in constructing knowledge by 'interrupting' thought processes and encouraging critical thinking (Vygotsky, 1986). A major assumption of the relationship between reflection and construction of knowledge is that "critical reflection can trigger a deeper understanding" (Richards & Lockhart, 1996, p. ix). The assumption is that by reflecting, the writer questions, examines and makes decisions. The reflective process acts as a prompt for constructing knowledge. In the same way that scaffolding can take a variety of forms, so can reflection.

The nature of the reflection is crucial to how it influences thinking and constructs knowledge. Marcos et al. (2008) argue that for the reflection to be dialogic there needs to be more than just description and narration of teaching or learning, there needs to be explanations and conceptualizations. In other words, the teacher or learner needs to be able to justify, respond to questions and defend their positions.

I also believe that in one main aspect research diaries serve a slightly different function than those of diaries kept on teacher training courses. Researchers are often working alone, maybe geographically far from their Universities of study and their supervisors. They may be novice researchers for a doctorate, for whom the whole research process is a new and very challenging experience. The diary then becomes a colleague, "a companion" (Altrichter et al., 1993, p.11), someone to confide in. The diary is not part of a course; it is also not going to be read by anyone else. The aim of starting the journal is not usually for reflection, but as part of the data collection and to increase validity by keeping a log of decisions made. The diary is a place where the researcher can write down thought processes.

Personal experience of a research diary

In 2008-2009, as part of my doctoral studies I carried out ethnographic research into the construction of teaching knowledge of Turkish trainee English teachers. At the beginning of the research, my plan was to keep both a research log and a diary. The log was to note activities, places, and any particular comments. The diary was to report decisions made and the thinking process on methodology, hunches and notes (Silverman, 2005). Although this was the case, I found that the diary also became an emotional support. The emotional aspect of carrying out research is little noted in the literature (Borg, 2001), yet the emotions can affect the research process and progress.

The research diary also acts as a repository of thoughts and reflections of the research experience and adds validity to my data. My diary provides an insight into my own experiences of carrying out the research and my coding, analysis and interpretations. In short, the diary represents my internal dialogue with the research process. This internal dialogue and reflection becomes part of the research data and can inform the research interpretations. "Personal agency is an important part of qualitative inquiries and the 'meta-data' generated by the researcher offer valuable insights into the project" (Dornyei, 2007, p.160).The research diary also gives more validity and credibility to the data because a reflective journal, along with member checks and triangulation, provided scaffolding tools (Gerstl-Pepin & Patrizio, 2009) to support my work. My research diary became a narrative of my research journey (Gibbs, 2007), with its highs and lows. On re-reading the journal, it becomes even clearer that all research is "researching yourself" (Walford, 2001. p.98). I also believe that the diary adds to the rigour of being explicit about the workings of the research process (Holliday, 2002).

The diary was not originally intended to form part of my data. My analysis of the research diary

was distinct from my thesis research. I approached the examination of it as I would any document such as a transcript of an interview. The procedure I took to examining my diary as a scaffolding tool was similar to that described by Miles and Huberman (1994) and Richards (2005). I read and re-read several times looking for codes and categories to explain how the diary was supporting my reflection and articulation of thoughts. With a socio-cultural theory of learning framework in mind, I found the following themes emerging from my diary: questions to self, reference to 'expert other', noticing differences, justification for decisions and activities.

In the following sections I provide examples of narratives where the diary was acting as a scaffold for development of research knowledge and researcher identity.

Questions to self

Questions to self indicate a form of intramental thinking (Mercer, 1995; 2000). Vygotsky also points out that scaffolding can be manifested through guiding questions (1986). The use of questions in the primary classroom as a scaffolding tool is well documented (Alexander, 2001 Dillon, 1990; Myhill & Dunkin, 2005). Questions are an indicator of thinking rather than just reporting or sharing procedural information (Gibbons, 2006) and as such, I do not believe that there needs to be answers to the questions. In narrative form such as a diary, questions are evidence of thinking and considering possibilities. The questions I posed myself represented a window into the process of constructing knowledge.

In the following excerpt I expressed my concern over the naming of my methods. The literature on research methodology is vast, as are the terms and concepts discussed. This caused confusion for me as a novice researcher in the beginning: "Reading for methods chapter but getting bogged down on terms – ethnographic <u>what</u>? Also, getting a bit worried about what mine is – seems to be an ethnographic study of myself as a trainer!" (RD, 22.9.08). My question of "ethnographic what?" reveals several things. One is my anxiety over the terms and literature. Another point is that I was responding to the literature with my own research in mind. I was attempting to fit my reading into my schemata on research methods.

I also had worries about the procedure of giving out consent forms and this anxiety is evident in the questions I asked myself:

> a) Gave out consent forms. Not all returned. I wonder what I will do if not everyone returns them. How will it work? (RD, 22.9.08).
>
> b) Two students refuse to fill in consent forms. Of course, they're right, but a bit peeved because it will make things a little awkward. Can't use their documents, but can I still ethically video? Not sure but if the answer is no then my whole research flops. Almost don't want to ask (RD, 8.10.08).

My questions reveal a consideration of various alternative scenarios. Such hypothesizing is at the top level of Bloom's (1956) taxonomy of cognitive development and suggests a comparison of the 'here and now' with alternative situations.

In fact I did ask my supervisor, after some courage, and we decided that I would not video that group which had these two students in. This made logistics difficult, but not impossible. My questions suggest I was grappling with the relevant issues in beginning a research. The formulation of the question suggests that I had noted a gap in my knowledge.

I started analyzing my data from the very first day, and found myself constantly making inferences and interpretations. It is impossible to separate analysis from interpretation and my experience and reading would have bearing on my perceptions, a situation I believe to be natural and unavoidable (Kelle, 2004). However, as I was starting data analysis and writing, I found my position to be a difficult one: "Where do you draw the line between description, analysis and interpretation? I want to do all three at the same time" (RD, 16.2.09).

As I read, I became aware that many writers, particularly Wolcott (1994) and Holliday (2002) share the view that trying to minimize the researcher's experience is not only undesirable, but also means ignoring an important resource. This guided me in my analysis and gave me confidence to accept and be explicit about my possible prejudices and position, thus my reflexivity.

Some of my questions represented both intellectual grappling and emotional insecurity. Borg (2001) writes of the need to give deeper consideration to the affective in carrying out research, and Skidmore (2006) reminds us that the affective aspect has been little studied in research into scaffolding. The following question, written around the time I was thinking about my interpretation and conclusions chapter reveal a deep insecurity about the very subject I was studying:

> But now I sit back and I think, so what? What does all this mean? I can only answer with a few short bland sentences which are superficial and don't go any way to explaining the depth of the analysis I have done. Or have I? Maybe my whole thesis research is superficial and I really haven't got anything to say. (RD, 16.6.09).

This inner dialogue is referred to by Vygotsky (1986) as "egocentric speech" (p.33). This is talk which is spoken out loud by children, and then becomes inner speech as we become older. This narrative writing reflects my thinking and problem solving strategies.

Justification for decisions made

Justifying actions involves articulating thoughts and this is one way of displaying knowledge:

> Reading TESOL 1994 on different methods and realize my research is quite a mix - ostensibly ethnographic with a strong feature of participatory action research – although I am not setting out to improve my training, but to inform others of what I find, so that we can all improve. I am the researcher and the researchee. (RD, 25.9.08).

In this extract I put forward my rationale for the aim of my research. It is interesting that I found the need to justify my actions to myself, but this clearly highlights the role of the narrative writing as a social, dialogic activity (Golombek & Johnson, 2004). In research on diary writing prior to group discussions, Syh Jong (2007) found that their participants felt that the writing of thoughts constructed their understanding and better prepared them to discuss issues at the group meetings. Justifying actions suggests that the writer has considered various options and has made a principled decision on a particular trajectory to take. In this case, justifying actions is also preparation for the academic discourse community I will be participating in. For example, I will have to defend my thesis and this will involve the thinking and justifying that are evident in the diary.

Again in the next extract I am responding to my data and, with the literature on discourse in mind, I felt the need to justify my actions and beliefs. As Vygotsky (1986) notes, the words here are a result of the thinking process, and my beliefs came into existence through them. I believe that it is through my justifying that I was able to 'handle' my beliefs and be stronger in them: "Lots to discuss here in terms of whose discourse, whose ideal of teaching. But I honestly believe at this level they need some basic ground rules" (RD, 11.1.09).

The articulation of my position on teaching ideals made my opinion clearer to myself. As Rapley (2007) highlights, we do not know what we think until we write or say it. Durkheim (2006) suggests that we can only think about a topic when we have named it, and this can only be done verbally: "...without language, we would not have, so to speak, general ideas; for it is the word which, in fixing them, gives to concepts a consistency sufficient for them to be able to be handled conveniently by the mind" (p.82).

Noticing

I was told from the very beginning of my research project that I would need to be very aware of my reflexivity and reactivity, since I was a participant in the research as well as the researcher. This notion was a theoretical one until I noticed my behavior and noted it in my diary. By articulating my behavior, I am noticing it. Noticing is a step in construction of language knowledge (Batsone, 1994) and I believe the concept is true for construction of other knowledge. Through the diary writing, I was able to reflect on my reflexivity (Gerstl-Pepin & Patrizio, 2009; Rapley, 2007):

> a) Listening to tapes of feedback sessions. Listened to C and E. Very interesting. It's making me very aware of how I behave and how I ask questions, the structure, the format, the way students respond, even how I interrupt or laugh. (RD, 13.11.08)
>
> b) My position, power. I withhold my important feedback until they have evaluated themselves. It is almost as if I am sitting on the real evaluations, and then I tell them, after letting them sweat and flail around trying to guess what the trainer is thinking. Clearly the status is not equal, even the way I interrupt them, or the way they defer to the 'expert's' ideas. Rarely do they argue with me or even disagree. (RD, 18.11.08)

I also noticed issues as I analyzed my data and looked for codes to emerge. I committed myself to certain ideas as I wrote in my diary. I also had to manage all the different issues and observations which were emerging from the data. In the extract below, I had just started listening to my taped feedback sessions and was transcribing. Although I was not consciously analyzing the data at this stage, I found it impossible not to notice certain themes as I transcribed. I felt the need to write these thoughts down before I forgot them:

> I'm transcribing the tapes and listening to everything carefully, writing it all down and noticing how it is going. I'm really listening carefully to my questions, but I'm starting to think it is <u>not</u> the questions, but the format, structure of the feedback. (RD, 13.11.08)

Dialogue with expert other

As I stated previously, in narrative form the expert other can be in the form of the writer and also the literature with which the writer is interacting. The expert other in this case scaffolds the

researcher through the input and response to the input. This was evident in the reference to literature that I had read for my thesis:

> Read some interesting stuff about activity theory and at the first level of analysis is goals. Now I am sure all my students have different goals, which means they are all actually involved in different activities. I should find out more about their motivations. (RD, 11.1.09)

When I was wondering how to transcribe my tapes, I referred to other writers. This seemed to give more weight to my thoughts:

> I have to keep reminding myself of the research questions. Wolcott (1994) says himself that when he goes back to transcripts from several years earlier, or listens to the tapes, he realizes he could have seen other issues, or interpreted the data in different ways. (RD, 18.1.09)

I used other writers and references to distinguish my work as well. I used their ideas to interact with and then noted how my work is different:

> I like Westgate and Hughes form, function, context particularly cognitive code, which is reminiscent of Bloom's taxonomy. Difficult to put these all together. But what is slightly different to mine is that I am putting great emphasis on the perlocutionary force. (RD, 8.2.09)

Such an interaction with expert others through the literature constituted a dialogue about ideas, and clarified my own concepts. I used the literature as a spring board to discuss my own framework and ideas, which also constituted practice for more public academic discussion about my thesis.

Conclusion

The researcher diary can be seen as an integral part of the development of the researcher and the construction of research knowledge. In the same way that diary writing and reflection act as mediators in the development of teaching, researcher diaries mediate the construction of research knowledge. I strongly believe that my experience of keeping a research diary scaffolded my development in several ways. One was as a repository for thoughts and reflections; another was as a written account of my research journey. Not only was the act of writing scaffolding my knowledge through inner dialogue with more expert other, but the opportunity to re-read and interact with my thoughts was also a strong mediator in understanding my role of researcher and the research process.

Vygotsky (1986) writes of psychological tools, also referred to as artifacts (Daniels, 2001). In the same way as documents or videos can be a scaffolding tool in teaching and training, I believe the diary itself, as a tangible object, can be a scaffolding tool. Not only the narrating as a reflective, reflexive act in scaffolding, but the physical presence and opportunity of reading and re-reading many times scaffolded my construction of research knowledge. As I was researching scaffolding in pre-service teacher trainees' construction of teaching knowledge, I realized that my diary was a significant scaffolding tool in my own construction of research knowledge and identity. The quote from my diary at the beginning of this article is the point when I actually noticed. This was a significant point in the research process as I was able to recognize that my trainees' and my own construction of knowledge were intertwined. As a participant researcher I knew my role was a

highly reflexive one. However, I had not realized the depth of my participation in the trainees' learning, and their participation in my own learning. The research diary was my scaffolding tool in its physical form, as a repository for reflections and thoughts, as well as my 'expert other' in our dialogue. The act of articulating my thoughts through the written word helped me to make the connection between ideas and form my identity as a researcher.

Note

1. RD refers to 'research diary.'

References

Alexander, R. (2001). *Culture and Pedagogy*. Oxford: Blackwell Publishing.

Altrichter, H., Posch, P., & Somekh, B. (1993). *Teachers investigate their work: An introduction to the methods of action research.* London: Routledge.

Batsone, R. (1994). *Grammar*. Oxford: Oxford University Press.

Bloom, B.S.E. (1956). *Taxonomy of educational objectives Book 1. Cognitive domain*. New York: Longman.

Borg, S. (2001). The research journal: A tool for promoting and understanding researcher development. *Language Teaching Research, 5* 156-177.

Daniels, H. (2001). *Vygotsky and pedagogy*. New York: Routledge.

Dillon, J.T. (1990). *The purpose of questioning.* London: Routledge.

Dornyei, Z. (2007). *Research methods in applied linguistics.* Oxford: Oxford University Press.

Durkheim, (2006). Education. In H. Lauder, P. Brown, J. Dillabough, & A.A. Halsey (Eds), *Education, globalization, and social change*. (pp. 76-88). Oxford: Oxford University Press. (Original work published 1956).

Eton, C. (2008). A dynamic systems account of learning a word: From ecology to form relations. *Applied Linguistics, 29,* 339-358.

Gertstl-Pepin, C., & Patrizio, K. (2009). Learning from Dumbledore's Pensieve: A metaphor as an aid in teaching reflexivity in qualitative research. *Qualitative Research, 9,* 299-308

Gibbons, P. (2006). *Bridging discourses in the ESL classroom: Students, teachers and researchers.* London: Continuum

Gibbs, G. (2007). *Analyzing qualitative data.* Los Angeles: Sage Publications

Golombek, P.R. and Johnson, K.E. (2004). Narrative inquiry as a meditational space: Examining emotional and cognitive dissonance in second language teachers' development. *Teachers and Teaching, Theory and Practice, 10,* 307-327

Gomez, K. (2009). 'Living the literate life': How teachers make connections between the personal and literate selves. *Reading Psychology, 30,* 20-50.

Holliday, A. (2002). *Doing and writing qualitative research*. London: Sage Publications.

Jarvis, J. (1992). Using diaries for teacher reflection on in-service courses. *ELT Journal*, *46*, 133 – 143.

Johnson, K.E. (2007). Tracing teacher and student learning in teacher-authored narratives. *Teacher Development*, *11*, 175-188.

Kelle, U. (2004). Computer - assisted data analysis. In C. Seale, G. Gobo, J.F. Gubrium, & D.Silverman (Eds.), *Qualitative Research Practice* (pp. 473-491). London: Sage.

Lantolf, J.P., & Thorne, S.L. (2006). *Sociocultural theory and the genesis of second language development.* Oxford: Oxford University Press.

Marcos, J.J.M., Sanchez, E., & Tilleman, H. (2008). Teachers reflecting on their work: Articulating what is said about what is done. *Teachers and Teaching, Theory and Practice*, *14*, 95-114.

McDonough, J. (1994). A teacher looks at teachers' diaries. *ELT Journal*, *48*, 57-65.

Mercer, N. (1995). *The guided construction of knowledge: Talk amongst teachers and learners.* Clevedon: Multilingual Matters Ltd.

Mercer, N. (2001). *Words and minds: How we use language to think together*. London: Routledge.

Miles, M.B., & Huberman, A.M. (1994). *Qualitative data analysis: An expanded sourcebook.* Thousand Oaks: Sage Publications.

Myhill, D., & Dunkin, F. (2005). Questioning learning. *Language and Education*, *19*, 415-427.

Parkinson, B., Benson, C., & Jenkins, M. (2003). Learner diary research with 'Cambridge' examination candidates*. Edinburgh working papers in applied linguistics, n. 12*, 45-63.

Rapley, T. (2007). *Doing conversation, discourse and document analysis*. Los Angeles: Sage Publications

Richards, L. (2005). *Handling qualitative data: A practical guide*. London: Sage.

Richards, J. C., & Lockhart, C. (1996). *Reflective teaching in second language classrooms*. Cambridge: Cambridge University Press.

Skidmore, D. (2006). Pedagogy and dialogue. *Cambridge Journal of Education*, 36, 503-514.

Silverman, D. (2005). *Doing qualitative research: A practical handbook.* London: Sage Publications.

Smith, K. & Sela, O. (2005). Action research as a bridge between pre-service teacher education and in-service professional development for students and teacher educators. *European Journal of Teacher Education*, *28*, 293-310.

Syh Jong, J. (2007). A study of students' construction of science knowledge: Talk and writing in a collaborative group. *Educational Research*, *49*, 65-81.

Walford, G. (2001). *Doing qualitative educational research: A personal guide to the research process*. London: Continuum.

Wertsch, J.V. (1991). *Voices of the mind: A sociocultural approach to mediated action*. London: Harvester Wheatsheaf.

Wolcott, H. F. (1994). *Transforming qualitative data*: *Description, analysis and interpretation.* Thousand Oaks: Sage Publications.

Vygotsky, L.S. (1986). *Thought and language*. Cambridge, MA: MIT Press.