

Rich pictures: Researching the role of peer interaction for pupils using the internet

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Abstract

Electronic information resources, including the Internet, provide young people with opportunities to interact with each other and with vast quantities of information. Research has indicated that learning and cognitive development are intricately linked to opportunities to process and interact with relevant information and the medium used to deliver this information may well have an impact on these opportunities. This research aimed to inform policymaking and contribute to locally situated, and global, knowledge. In order to achieve these aims a constructivist approach, focusing on sixteen, in-depth, holistic case studies was used to produce 'rich pictures'. These rich pictures revealed a variety of ways in which access to the Internet can provide valuable learning opportunities in relation to cognitive, affective and social variables. Peer interaction in the electronic environment plays a significant part in contributing to cognitive development, this paper concentrates on that interaction and discusses ways in which it can impact positively on learning opportunities for young people.

Introduction

This research aimed to answer the question; 'does access to electronic information resources have a role in breaking down barriers to learning encountered by young people? If so, then how, why, and under what circumstances, to provide a clear understanding of the use of these resources.' [Pickard, 2002, p.3] This, in turn would suggest a guide to good practice in the management and provision of these learning resources at a local level, and inform practice at a global level. The first stage of this research was to establish the role of information in the provision of learning opportunities to the young people at the heart of the study.

' Children in schools frequently engage in information-seeking tasks either for personal interest or as part of some instructional activity. It is a process that usually involves such activities as locating, selecting, organizing, interpreting, synthesizing, and communicating relevant information. In most instances, an assumed and implicit purpose of the information seeking is that some form of learning will occur. But it is not necessarily the case.' [Oliver & Oliver, 1997, p.519]

Since this initial study was undertaken there has been a second, three year study of undergraduate students and their use of online information and social networks in the learning process. (Pickard, 2005). Currently, doctoral research is being conducted with primary school children to identify any emerging trends across all ages in the use of online information. Information Literacy and ICT literacy are very different skill sets which are often regarded as 'the same thing' at the expense of the learner. Somewhat remarkably, this longitudinal study has revealed that despite continuous rhetoric, very little has changed in the virtual worlds of young people. The recently published research report from CIBER (Centre for Information Behaviour and the Evaluation of Research) on the 'Google Generation' (CIBER, 2008) has confirmed what many Information Professionals have suspected for some time and what is certainly evident in the research discussed in this paper. Many myths surrounding the 'Google Generation' have no grounding in 'fact' but are assumptions made on the premise of familiarity. Young people feel at ease in many virtual environments but this does not necessarily mean they are equally at ease in all virtual worlds, they are, however, acutely aware of the limitations and potential pitfalls surrounding internet use. Rather than being discouraged from over-dependence on the internet, what learners need are the tools to allow them to use the internet to their best advantages, these tools are not ICT skills, navigating a keyboard is vastly different from

navigating the choppy waters cyberspace. Information Literacy is the key to efficient and effective use of the vast store of information now available to anyone with internet access.

Individuals all have their own, unique innate skeletal framework upon which all future learning builds, it is at the level of information input that the external environment can begin to impact, positively or negatively, upon that framework. [Bedford, 1993] The process of actively relating new information to previously retained information and building new cognitive structures is termed *knowledge construction*. [Prawart, 1992] Research has indicated that learning and cognitive development are intricately linked to opportunities to process and interact with relevant information and the medium used to deliver this information may well have an impact on these opportunities. [Borgman, et. al. 1995, Hiltz, 1993, Kozma, 1991, & Yang, 1997]. 'Learning is an active, constructive, cumulative, and goal-orientated process' [Shuell, 1990, p.532], in order for this process to take place the learner must be provided with high quality, accessible, and relevant information. Learning is a combination of several, inseparable aspects: the outcome (what is learned), the process (how it is learned), the situation (where it is learned), and the internal characteristics of the learner (genetic and historical influences) [Schmeck, 1988]. Learning opportunities then have 'to do with the manner in which we arrange the environment such that the child can reach higher or more abstract ground from which to reflect'. [Bruner, 1985 p.24] Vygotskian theory of the *zone of proximal development*, the distance between actual development and the level of potential development determined by collaboration with external factors, [Vygotsky, 1978] forms the basis for this argument. Information is one of those external factors, as is the provision and management of the resources used to deliver that information, both intellectually and physically.

The research model.

In order to provide the level of detail necessary for this type of 'how' and 'why' question, research needs to be carried out over time and in depth. [Yin, 1989] This research was concerned with 'multiple, holistic, competing, and often conflictual realities' [Lincoln, 1990 p. 73] Constructivist case studies based on qualitative data were used to provide rich pictures of individuals and their interaction with processes, social relationships and organisational frameworks. This research aimed to inform policymaking and contribute to locally situated, and global, knowledge. In order to achieve these aims a constructivist approach, focusing on sixteen, in-depth, holistic case studies [Yin, 1984] was used to produce 'rich pictures'. Each case was situated in the 'bounded system' [Smith, 1979] of one of four schools sites used in the study and all were embedded in the macro-environment of national policies. These are holistic cases because the focus was on the individual. To call them embedded would have implied that each school was studied in equal detail to each individual participant [Yin, 1989], this was not the design of the research, the school acted only as the bounded system for the participant. As well as individual rich pictures, cross-case analysis of all sixteen case studies identified issues which were generic across the research study, such as motivation, purpose, stress and application of information.

The initial study sample.

In order to locate a relatively small sample of great diversity, four schools were identified as *ideal* sites. The four secondary schools were selected to provide maximum variation of the bounded system; a grant maintained school, an inner-city school, a rural school and a school in a suburban town. The sixteen cases were then identified using the participant from a previous 'dry-run' as the initial case, she was not included in the final sixteen in order to reduce any bias, she did however highlight the first criteria for the initial research participant. Gender, access to electronic information, [in school, at home and in the community] educational level, social location and family background were some of the issues raised which then became the criteria used during all subsequent selection of the sixteen young people involved in this study. Each participant was unique in one or more of these factors. The aim of using maximum variation was based on the principle that any shared themes which emerge become all the more significant for having come from a small, heterogeneous sample. [Pickard, 2007]. This allowed the research to focus, quite deliberately, on unique cases which could provide

valuable insight into specific instances. [Simons, 1996] 'Snowball sampling' was used 'to locate subsequent participants or settings very different from the first.' [Maykut & Morehouse 1994, p.57].

Designing the inquiry.

The emergent design of a constructivist inquiry does not allow for a detailed plan before the research begins 'the research design must therefore be 'played by ear'; it must unfold, cascade, roll, emerge.' [Lincoln & Guba, 1985 p.203]. However, a model was developed to guide and focus the study whilst not inhibiting the iterative nature of the research. This approach to the design of data collection ensured that all possible avenues were explored and minimised the risk of 'loosing' data due to inappropriate tools. Data collection finally consisted of; various types of participant diaries, fully transcribed in-depth interviews, multi-site observations, document analysis, discussions with other interested parties and the researchers' log. The value of using multiple methods to provide insight and understanding by maximising data capture, is well illustrated by an example from the fieldwork concerned with feelings towards the Internet. During interviews all participants were asked how they felt about the Internet, these three examples were similar to all initial responses to the question;

'It's easy to find things on the Internet'

'The Internet is easier than books because all you have to do is type in the words you're looking for.'

'It's quicker to find what you want on the Internet, not like having to read through loads of stuff in the books.'

This interview data would have provided a particularly positive view of the Internet and indicated high confidence levels. During subsequent observations, which were carried out one week after the interviews, a rather different picture began to emerge. Comments made whilst these same three people were searching for information for school related research revealed some of the problems they were experiencing;

'It's just so painful, I know it's there but it takes so long, it takes hours, I hate it.'

'It's a bit annoying really, it goes so slow, I usually have a game running so I can play that while it's searching.'

'What am I supposed to do with all of this? I wish I'd never typed in volcanoes, I'm the one who'll explode.' (Pam slaps the screen)

The second quote here reveals something about both the reality of the situation and the nature of interview data. Ian claims to have developed a coping strategy to deal with the time it takes to retrieve relevant information. This is unlikely to have happened in the one week between interviews and observations. He has accepted that the Internet is slow, he has internalised that information accommodated it and developed a method of coping with it. During the interview he responded by verbalising his feelings, he does feel the Internet is easier, although it may be annoying and slow. Multiple methods of data capture can provide levels of insight which are difficult, if not impossible, to generate through application of a single method.

This data was analysed using a qualitative data analyse software package; QSR NUD.IST. The findings of the research appear as individual, holistic case studies described in the boundedness of their own school and placed in the context of national policies. These findings have relevance at the local level in which they were created and have been used to inform local practice, they also have implications for more global application.

Research findings.

This research has provided a tentative working model which identifies four major groups of variables which are likely to influence the impact that access to electronic information resources can have on learning opportunities for the individual. Technical and organisational variables which relate to the physical resources necessary to interact with electronic information resources and the availability of these resources. Cognitive variables, which relate to knowledge of the resources, perception of the processes involved, and the ability to apply this knowledge and perception to the use of individual electronic information resources. Affective variables which are concerned with the individuals feelings and emotions about, and attitudes towards, the use of the resources, the information, the location, and the purpose of their own searching behaviour. Social variables, which are primarily concerned with economic factors, images of electronic information, peer interaction and gender

issues. This paper will focus on the social aspects of Internet use and the impact this has on learning opportunities.

Research has shown that peer interaction, in the form of collaboration and instruction, has a significant role to play in learning opportunities for young people. Vygotsky claimed that social interaction was the foundation of developing new mental processes and attaining a higher mental level. [Wertsch, 1981] The important element here is the concept of *social interaction*, it could be argued that teacher-pupil interactions also involve a social perspective. However, the typical framework for teacher-pupil interaction is the giving of instruction by the teacher and the response to that instruction from the pupil, with limited possibility of these roles ever being reversed. Peer interaction includes both tutoring and collaboration. This research suggests that peer tutoring and collaboration takes place at all stages of the information seeking process, from acquisition of *technical skills* and *information skills* to the *information use* stage. There is also evidence to suggest that this interaction was actively discouraged in all educational sites visited in this research.

Gwen, a low achiever in all subjects, had never tried to access or use the Internet and was not confident in attempting anything *new*. Gwen discussed how her friend had helped her to access the Internet and how to copy and paste material from there to her own document;

Gwen/I2: I don't know, my friend told me how to get on the Internet.

RQ: SO HOW DID YOUR FRIEND SHOW YOU? DID SHE SIT WITH YOU?

Gwen/I2: Yeah, I got in to the computer first and then she told me how to do it. I think its got on the bottom 'go to next page' just do that when you want to go to another page, you just type something in then it was like loads of information and I just picked bits out that I needed to know.

RQ: DO YOU LIKE WORKING WITH YOUR FRIEND?

Gwen/I2: Yeah, I think that's good because we share ideas and that and you learn, at least I do.

During an observation Gwen asked for instructions constantly, instructions which her friend gave her willingly and which were pitched at a level Gwen could cope with and internalise. By the penultimate observation she was accessing the Internet and retrieving relevant information, although she did need her friend to be present. After the tutorial session given by the friend the researcher asked the friend if she minded spending so much time helping Gwen, she responded by saying; '*No, it's good fun and I'm not good at much so when I am it feels great.*' It would appear that this tutoring had benefited both Gwen and her friend.

There were many examples in this study of successful peer tutoring, Eddie frequently spent time tutoring his friends;

'I showed my mate how to write his homepage, we spent ages on it, I usually go around to his house because my Dad uses our computer a lot. You don't get shown that sort of stuff at school because it isn't really school stuff is it. I showed him how to find other stuff on the Internet because he hadn't used it before. I learn something new a lot of the time as well, it's good fun anyway because it feels like I've got something to show him, you know, like I know something he doesn't.'

Becoming aware of the facilities available and how to use these facilities was very often a result of peer interaction, Ian was unaware that he had access to email in school until a friend informed him of the fact, then went on to instruct him in use of the resource;

'Well the people in charge of this place, the library, they are always too busy fixing the machines, they don't show you how to do stuff. I think Karl showed me. Somebody said have you got an email address and I sort of went, what? I didn't know what it was I just thought Oh! I can have an email address. Karl showed me what to do then started sending me emails so I had to answer him and I just learnt.'

There was no evidence to suggest that peer tutoring was gender specific, Annie was frequently asked for help from both her male and female friends and Pam had received much of her Internet training from her male friends. '*The lads in my group showed me how to use the computers, you know, Encarta and the Internet, I found out most of it in lunch times and after school, it's easier when they show you because they know I don't know much about it.*'

Peer collaboration also played a significant role in Internet use, many of the male participants in this study would work together with friends on technical problems to reach solutions to both school related and personal projects. Ian worked with his friends to produce their own homepages, he claimed very limited knowledge but this was less of a problem when they worked together. *'About five of us got together to do homepages, we all wanted our own but we figured it out together, that way you get the best from everybody, as long as you all know a little bit, well in my case a very little bit.'*

John had considerable technical knowledge and he still benefited from collaboration with friends in reaching solutions to problems. *'I built my own computer, you know, I got all the bits from mail order, just a cheap box but the sound card was the best and I put loads of memory in. It worked out cheaper that way and it's great to build your own. Three of us worked on it and did my homepage, now the other two are going to do the same thing. Now we've worked it out it will be easier next time.'*

The young people in this study clearly valued their ownership of the problems and the autonomy they develop through their knowledge. They often referred to occasions when they had deliberately avoided seeking or using input from adults. Lee and his friends were determined to succeed independently when Steve got a new computer and wanted to 'surf the net', *'Me and some other lads worked out how to fix up Steve's computer, he didn't have a clue but we managed in the end. We went on the Internet and none of us knew much but we all knew more than his Dad. He wanted to help but he just kept telling us what to do and saying as how he was wrong most of the time, we gave up and came back when he was at work.'*

The acquisition of information skills appeared to be enhanced by peer interaction, there was evidence to suggest that collaboration was of greater significance than tutoring, Karen preferred to work with her peers, she did not always need their input but it gave her confidence to know they were there. *'I like working in the library, I find it quite easy because its not, well there's supposed to be silence but there isn't and then you can like talk to your friends and work it out with someone else. When I go on the Internet at home it's more boring and I never find as much, we all have something to say and some move to try.'*

Nicola enjoyed working with her friend, during an observation she was having considerable difficulty finding relevant information and she missed not having someone to work with. *'It's better when I go on with Katie, we have a good laugh trying to find the answers and I don't feel as stupid when we both keep getting loads of hits. We always find something but it never takes as long as this. Well it doesn't seem as long, sorry no offence but you're not supposed to be here really are you, like you don't do the work with me you just watch.'*

During the fieldwork Pam had a particularly unpleasant experience with a search on volcanoes, she had located a vast quantity of information but was unable to decide what was of use to her and what was not. She attempted this search again with Ian, another participant in the research. They had managed to narrow this search down using standard search procedure they had worked out for themselves during another search on photosynthesis. Pam was so keen to demonstrate this that an additional observation was set up to allow the researcher to witness her newly acquired skill.

The young people in this study demonstrated a willingness to share information located on and retrieved from, the Internet that they claimed was not there using more traditional resources. Lee tried to explain why information located through the Internet was different;

Lee/II: Sometimes you work alone because, we didn't all have to do vivisection, you just had to do a leaflet about animal rights and we went up in groups of who chose what, because some of my mates chose hunting and they went on at a different time to me. So like they could share information with other people doing your topic and like share web sites and stuff.

RQ: WOULD YOU DO THAT WITH BOOKS?

Lee/II: No.

RQ: WHY?

Lee/II: Because the stuff on the web is for everyone, like it's just there it's open to everyone to use and we just pass it around.

RQ: ISN'T IT THE SAME WITH A BOOK THOUGH, THAT'S WRITTEN DOWN FOR EVERYONE TO READ?

Lee/II: No because you have to go and get that from the shelves and read it for yourself, it's sort of private.

It was very natural to share information from the Internet without appearing to give anything up, Karen explained that they frequently, and casually exchanged their research findings. *'We were doing it for history that time but we always end up telling someone what we find, sometimes in pairs swapping information and stuff and if you can't find something ask someone else and see if they've got it.'*

All of the learning resource centres in this study had a policy of one person to each computer and did not encourage resource sharing. Discouraging peer interaction appeared to be common practice in all schools and public libraries where observations were carried out during the fieldwork for this study. Ruth enjoyed working with other people and often relied on her friends to help her to work out problems. She was unable to do this when using the Internet because school policy did not allow more than one person to each terminal and she was not familiar with email at this point. *'They do mind if there's more than one on a computer, it's best to get two computers near each other because if you like go and talk to them they'll shout at you until you get back to your seat. It doesn't matter that your asking for help or something they just tell you to shut up and go and sit down, it's just one to a computer in here.'*

Annie had a solution to this problem, *'We aren't allowed to sit together because they reckon we are just messing around, it's a bit of a pain but it doesn't matter really because we just email each other with any questions. It would sometimes be easy to just sit next to each other but it's good to feel like you've managed to do it together anyway, even if your not allowed to.'*

Helen believed that it was not possible to work together in the school library, so rather than face the possibility of being asked to leave she avoided the situation and worked with her friends at home. *'We all have sit on our own in the library, if we don't I think we get thrown out, I'm not sure because I haven't tried, I just work with my friends at home. But other people have been in trouble because they tried to sit together, it's a bit mean really because some people don't know how to use all of the stuff on their own.'*

It appears that the young people in this study did rely heavily on each other for support, tuition and guidance, but repeated attempts to share their knowledge had led to them feeling embarrassed and eventually many gave up. *'We sometimes sit on the computers by the desk but the librarian can see you from their so you have to try and get two computers next to each other and just whisper when nobody's looking. Sometimes, when I get stuck I wheel my chair over to my friend so I can see what she's doing but I always get caught and it's dead embarrassing to get told off in front of everyone.'*

During the course of the fieldwork all of the schools in the study banned access to 'chat rooms'. This was the environment where many of them had made good friends, sought and found solutions to problems, and developed a strong sense of their own location within the three dimensional space of hypertext. Pam was inspired to master the Internet in order to join the discussions in chat rooms focusing on her favourite pop group. This provided Pam with a 'peg' to hang her experiences of Internet searching on, she began to see the organisational aspects of hypertext and she acquired a clearer mental picture of her location within that environment.

Implications

Peer interaction removes the element of rigidity present in the teacher-pupil relationship and provides opportunities for peers to constantly revert from teacher to pupil and pupil to teacher. [Forman &

Cazden, 1985] The young people in this research frequently reversed roles, *experts* were identified and allowed to pass on their knowledge to their peers. This also appeared to raise levels of personal self-esteem amongst those being asked to share their knowledge. Use of the Internet appears to encourage peer interaction to a greater extent than information seeking in other environments. All of the young people in this study used friends to develop their understanding of the technology. They relied heavily on their friends and classroom acquaintances to offer guidance in the use of these resources. This peer tutoring and collaboration appears to take place at all stages of the information seeking process, from acquisition of technical skills and information skills to the information use stage.

This study revealed development over an observable time period [microgenesis] in those participants who had benefited from peer interaction. During the course of the field work four participants who had very limited knowledge of the technical skills necessary to access and use the Internet had been taught by friends how to gain access, how to set up their own email address, and how to identify relevant information.

Peer tutoring does provide benefits in information skills acquisition although this study indicates that it is peer collaboration which has the greatest influence on information seeking behaviour. There could be a number of reasons for this but it is suggested here that because all of the participants were relative beginners in using these resources, with the exception of John and Eddie, there were no established experts and they all appeared to be learning together for the majority of the time. These young people appeared to be capable of internalising a great deal of information when they worked together to reach a solution to a search problem, often one *real* episode was sufficient to teach a more advanced search skill.

The young people in this research revealed a definite willingness to use information located by others and to pass on information they had identified without feeling as if they had given up anything precious to them. Many of the participants used this as a means of demonstrating that they were able to locate information using electronic resources, an ability that has considerable standing amongst their peer groups. This pride in their ability and urge to demonstrate their skills did not appear to be present in the location and use of print based material.

‘ the Vygotskian perspective enables us to see that collaborative tasks requiring data generation, planning, and management can provide another set of valuable experiences for children.’ [Forman & Cazden, 1985. p.343]

The teachers and librarians in this study did not encourage sharing, when asked about this the reason usually given in all locations was that sharing computers encouraged talking and this usually led to ‘*messing about*’ and ‘*no work getting done*’. This was in huge contrast to events witnessed by the researcher, a great deal of work did in fact get done when these young people were together. There is no doubt that they talked a lot and often laughed out loud when they made mistakes or located amusing or irrelevant information, they also became quite exuberant when they made unexpected discoveries, they were, however, learning a great deal about the resource, the information and the topic.

References.

- Bedford, F. (1993) Perceptual learning. In *The psychology of learning and motivation*, ed. D. Medin, vol. 30, pp. 1 - 60. Academic Press
- Borgman, C. L., Hirsh, S. G., Walter, V. A., Gallagher, A. L. (1995) ‘Children's searching behaviour on browsing and keyword searching online catalogs: The science library catalog project.’ *Journal Of The American Society Of Information Science* 46:663-684
- Bruner, J. (1985) Vygotsky: a historical and conceptual perspective. In *Culture communication and cognition: Vygotskian perspectives*, ed. J. V. Wertsch, pp. 21-34. Cambridge: Cambridge University Press

- Charmaz, K. (1995) Grounded theory. In *Rethinking methods in psychology*, ed. J. A. Smith, Harre, R. & Langenhove, L. V, pp. 29-49. London: Sage
- CIBER (2008) *Information behaviour of the researcher of the future*. JISC / BL funded available at: <http://www.bl.uk/news/pdf/googlegen.pdf>
- Clarke, R. (1989) Reconsidering research on learning from media. *Review of Educational Research* 53:445-459
- Deem, R. (1998) From local to global? The role of case study in policy-relevant educational research. Plenary address to the Centre for Educational Development, Appraisal and Research Conference 'Case Study Research in Education' Warwick: University of Warwick.
- Dervin, B. (1997) Given a context by any other name: Methodological tools for taming the unruly beast. In *Information seeking in context: Proceedings of an international conference on research in information needs, seeking and use in different contexts 14-16 August, 1996, Tampere, Finland*, ed. P. Vakkari, Savolainen, Reijo., & Dervin, Brenda, pp. 13-38. London: Taylor Graham.
- Erlandson, D. A., Harris, E. L., Skipper, B. L. & Allen, S. D. (1993) *Doing naturalistic inquiry. A guide to methods* London: Sage.
- Glaser, B. (1992) *Emergency Vs Forcing: Basics of grounded theory analysis*. Mill Valley, CA: The Sociology Press
- Hamel, J., Dufour, S., Fortin, D. (1993) *Case Study Methods* London: Sage.
- Hiltz, S. R. (1993) Correlates of learning in a virtual classroom. *International Journal of Man-Machine Studies* 39:71-98
- Holland, J., Blair, M., Sheldon, S., eds. (1995) *Debates and issues in feminist research and pedagogy*. Clevedon: Multi-Lingual Matters
- Kozma, R. B. (1991) 'Learning with media.' *Review of educational research*. 61 (2), pp. 179-211.
- Lazar, D. (1998) Selected issues in the philosophy of social science. In *Researching society and culture.*, ed. C. Seale, pp. p. 8-22. London: Sage.
- Lincoln, Y. (1992) The making of a constructivist. In E. Guba. [ed.] *The alternative paradigm*. pp. 67-87. London: Sage.
- Lincoln, Y. S., Guba, E. G. (1985) *Naturalistic Inquiry* London: Sage
- Maykut, P., Morehouse, R. (1994) *Beginning qualitative research: A philosophic and practical guide* London: Farmer Press
- Melia, K. M. (1997) Producing 'plausible stories': Interviewing student nurses. In *Context and Method in qualitative research*, ed. G. Miller, R. Dingwall, pp. 26-36. London: Sage
- Miles, M. B. (1979) Qualitative data as an attractive nuisance: The problem of analysis. *Administrative Science Quarterly* 24:590-601
- Oliver, R., Pliver, H. (1997) Using context to promote learning from information-seeking tasks. *Journal Of The American Society Of Information Science*. 48:519-526
- Patton, M. Q. (1987) *How to use qualitative methods in evaluation* London: Sage
- Pickard, A. J. (2002) *Access to electronic information resources: their role in the provision of learning opportunities to young people. A constructivist inquiry*. PhD Thesis, Northumbria University.
- Pickard, A. J. (2005) The role of effective intervention in promoting the value of electronic information services in the learning process: Case studies in Higher Education. *Performance Measures and Metrics* 6 [3] pp: 172-182
- Pickard, A. J. (2007) *Research methods in information*. London: Facet
- Prawart, R. (1992) Teacher's beliefs about teaching and learning: A constructivist perspective. *American Journal of Education* 100:354-395
- Schmeck, R. R. (1988) *Learning strategies and learning styles* London: Plenum Press
- Shuell, T. J. (1990) Phases of learning. *Review of Educational Research* 60:531-547
- Simons, H. (1996) The paradox of case study. *Cambridge Journal of Education* 26:225-240
- Smith, L. (1979) An evolving logic of participant observation, educational ethnography, and other case studies. . In *Review of research in education*, ed. L. Shulman, pp. 316-377. Itasca, IL: F. E. Peacock

- Stake, R. E. (1995) *The art of case study research* London: Sage
- Vygotsky, L. S. (1978) *Mind in society: The development of higher psychological process* Cambridge: Cambridge University Press
- Weiner, G. (1994) *Feminism in Education* Milton Keynes: Open University Press
- Wolcott, H. F. (1990) On seeking and rejecting-validity in qualitative research. In *Qualitative inquiry in education: the continuing debate*, ed. E. Eisner, W, A. Preshkin, pp. 121-152. New York: Teachers College Press
- Yang, S. C. (1997) Information seeking as problem-solving using a qualitative approach to uncover the novice learners' information-seeking processes in a Perseus hypertext system. *Library and information science research* 19:71-92
- Yin, R. (1989) *Case Study Research* London: Sage
- Yin, R. K. (1984) *Case study research: Design and methods* London: Sage

