

Justification for a Qualitative Educational Research Project on Distributed Cognition

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本論文は、研究者の研究目的及び範例(パラダイム)配置・処理、現存の情報収集・分析方法、そして、正当性と確実性に関する近年の議論を検討する。次に、定量分析あるいは定性的(質的)分析のどちらが分散認知により適しているかを説明する。結論として、範例と研究方法の弁明を行う。

This paper discusses a research project in the light of current debate on the purpose of research, paradigm dispositions of researchers, existing methods of data collection and analysis, and discussions on validity and reliability. The paper will attempt to explain and justify which research method, quantitative or qualitative, is suitable for research on distributed cognition. This paper will conclude with the justification of the paradigm and research methods.

Picture this: A group of students are discussing a problem, seeking to resolve it. They are exchanging information, challenging ideas, constructing and synthesizing meaning, with some making notes or drawing visuals. Simultaneously, some consult their hand-held electronic gadgets: personal digital assistants, dictionaries, hand-phones and computer laptops. This may be a typical learning scene in a small group. Cognition has hitherto been understood as a private and individualised activity, but in the situation described above, could cognition be seen not as something private or implicit? Under the broad educational psychological framework of learning, this research seeks to question the *what's* and *how's* of cognition that is shared and distributed across the participants in a group.

Classical cognitive science examines how information is represented in the cognitive system, and how these representations are transformed, combined, propagated through the system in goal oriented behaviour (Simon, 1981). Thus far, the individual and what goes on in his mind has been the main focus, until the notion of distributed cognition emerged arguing for the equal emphasis (in some cases, more) on the external artefacts as well as the social and cultural elements. The artefacts refer to any item or visual that engages the cognitive development of the participants in the group. The classical idea of cognition was started with the mind and considered what went on inside that constitutes learning, such as memory and motivation. Only in the recent ten years has cognition slowly been considered outside the individual, distributed across the individuals in a system. Several researchers such as Hutchins, Salomon and Resnick began discussing socially shared cognition and the cognition processes in the 1990s and now serious attention has been given to the study of distributed cognition.

Essentially, distributed cognition is the cognitive process that is distributed across members of a social group (Salomon, 1993). These non-neurological considerations of cognition are the social and cultural interactions amongst the individuals accomplishing a task or resolving a problem. In his classical seminal book on distributed cognition, "Cognition in the wild", Hutchins (1995) studied the interactions of a captain piloting his boat at the control helm and his interactions with his instruments (artefacts) and his crew members (participants). He argued for cognition being distributed outside the individual mind and that these external participants and artefacts are significant in the development of the cognitive activity necessary to perform the task at hand: to navigate the boat to a destination. Distributed cognition is the study of the interactions between the participants and the artefacts in the environment.

The problem

Much of the research into distributed cognition has been centred on the fields of anthropology, cognitive psychology, cultural psychology, and sociology. However, there has been limited research in education where learning and thinking are the main businesses of schools and colleges. Brown et al's (1993) study into classroom practices was one of the early reported instances of research into formal learning institution distributed cognition. Distributed cognition has primarily been analysed in working environments such as airplane's cockpit, engineering workplace, etc. but little in the area of educational settings. Hence there is a need to study distributed cognition in a learning environment.

Distributed cognition has been used successfully in understanding some working environments but its applications were deemed limited to small, focused and "closed" systems (Perry & Macredie, 1999, p.2) such as the pilot in his cockpit and the captain on his bridge. Perry & Macredie felt that the study of distributed cognition has been confined to a "constrained set of problem solving activities, restricted resources and event durations" (p.2). A study of distributed cognition in less constrained and open environments may yield different insights and reveal more understanding of cognition.

This research seeks an understanding into the nature of distributed cognition in a classroom: amongst the learners and learning artefacts in an open and natural environment. This involves examining ways participants negotiate socially, conduct discourses and interactions. Owing to the nature of different individuals acting independently and interdependently, the participants will exhibit multiple variables and emergent behaviour. This research will contribute to the design of future classroom learning environments fostering the development of a community where knowledge is distributed in ways that provide the seeding ground for learning.

The problem statement can be seen as the study of distributed cognition and how it is distributed across a group of late adolescent male and female college students in single sessions of a problem solving activity. Relationships between the participants and artefacts will be studied and their cognitive representations will be analysed.

The purpose

What is the purpose of this research project? Perhaps the definition of research provided by Bassey (1999) is a good starting point: research is a "systematic critical and self-critical enquiry which aims to contribute towards the advancement of knowledge and wisdom" (Bassey, 1999, p.38). It seems that most research, if not all, should aim towards the progression of knowledge. Michael Bassey further defines educational research as "critical enquiry aimed at informing educational judgments and decisions in order to improve educational action" and makes a distinction from "discipline research" where it seeks to inform the understanding of phenomena (Bassey, 2005, pp.108-109). Johnson (1994) sees the purpose similarly as "to assist the development of effective school and college management...is meant to lead to professional reflection and...a commitment to change." For educational research, it appears that research should improve educational practice on top of attaining new illuminations to new phenomena in educational settings.

Setting noble aims aside, some may feel that the purpose of research in professional practice may be a "rule-driven" means of finding out information (Morrison, 2005, p.4) and done as a matter-of-factly, sacrificing the important questions of "Why?" in any research project. Similarly, some may feel that research is a means to be belonged to the elitism of academic profession. Such attitudes and practice may have pushed the whole notion of research as being irrelevant in some cases, leading to many managers and teachers feeling exasperated about research (Clipson-Boyles, 2000). Some writers even considered educational research as "disinterested inquiry" (Morrison, 2005, p.9).

An interesting aspect to educational research is that many researchers use a hybrid approach where problems are derived primarily from other disciplines such as psychology or sociology and their constructs are applied to an educational setting (Morrison, 2005). The research purpose seems to fall into this description: using a theory or concept derived from cognitive science and trying to understand it in an educational learning activity. The purpose for this research is certainly to enhance the body of educational research at large following Bassey's definition, hoping that it will impact both policymakers as well as practitioners in their design of learning environment for cognitive development.

The purpose is therefore to examine the meaning of a phenomenon: distributed cognition in a classroom setting. It is interest driven not rule-driven and is done neither for the sake of research nor on the grounds of academic "elitism".

Research Questions

Qualitative studies revolve around a central question and associated sub questions (Creswell, 2003; Marshall & Rossman, 1999; Borg & Gall, 1989). Quantitative studies, on the other hand, state specific objectives or hypotheses. Miles and Huberman (1994) set a limit of one to two central questions and not more than twelve sub questions. Creswell (2003) feels that five to seven is good enough. These questions serve as guidelines to the research compared to hypotheses to be tested in quantitative research. Essentially, qualitative research asks open-ended and exploratory questions, seeking to explain and describe phenomenon. It is emerging and employs non-directional language (Marshall & Rossman, 1999). Quantitative research, on the other hand, asks close-ended questions and seeks to test, resulting in either null or alternative hypotheses.

Matching of research questions to the purpose of the research is crucial (Marshall & Rossman, 1999). Qualitative questions that seek to explore are: investigate phenomena, discover categories of meaning, explain patterns in phenomenon, and identify relationships; to describe are: document and describe the phenomenon; and to emancipate are: opportunity for social action, employing the "what's" and "how's" (Marshall & Rossman, 1999).

If the purpose of research is to explore and understand a phenomenon by investigating, identifying patterns and discovering relationships, then the questions would be asking about those effects. The general research questions are: what happens when cognition is distributed in a group? What is "distributed" in distributed cognition? What is the cognition between the participants themselves, and with the artefacts? The sub-questions are: What are, if any, the representations of distributed cognition between and amongst the participants, and with the artefacts? If so, how are these representations generated, communicated and shared? Is there joint cognition and if so, how are they distributed? These sub questions seek to understand the phenomenon better.

Paradigmatic Quandary

Let's consider some underlying issues first. Researchers draw on their understanding of reality and knowledge in their investigation and creation of new knowledge. Currently, there are three to four paradigms to understand reality and knowledge: what they are (ontology) and their relationship with us (epistemology). In traditional scientific research approach, positivism or objectivism is the widely used and acclaimed system of philosophy (Lincoln & Guba, 1985; Borg & Gall, 1989). Sometimes also known as "logical positivism" (Borg & Gall, 1989, p.16), it asserts that something is meaningful only if it can be observed objectively by human senses. There are universal principles and laws "out there" that can be known by testing them from observing and collecting data objectively. Owing to criticisms that there is no such thing as "theory free" and "value-free", and that not all phenomena are observable, this paradigm was modified to post positivism, which accepted the possibility that knowledge and reality may not

be imperfectly understood (Lincoln & Guba, 1985). However, it was further criticised as resulting in relativism (Borg & Gall, 1989).

Consequently, the third paradigm emerged: interpretism. This paradigm is also known as discovery-oriented, artistic research, subjectivist, constructivist (Mertens, 1998), and naturalistic (Lincoln & Guba, 1985). Its key thrust is that knowledge is understood through interactions between the individual and the world. There is thus no objective reality but rather, knowledge and understanding of reality are constructed, interpreted, and modified by people and the meaning they place on them (Easterby-Smith et al. 1994). Instead of seeking to explain, it seeks to understand; instead of testing hypotheses, it builds theories; instead of being an independent observer, it acknowledges that it is part of what is being observed; instead of deconstructing the phenomenon, it looks at it holistically; instead of being value free, it is driven by human interests; instead of a single method of measuring the constructs, multiple methods are used to view the phenomena from different angles and instead of focusing on facts and figures, it focuses on meaning.

These bipolar and diametrically opposite philosophies on reality and knowledge have been the main debate for both scientists and social scientists (Borg & Gall, 1989; Lincoln & Guba, 2000) in modern times. Here is the crux of the dilemma: while in physical sciences, one can strongly argue for the objective realities of physical world but in social and human sciences, this cannot be said to be the same. And yet, it is irresistible to posit generalisations of human behaviour which is the basis of psychology, sociology and to some extent, anthropology. After all, after observing and testing hypotheses, patterns do emerge amongst several groups and one may be led to generalize its universality. A discerning person will qualify generalizations, but if everything has to be qualified, then in reality there is really no reasonable generalisation to be made. If so, why generalise in the first place, and why do any research at all?

Critiquing both positivism and interpretism, feminist and critical theory became the next alternative paradigm that spawned the neo-Marxist, praxis-oriented, ethnic studies, cultural studies and action research (Denzin & Lincoln, 2000; Marshall & Rossman, 1999) that sought to transform, emancipate and empower research according to their particular and individual agenda. It purports that truth responds to power, all knowledge is “interested” and power-oriented and that researchers are implicated in political relationships. This paradigm seeks to liberate people from “false consciousness” (Eagleton, 1991). There is therefore no objective knowledge and reality as they are influenced by social interests and political associations.

The research began with a theoretical concept about cognition. So, it will certainly not be done “theory free” or “value free”. And even if distributed cognition is unobservable socially, it does not mean that it does not exist. In positivist research, the use of control groups, experimentations and standardised testing of participants is unreal from the social sciences point of view. Arguably, the test participants will respond differently under different contexts no matter how identical the constructs and environments are set up. Variables, other than those determined by the researchers, come into play because one cannot account completely for all the variables. Because it is difficult to pre-determine and stipulate all the constructs to be analysed, would it not be better to examine the phenomena in its natural and real setting rather than in a controlled environment. It appears that taking a positivist position for this research would be erroneous.

This research paradigm does not belong to the school of feminist and critical theory either. It has no emancipatory aspirations because the research does not seek to change any current situations in the college nor the community at large. I have problems reconciling this position’s rejection of positivism while claiming to correct the “false consciousness” of groups of people. If we see groups of people having “false consciousness”, then who is to judge and by which objective value or criteria do we levy that judgment (unless they draw from some objective criteria!)? While feminist and critical theory is based on rationalisation, so will this research be, in understanding these free autonomous agents (students), creating and managing

their own time in a setting without political and capital constraints (college). However, it will not be seeking to empower the individuals (students). Neither is the research speaking on their behalf in order to make a political or social change to the college or community.

Having examined the various paradigmatic positions, it appears that the research problem (on distributed cognition in a natural environment), research purpose (of examining this phenomenon), and research questions sit well in the interpretist or constructivist paradigm. However, I do confess having an eye cast on the possibility of building theories, which pictures this research sitting as an interpretist looking at post-positivism.

Justifying the Naturalistic Way

Traditional scientific research has been using the quantitative method and is seen by many as the only valid and credible way of research (Borg & Gall, 1989; Burns, 2000; Creswell, 2003). Perhaps because statistics do not lie, the quantitative method of churning out figures and computed analysis appears more credible. Quantitative research sees the researcher as separate from the participants, maintaining a neutral position while observing and obtaining the objective knowledge that is “out there” (Creswell, 2003). It employs standardised testing and uses instruments to gather data. The purpose is to test hypotheses that are pre-formulated by the researcher. This is done by deducing observable consequences of the hypotheses and with the data collected, usually from large and cross-sectional represented samples, they are analysed and presented in facts and figures to prove or disprove the theories (Borg & Gall, 1989; Creswell, 2003). As you can see, the focus on facts and figures, deconstruction, measurable constructs and variables to explain the phenomena via large research samples can be very scientifically appealing.

However, the emergence of social sciences and their significance to human society has seen this way challenged in the late last century as the positivistic paradigm has been challenged on both ontological and epistemological grounds. Lincoln & Guba (1985) were at odds with positivism and offered the alternative naturalistic way, which is now known as the qualitative method. The characteristics of qualitative research are well documented by Lincoln & Guba (1985), Burgess (1989b), Borg & Gall (1989) and many others. It is a method for research that goes in-depth into complexities and processes; examines little-known phenomena; explores discrepancies between theory and practice; observes informal and unstructured linkages and processes; and studies variables that are unknown (Marshall & Rossman, 1999). Borg & Gall (1989) consider research with a focus on individuals’ lived experience, on society and culture or language and communication as part of the qualitative inquiry genre. Qualitative research genres involve the constructivism, interpretivism, critical theory, feminism, ethnic studies and cultural studies paradigms (Denzin & Lincoln, 2000).

Some researchers take the extreme irreconcilable position between quantitative and qualitative research methods while others such as Borg and Gall (1989) posit that different philosophies support different types of research. Some feel that a combination of both (mixed methods) is superior to either one, such as Miles and Huberman (1994), Wolcott (2001) and Creswell (2003), who also rejected the claims of incompatibility suggested that using both methods is legitimate, pragmatic, and not mutually exclusive. Strauss and Corbin (1998, p.31) saw them as more than complementary: as an “interplay” that allows the qualitative to inform the quantitative and vice versa, in order to build a grounded theory.

Human actions and behaviour in a real life classroom group activity are the main investigation interests of this research. As such, the social dimension and physical setting, cultural norms, traditions, roles and values of the participants will become important variables in this collection of data and analysis. These research variables make this research setting highly complex and multi-layered. Borg and Gall (1989), Creswell (2003), Marshall and Rossman (1999) and Mertens (1998) consider that research into human behaviour and complex situations requires the qualitative approach to harness the richness of information and data for analysis.

This research is about individuals' lived experience in a discussion group: uncovering the meaning and reasons behind the participants' actions—their feelings, beliefs, values, thoughts, assumptions and perspectives. This is best done via face-to-face interviews or focus group interviews (Creswell, 2003). The quantitative research method operates by coding variables and imposing pre-determined constructs. Doing this will ignore and miss valuable information.

As a social science researcher, I am aware that my actions and observations as an observer will have an influence (Burgess, 1985b) on the setting. The fact that the participants are aware of my presence and that they are being observed or researched is an influence that will directly affect their behaviour and actions in the group. They may speak less or be careful with what they say, or choose to be more focused on their tasks than in other unobserved occasions. Another issue with my personal involvement is power. They will act differently if this research was arranged by a fellow student (i.e. they may be more casual) or by the dean of the college (they may be more serious) compared to being arranged by myself, as a teacher. However, even with these considerations, it is believed that the overall integrity of the phenomena that is to be investigated is still largely valid and representative of such a setting. The reason is that it represents a typical case of the behaviour of participants in the process being observed.

As the primary source of data collection, personal observation is used because the nature of the phenomena is complex and dynamic. The discussions are fluid and multiple variables may emerge unexpectedly. Personal observations are adaptive enough to capture what the researcher is looking for and minimise any biasness that may result from the interactions and value differences between the researcher and participants (Borg & Gall, 1989). Video and audio recordings of the sessions and interviews with the participants will be made in order to supplement data collection. Open-ended questions will be used to ask for their perceptions during interviews. Observations and open-ended questions are characteristics of qualitative inquiry (Marshall & Rossman, 1999).

The dynamic and unanticipated events in the observation will affect the methods design of the research. Adjustments and changes will be made as needs and influences emerge: additional data collection, even with different methods and modifications to the constructs that are being analysed. The reason is the recognised unpredictability of the phenomena and the unfeasibility of ascertaining all possible constructs and influences ahead of time. Such emerging and unpredictable scenario in a research setting can only be qualitatively researched (Creswell, 2003).

Because of my personal involvement, my inevitable contamination of the research setting must be considered. As a primary instrument in collecting the data, my feelings, impressions, interpretations and invariably my judgments will come into play in my understanding of the phenomena. And because I believe that knowledge is created through the individual's interaction with the world, the students will have their own realities and meaning in the discussion activity. Each student socially constructs their own understanding of the world (Easterby-Smith et al., 1994) and the class with his or her peer, teachers, family, community and nation. Each student is culturally, historically and socially bound in their understanding of the meaning of being in a discussion group. Additionally, a student in a different part of the neighbourhood, city or country will perceive and understand their reality of class slightly different from the other. This will be true even of the next student in the same class.

The research is about the social processes, specifically students' learning processes in a group setting: how they think together and how they distribute cognition through their interaction with each other. This research will look at how people act according to what they make of the situation and how they respond and react to the multi-faceted stimuli present. And since all human action is meaningful and personal from the participants' point of view, the research will seek to understand and interpret their actions within their contexts. Each individual's contribution to the distribution of cognition, their action as well as non-action, and what they jointly or collectively as a group create over time in the discussion will be looked into.

The group dynamics and hegemony struggle will also be examined, together with the learning from the teacher and co-learner relationships.

The research will also attempt to look at the phenomena as a whole, considering as many cognitive constructs as well as social, cultural and historical variables. In other words, there will be no pre-determined constructs but rather they are recognised as they emerge in the observations. The phenomena in its natural setting will be examined. The students will be in their regular classes, engaging in small group discussions revolving around a problem solving scenario. Whatever learning artefacts that can be possibly identified in the natural physical environment will be considered.

The sampling will be selectively chosen rather than random. Purposeful sampling (Miles & Huberman, 1994), looking at a particular phenomenon and choosing the most typical case, will be used. Apart from the nature of the discussion being a problem solving type, the groups chosen will be mixed gender and mixed ability groups. Another key consideration will be the timing of the observation of these discussions: whether it is at the beginning or middle or towards the end of the semester. This has bearing on the group dynamics and the individuals' other academic demands.

One purpose of this research is also to see if it is possible to induce some qualified generalisations from the understanding of the distributed cognition in educational settings. While I may not begin with a hypothesis, the possibility to develop some grounded theory (Glaser & Strauss, 1999) is enticing. I am opened to the "interplay between qualitative and quantitative in theorising" my research (Strauss & Corbin, 1998, p.31).

There are several traditional qualitative research methods which an interpretivist or a constructivist researcher may use: ethnography, grounded theory, phenomenology, life history, action research (Denzin & Lincoln, 2000), focus group (Mertens, 1998), ethnomethodology, and conversation analysis (Burgess, 1985b). Although Tesch (1990) described 26 different strategies, she considers ethnography as the most common. Guided by theory, ethnography seeks to understand the phenomena in their natural socio-historical and cultural setting (Jacobson, 1991). Hutchins (1995) considers ethnography as the common research method in distributed cognition studies. In fact, he developed the term and method, "cognitive ethnography" to study cognition in a natural environment (Hutchins, 1995, p. 371).

Ethnography will therefore be the main strategy supported by conversation analysis and phenomenology. There will be thick description from several viewpoints in order to understand the behaviour of a social or cultural group using participant observation. Focus group interviews will be conducted in order to reveal the participants' inner thoughts and understand reasons for their actions and behaviour (phenomenology). Analysis of the conversations will be done to see how the speakers jointly construct meaning and shared cognition in the discussion (conversation analysis). Microanalysis of discourse and behavioural descriptions will be attempted: a detailed line-by-line analysis to "generate categories" and suggest relationships between them in a combination of "open and axial coding" (Strauss & Corbin, 1988, pp. 57-58). Different qualitative methods of data collection will allow me to have "multiple realities" (Borg & Gall, 1989, p.385) to further understand the complex phenomena.

Validity and Reliability

All research must have rigour and be tested against reliability and credibility (Marshall & Rossman, 1999). "Trustworthiness" is a common term used for validating qualitative research, although this is debatable (Lincoln & Guba, 2000). This will ensure that the results are believable. Creswell (2003) suggested that reliability and generalization play a small part in qualitative research due to different starting points and goals.

Qualitative research has been questioned in the area of population validity (Borg and Gall, 1989): that purposeful sampling is not representative of the larger population. In this light, LeCompte and Goetz (1982) suggested that qualitative researchers need to be cautious when

making generalisation. The other concern is the experimenter effect (Borg and Gall, 1989) where the biases and expectations of the researcher may distort data. A tedious and rigorous process called “analytic induction” (Ryan & Bernard, 2000, pp. 736-787), a process of reformulating hypotheses to apply to all cases under analysis, may validate generalization. This is also ethnography’s way of validation (Vidich & Lyman, 2000). To some extent for case studies in qualitative research, Creswell (2003) believes that we can generalise some facets of the results to other cases. Yin (1994) believes that multiple cases can strengthen this.

The internal validity is also considered weak in qualitative inquiry (Borg & Gall, 1989). This is the degree of distortion by unrelated variables getting more pronounced over long periods of observation. These changes stem from shifting perception and subjectivity of the researcher over time. Much of the criticism on the reliability and validity of qualitative research comes from the quantitative inquiry camp. However, Creswell (2003) believed that the internal and external validity problems faced by either research method are different and to compare them using the quantitative research criteria is not equitable.

There are several methods that will be used to ensure validity in my research project. The first of which is at the onset of data collection, the purposeful sampling from a typical case will add weight to the internal reliability (Miles & Huberman, 1994). A small scale quantitative survey of the most typical learning and cognitive activity of the students can be done to determine which cases. Secondly, employing multiple strategies to collect data as mentioned under the section “justifying the naturalistic way” will also enhance credibility (Mertens, 1998). Thirdly, the triangulation method is the classic strategy to increase validity (Burns, 2000). Besides observation descriptions of the sessions, there will be in-depth interviews with each member of the group, transcriptions of the discourses, and subsequent observation descriptions from the video recording. Although this is accepted as a traditional way of making one’s research valid, it falls prey to finding consistency when one looks for it (Lincoln & Guba, 2000). However, when done properly this method can support verifying of facts. Fourthly, checking via a third party to verify the findings and checking for accuracy with the participants will be conducted. Guba and Lincoln (1994), Mertens (1998) and Creswell (2003) consider member checking as an excellent way to enhance credibility.

Fifthly, rich and thick descriptions of findings, furnished as close to an authentic picture of the phenomena facilitates a degree of validity (Miles & Huberman, 1994). This will be descriptions of the discourses, actions, behaviour and body language of the participants. Creswell (2003) opined that such richness and thickness of description supports authenticity to the observation.

Sixthly, personal biasness and subjectivity will be reported. This will qualify and hedge any results and findings from over generalisations and assumptions. Seventhly, any contradictions and apparent antithetical observations or conclusions will not be omitted in the discussion. When possible, the research process and data gathering will be peer reviewed to minimise any oversight. Such steps are measures to justify qualitative inquiry (Creswell, 2003; Marshall & Rossman, 1999). Finally, the period of data collection will be confined to the same semester where the fear of distortion by unrelated variables such as history, maturation, experimental mortality, and instrumentation will be allayed (Borg & Gall, 1989).

LeCompte and Goetz (1982) pointed out that in a highly social situations such as a classroom, the amount of interaction is too complex and too subtle for the participant observer, whether complete or pure observer, to record everything that happens. Their contention is that while the researcher may record what is relevant to the topic being researched, what is being excluded should be recorded. This will be true in this case, and to compensate this inherent problem, the entire participant observation sessions will be video-taped and audio-taped. This, no doubt, will even capture unobtrusive cues that participants may have exhibited but eluded the observation. Such modern day technologies that support ethnographic research are one of the

major changes in qualitative research in the last two decades (Preissle, 1999) and includes verification of the claims made.

The validity and credibility of qualitative research rest on dispelling the subjective nature of the collection, analysis of data and deriving conclusions from the findings. Hopefully, the steps to be taken above will minimise the experimental effect and if necessary and time permits, the number of case studies may increased for more credibility. Any good qualitative work should not be denied its accuracy and trustworthiness when adequate steps are taken.

Conclusion

Concerned for human actions and behaviour in a natural and open environment of a classroom group activity, balancing its social and cognitive process with looking at it as a whole, and seeking to induce some qualified generalisation of distributed cognition in an educational setting, this research exhibits the “soft side” of research (Burgess, 1985b, p.1). The collection of data, adoption of ethnography, conversation analysis, and phenomenology strategies using observations, face-to-face focus group interviews, discourse recording, and purposeful sampling are typical of the fluid nature of data collection. The analysis of data, rich in thick descriptive information, and from different sources of information: interviews and discourse analysis, provides the “multiple realities” (Borg and Gall, 1989, p.385) of the same phenomena in question. My involvement as an observer—being aware of my presence as a “contamination” and myself as the primary source of data collection—undoubtedly makes this research unmistakably subjective. My research setting and forces that affect the cognitive activity are dynamic, unpredictable and emerging making it uncontrollable and unfixd. With all these classic symptoms of the qualitative inquiry of the interpretist paradigm, this research project seems destined for a tedious and arduous journey of data gathering, processing and analysis.

While I may be largely persuaded that the qualitative method is best suited for this research interest, I recognise and am somewhat unsettled with the fact that I started off with a claim made by distributed cognition: that cognition is distributed across a social group. While seeking to understand and describing it in an educational context, am I not, to some extent, trying to prove that distribution cognition exists, which qualitative work sometimes does? Unless of course, I accept the theory at face value and seek to further the understanding of this theory, in particular, in my own setting and context. Unabashedly, I cannot deny my “sneaky” intention (and at the back of my mind) that a little of my research endeavour is to attest to this cognitive claim. However, at present, I am leaning towards the approach that distributed cognition is an assumption and am exploring it in order to develop it further.

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