# University of Alberta


Beyond Policy Implementation: Policy Sense Making and Policy
Enactment in Schools


by


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**Abstract**

This thesis aims to answer the following question: How does an account of educational policy sense making from the perspective of embodiment inform our understanding of educational policy enactment? I start by describing a widespread phenomenon identified by educational policy analysts: A growing body of research has shown that a single policy can be put into practice in multiple, diverse, and sometimes contradictory ways. How is this possible? I argue that the traditional notion of policy implementation is insufficient to characterize these variations and I make use of the notion of policy enactment (Ball, Maguire & Braun, 2012) to argue that we require an account of policy that takes into account the contexts in which school actors transform and adapt the policy to their own practices. I argue that this multiplicity of practices is related to the ways in which school actors make sense of policy when they engage in embodied interactions with other policy actors and policy artefacts in their contexts of practice. I propose the notion of "embodied policy sense making" to explain the multiple ways in which policy is enacted in schools. My intention in this dissertation is to offer an account of what makes policy sense-making possible. I do not offer an account of what makes a particular understanding of a policy correct or incorrect, true or false, accurate or inaccurate. I offer an account of what are the conditions so a policy is made sense of by the school actors in their contexts of practice.

## Table of Contents

## List of Tables

## List of Figures

**Introduction**

**Problem Statement and Research Questions**

Scholars in educational policy analysis have found that educational policy initiatives often get transformed when they are put in practice and, in some cases, the resultant practices are contrary to the initial intentions of the policy makers (Coburn, 2001; Cuban, 1998; Honig, 2006; Spillane, 2004; Hill, 2001; 2006). A number of theories have been presented to explain the nature of the different local adaptations of policy initiatives. Traditionally, the policy implementation literature portrayed local adaptations of policy as errors caused by failures in the implementation stage or failures in the policy design (Hogwood & Gunn, 1984; Pal, 2009). The solution to this problem consisted in realigning the policy objectives with the desired outcomes through a redesign of the policy implementation process. Many researchers discredited this approach to policy analysis (Ozga, 2000; Ozga, Seddon & Popkewitz, 2006; Simons, Olssen & Peters, 2009) because it focused only on the formal aspects of policy design without taking into account the local context's input to policy enactment. According to Ball, Maguire and Braun (2012) "policy enactment involves creative processes of interpretation and recontextualization –that is, the translation of texts into action and the abstractions of policy ideas into contextualized practices" (p. 3). Researchers in policy analysis have focused on the conditions and nature of specific policy enactments in order to explain the different local adaptations of educational policy (Meyer & Rowan, 2006). Some authors (Spillane, 2004; Spillane, Reiser & Gomez, 2006) have explored how the school actors' understandings of policy initiatives inform the way policy is put in practice. Studying the conditions and nature of policy enactment is important because we want to know what facilitates or constrains the enactment of educational policy in the classroom, school, or district. Also, a better understanding of policy enactment will provide new venues to study policy design and will allow us to understand how local contexts, such as the school or the classroom react and are affected, disrupted, or impacted by educational policy initiatives. One way to study how

1

educational policy initiatives are transformed in the local context is through an examination of the way people in schools make sense of the policy messages and translate policy messages into practices (Ball, Maguire & Braun, 2012; Dyer, 1999; Spillane & Zeuli, 1999).

I shall argue that we require a deeper and contextualized understanding of how educational policy is recontextualized into practices. I defend that school actors recontextualize policies into the school context when they engage in situated process of sense making. I will study the process of sense making from a situated perspective that includes the policy actor's body in interaction with the environment. In order to exemplify the processes of policy sense making that enact policy initiatives, I will investigate the enactment of a policy on instructional technology. The policies on Information, Communication, and Technology (ICT) in schools have gained momentum in the current wave of school reform (Cuban, 2001). An example of such policies can be seen in Alberta's provincial mandate for including technology in the classroom (Alberta Education, 2004). School districts across the province responded by adopting the interactive whiteboard (IWB) technology, among other technologies, and teachers were asked to incorporate this tool into their classroom practices. The particular enactments of this policy within the classroom environment could be evidenced in the classroom practices that appeared after the introduction of the IWB. Researchers have reported that the degree to which IWBs have been incorporated into classroom practices vary significantly. For example, a study by Levy (2002) in the UK has shown that in some cases IWBs have been incorporated into traditional teaching practices that resemble the use of chalkboards, although in some other cases, there have been substantive levels of learning interactivity brought about by the use of the IWBs. We do not have a model that explains adequately the nature of these different enactments.

In this study I am interested in the question of the constitution of policy enactments. I want to examine the ontological conditions that make possible the enactment of educational policy through the educational practices that emerge

when school actors try to make sense of the policy. The main research question that will guide my study is the following:

> How does an account of educational policy sense making from the perspective of embodiment inform our understanding of educational policy enactment?

In order to answer this question I will answer the following sub-questions:

1. What constitutes educational policy sense making?
2. What constitutes educational policy enactment?
3. What Specific Instances of Educational Policy Sense Making Illustrate the Enactment of a Policy?

I start with a review of the literature on the academic fields related to these questions. I review the literature on four fields. First, I review the literature on educational policy analysis that has given some importance to the notion of policy enactment in the analyses of educational policy. In brief, policy enactment involves the processes of recontextualization of policies into practices Ball, Maguire & Braun, 2012). I elaborate on Ball, Maguire and Braun's (2012) conceptualization of policy enactment, and I review the contributions of Yanow's (2000) notion of Interpretive Policy Analysis, Dyer (1999) and Crump's (1992) conceptualization of Pragmatic Policy Analysis, and Fenwick (2010) and Fenwick and Edwards' (2010) insights on Actor-Network Theory in education. I will review the studies of Spillane (2004), Coburn (2001), Hill (2006), Ramirez (2006), and Meyer (2006), among others that have shown that policies are recontextualized and transformed in the school. Second, I draw from philosophical analyses on the embodiment of thought. I argue that the idea of embodiment (Robbins & Aydede, 2009; Shapiro, 2010) opens new avenues for the study of the educational practices and actions that enact educational policy. I explore philosophical arguments that propose that the body and its interactions with other objects and people in the world constitute episodes of sense making, that is, understanding is an embodied process that takes place when the body enters in practices and actions that include objects and/or people. Historically, the situated character of thought has been a main concern for philosophy. For

3

example, according to Merleau-Ponty (1962), the body is not experienced as a bundle of organs or limbs, but as a unit, and such experience of the body as unit influences the way we understand the world and act in it. Third, I review the literature on organizational theory that has underscored the role of human thought and practices to study organizations, particularly, for the study of organizational learning. I explore the contributions of organizational theory to the notion of enactment. In particular Weick's (2001) conceptualization of enactment according to which organizational actors create organizational phenomena, that is, enact their organizational reality, when they engage in practices conducive to make sense of their environment. I situate some of these discussions in the school context and review some authors that have focused on the notion of sense making, and more specifically, embodied approaches to cognition in order to explain practices in the school settings. Fourth, I review some studies on the introduction of IWBs in schools. I reference some of the policy documents in the context of the province of Alberta, and highlight how these studies reveal the multiple ways in which policy on instructional technology is enacted schools.

Many researchers have proposed analyses of educational policies that focused on the way school actors understand policy and put it into practice (Spillane, 2004, 2006). Some have proposed cognitive accounts of decision-making processes in schools (Evers & Lakomski, 2000), or have proposed cognitive models of school functioning (Lakomski, 2005). However, researchers have not investigated policy sense making and enactment from the perspective of embodiment. This study aims to fill this void and intends to show that this is a legitimate field of inquiry. In this study I explore new avenues for research and scholarship in the area of educational practices. I want to trace the connections between educational policy analysis, philosophy, and organizational theory. In the literature review, I take each one of these fields in turn and review the literature that will help me answer the questions that guide this study.

### The Format of this Thesis

This thesis adopts a "paper format". It consists of four chapters. Each chapter has its own list of references according to the Faculty of Graduate Studies and Research guidelines. In chapter one I present a literature review on the fields of inquiry that are related to the guiding questions. I review the literature on educational policy analysis that has used the notion of enactment and the literature that has applied a pragmatic or interpretive perspective to the analysis of educational policy. Chapter two is a paper (Riveros, submitted a) submitted for publication. In this paper I argue that policy sense making is a process that includes the body in interaction with objects in contextualized practices. In my analysis of some case studies on the introduction of Interactive Whiteboards (IWBs) in the school context, I argue that schoolteachers make sense of the policy that guided the introduction of the IWBs by engaging in embodied interactions, through gestures, when operating the IWBs. I use the notion of policy enactment (Ball, Maguire & Braun, 2012) to refer to the processes of recontextualization of a policy by school actors through their actions and practices. I conclude by showing the implications of an embodied account of policy sense making for the study of policy enactment. Chapter three is another submitted paper (Riveros, Submitted b) in which I build upon the idea of embodied policy sense making, and provide more detail about the notion of embodiment. I ask: How is embodiment manifested in the world? And more importantly, how does a conceptualization of embodiment inform an analysis of a concrete case of policy sense making? I apply Shapiro's (2010) taxonomy of theories of embodiment to the analysis of the introduction of IWBs in the classroom. Briefly, the three themes identified by Shapiro (2010) are Conceptualization, Replacement and Constitution. The conceptualization theme indicates that concepts used by the organism depend on the characteristics of the organism's body, the replacement theme indicates that theories of embodiment replace representationalist/internalist explanations of action and thought, and the constitution theme indicates that for certain cognitive processes to take place it is required that the body and some objects in the world interact and work as a single and unified system. I argue that an embodied account

5

of policy sense making offers a context-sensitive way to understand how educational policy is transformed and adapted by school actors in their contexts of practice when they engage in embodied interactions with the IWB. In Chapter four I return to my initial questions and explain how I have answered them in chapters two and three.

**Chapter 1**

**Literature Review**

**Beyond Authoritative Instrumentalism in Policy Analysis: Enactment, Sense Making, Practices, and Artefacts**

In this section I review models of educational policy analysis that have rejected conventional accounts of policy analysis according to which policy is designed at the higher levels of the bureaucratic structure by authoritative individuals or groups. In this conventional view, policy is portrayed as a finished product that is transferred to the lower levels of the bureaucratic structure in order to be implemented by practitioners and other policy actors. Colebatch, Hoppe and Noordegraaf (2010) and Shore and Wright (2011) called this perspective the narrative of authoritative instrumentalism. In this view, policy is designed with the purpose of "solving problems". For example, Pal (2009) defined public policy as "a course of action or inaction chosen by public authorities to address a given problem or interrelated set of problems" (p. 2), Dye (2013) indicated that policy is "whatever governments choose to do or not to do" (p. 7), Kraft and Furlong (2007) indicated that public policy is "a course of government action or inaction in response to public problems" (p. 5). From this perspective, policy development corresponds to a cycle according to which authoritative individuals identify a problem and these individuals, or policy makers, find the possible solutions to the problem. After selecting the most plausible course of action, policy makers implement it. Implementation is often evaluated in order to find whether the problem has been solved or not. If the problem persists, the policy can be redesigned and a new implementation process takes place (Dye, 2013; Kraft & Furlong, 2007; Hogwood & Gunn, 1984; Pal, 2009). Colebatch, Hoppe and Noordegraaf (2010) summarize authoritative instrumentalism as follows:

> In the narrative of authoritative instrumentalism, governing happens when 'the government' recognizes problems and decides to do something about them; what it decides to do is called 'policy'. The narrative constitutes an

actor called 'the government' and attributes to it instrumental rationality: it acts in order to achieve preferred outcomes. (p. 15)

Many authors (Apple, 2004; Ball, 1994; Ball, Maguire & Braun, 2012; Crump, 1992; Dyer, 1999 Fenwick, 2010; Fenwick & Edwards; 2010; Riveros, Newton & Burgess, 2012; Riveros & Viczko, 2012; Simmons, Olsen & Peters, 2009; Yanow, 2000; Webb, 2009) have argued that this view is insufficient to analyse the way educational policies are adopted in schools, because it does not take into account the contested nature of policy work. Schools engage in complex processes of conflict and negotiation when policies are introduced in the classroom (Ball, Maguire & Braun, 2012). The notions of contestation, resistance, negotiation (and consensus), suggest the existence of a political dimension in the analysis of policy processes. These notions will be mentioned and explored throughout this study as they provide the background for my critique to authoritative instrumentalism. Biesta (2010) has suggested that current technocratic and instrumentalist forms of government have decimated the political spaces in contemporary societies: "not only can it be argued that the relationship between the state and its citizens has been depoliticised. One could even argue that the sphere of the political has been eroded" (p. 54). Conceptualizations of policy analysis that portray policy processes as formal and mechanistic have the consequence of "depoliticizing the role of policy actors in policy processes. These models portray policy actors as mere implementers of policies as mandates. Similarly, Giroux (2001) argued that schools "contain ideological and material spaces" (p. 116) that constitute scenarios of resistance to instrumentalist and technocratic forms of governance. Evidently, there is a need for more robust and complex conceptualizations of policy processes that recapture the political role of school actors in policy processes. Conventional linear models of policy analysis that rely on the idea of policy implementation, as a top-down process, fail to capture such complexity (Shore &Wright, 2011). In the following sections, I elaborate on some of the responses to authoritative instrumentalism.

I begin with a review of Ball, Maguire and Braun's (2012) notion of policy enactment, and continue with a description of Yanow's (2000) interpretive policy analysis, also, I review the contributions of pragmatic policy analysis proposed by Crump (1992) and Dyer (1992). These models highlight the symbolic aspect of policies and the importance of the local context in understanding policy enactment. Finally, I turn to actor-network theory (Fenwick & Edwards, 2010) to illustrate how the study of policy could benefit form acknowledging the role of policy artefacts in shaping educational practices.

**Policy enactment.** According to Ball, Maguire and Braun (2012), instrumentalist models of policy analysis have embraced the notion of implementation to portray policy making as a process in which a finished product is transferred through a hierarchical structure from the upper levels of decision making to the lower levels of implementation. In their view these models do not take into account the way policy actors recontextualize the policy messages adapting them to their own contexts of practice.

> Many of the studies that explore how policies are out into practice talk of 'implementation' which is generally seen either as a 'top-down' or bottom up' process of making policy work, and these studies 'stress the demarcation between policy and implementation'. In contrast, we see policy enactments as a dynamic ad non-linear aspect of the whole complex that makes up the policy process, of which policy in school is just one part. (Ball, Maguire & Braun, 2012, p. 6)

In Ball, Maguire and Braun's view, the notion of policy implementation does not convey the actors' role in translating policy into practices. In contrast with the notion of policy implementation, Ball, Maguire and Braun, proposed the notion of policy enactment to convey the "creative processes of interpretation, that is, the recontextualization –through reading, writing and talking – of the abstractions of policy ideas into contextualizing practices" (Braun, Maguire, & Ball, 2010. P. 586). The notion of enactment highlights the active role of actors in the process of recontextualizing and translating the policy into practices. According to Ball,

Maguire and Braun, the contextual dimensions of schools are crucial to policy analysis. They identified four contexts that contribute to policy enactment: First, the situated context, which refers to the aspects that are "historically and locationally linked to the school" (Ball, Maguire & Braun, 2012, p. 21), such as the history of the school, its location, and demographics. Second, the professional context, which refers to the professional cultures within the school, and the values and commitments of the practitioners that shape the way policy is enacted. Third, the material context, which refers to the buildings and infrastructure that bound the enactment of a policy, and fourth, the external contexts, such as the "pressures and expectations generated by *wider* local and national policy frameworks" (p. 36). Ball, Maguire and Braun's conceptualization of policy offers a different way to understand policy processes. They called for a context-sensitive analysis of policy and challenged the instrumentalist narratives that pervade theorizations of policy analysis. They showed how the notion of implementation fails to capture the non-linear aspects of policy processes in schools. Their conceptualization of policy suggests that policy is not an object or a finished product that arrives to the school door ready to be unpackaged and applied without contention. In response to this instrumentalist perspective, Ball, Maguire and Braun, argued that policy is better portrayed as a process that spans over multiple contexts of practice.

> Contexts are magically dematerialized in the way that schools are represented in much policy analysis. Thus, policy making and policy makers tend to assume 'best possible' environments for 'implementation': ideal buildings, students, teachers and even resources. In contrast, we have attempted to disrupt this version of schooling by introducing the 'reality' of our case study schools, with their situated and material contexts, their specific professional cultures and challenges, and their different external pressures and supports. (Ball, Maguire & Braun, 2012, pp. 41-42)

The notion of policy enactment constitutes a rejection of the instrumentalist and authoritative assumptions of most policy analysis and provides a situated account

10

of policy processes that highlights the role of school actors, their practices and actions in the adaptation of policies to the school environment.

**Interpretive policy analysis.** According to Yanow (2000) policy analysis has traditionally dealt with the formal aspects of policy design and implementation. The job of a policy analyst was to ensure the coherence of the policy development process and to identify structural incoherencies, such as the lack of alignment between objectives, resources, and implementation. One difficulty that policy analysts face is how to understand the adaptations of policies in local scenarios. Yanow cited examples of studies that have found that the attitudes toward certain policies differ from community to community, influencing the way the policy is put in place. For instance, she cited a study that found that different ethnic groups in the U.S. have different expectations regarding infirm elderly. Some groups take it as a given that parents should be cared for at home until death, whereas other groups consider that such care is better provided by nursing homes. A survey sent to households asking about elderly care, was centered on the service provided by nursing homes. The survey was perceived as meaningless from the perspective of the care-at-home group as the survey did not take into account the care-at-home perspective. Consequently, the results of the survey were biased against the care-at-home group. Similarly, Schmidt (1993) wrote about the collapse of a dam after policy makers in Washington dismissed the knowledge about cement requirements under local conditions provided by site-based engineers. Also, Wynne (1992) described the detrimental economic results in northern England after policy makers ignored the implicit knowledge of local shepherds.

A number of studies have illustrated this situation in educational contexts (Cuban, 2000; Hill, 2006; Spillane, 2004). The particular understanding of policies at the school level generates new adaptations or outcomes different from what designers intended. An interpretive approach to policy analysis states that communities interpret and adapt policy to their particular situation. Indeed, policy-related actions in school communities are usually framed by idiosyncratic

11

conceptions of education, student, or subject matter, among many others. According to Yanow: "through a process of interaction, members of a community –whether a community of scientists or environmentalists or some other group – come to use the same or similar cognitive mechanisms, engage in the same or similar acts, and use the same or similar language to talk about thought and action" (Yanow, 2000, p. 10). In Yanow's view, contemporary policy development is the product of the interaction of different social groups or communities. Interest groups and governments usually engage in bargaining processes when it comes to policy design.  This interaction could be seen as a meaning-negotiation and meaning-creation process. Communities make use of their interpretative frameworks to understand the messages from the government, and concrete practices appear during this interpretation process. Specifically, Yanow studied the way communities make sense of policy and interact with policy instruments or artefacts. She indicated that policy artefacts, spaces, patterns of action, among others, are concrete representations of the abstract meanings in the policy. For example, a smart classroom layout, the architectural design of a school, and the software that runs in the school's computers, afford the occurrence of certain actions and not others. In Yanow's view, the abstract meanings in the policy are embedded in the artefacts that put the policy into practice. Simultaneously, the community may adapt the artefacts to their own context and assign these artefacts certain values and meanings relative to their own situation. According to Yanow, an interpretive policy analysis has at least five steps:

1. Identify the policy artefacts that are significant carriers of meaning for a given policy issue, as perceived by the policy-relevant actors and the interpretive community.
2. Identify the communities of meaning / interpretation / speech / practice that are relevant to the policy issue under analysis.
3. Identify the "discourses" or specific meanings being communicated through specific artefacts and their entailments (in thought, speech and act)

4. Identify the points of conflict and their conceptual sources (affective, cognitive, and/or moral) that reflect different interpretations by different communities

5. Intervene to

   a. Show the implications of different meanings for policy formulation and/or action.

   b. Show that differences reflect different ways of seeing

   c. Negotiate / mediate / intervene in some other form to bridge differences (e.g. suggest reformulation or reframing)

<div align="right">(Yanow, 2000, p. 22)</div>

Interpretive policy analysis pays attention to the symbolic relations people establish with policy artefacts. "Interviews, observations and document analysis constitute the central interpretive methods for accessing local knowledge and identifying communities of meaning and their symbolic artifacts" (Yanow, 2000 p. 31). In her view, policy analysts could use these sources in order to study the local understanding of the policy through the ways people engage with policy artefacts.

**Pragmatic policy analysis.** Interpretive policy analysis has some similarities with pragmatic policy analysis (Crump, 1992; Dyer, 1999). Crump argued that school actors have a chance to intervene in policy enactment by adapting the policy to their own context:

*Policy is a process not just an end product . . .* If policy development is a multifaceted process, actual policies are capable of more than one interpretation. In an organization the size of education, policy is open to interpretation in all parts of the system: there are gaps, spaces and contradictions; policy is filtered, interpreted and recontextualized; it is opposed, contested and resisted; interpretations are constantly shifting; interpretations reside in different power bases; and, policies are loosely coupled within and between specific examples. (Crump, 1992, p. 420)

In Crump's view, policy has at least three levels of analysis: the intended policy or what the various interest groups want; the actual policy or the actual document, piece of legislation or report; and the policy-in-use or the reaction to the policy at the school or district level. According to Crump, schools still have room to adapt policy to their own circumstances due to the differences between the intended policy and the policy-in-use.

Crump called this approach Pragmatic Policy Development (PPD). The pragmatic component suggests a focus on practices. In his view, policy aims to build practices rather than to merely build consensus. He portrays policy development as a dynamic process in which the resultant practices are not just final products –they evolve and change with time.  Crump's analysis has at least six stages.

1. Determine what is regarded as a problematic situation by the community
2. Determine if there are different problems for different groups
3. Determine if there are different solution proposals within the community
4. Find out the common ground between the proposed solutions
5. Negotiate the implementation of one of the solutions
6. Attempt another solution

Crump indicated that this is not a canonical methodology and it could be expanded according to the community's needs. In his view, pragmatic policy analysis questions the idea that educational policy is imposed and "filters down unproblematically" (Crump, 1992, p.421). According to his model, school actors still have room to modify, influence, and adapt policy to their specific contexts. Such adaptability allows school actors to retake control of the decision-making process within the relative freedom that policy provides.

Crump's model coincides with Dyer's backward mapping model of policy analysis (Dyer, 1999).  Dyer indicated that the "top-down approach is a myth" (p. 48). She argued that practice generally overrides centrally formulated policy, because contexts of practice are usually more complex than expected. Her model starts by stating the "specific behaviours at the lowest level of implementation

that generate the need for a policy" (p. 48). In her model, policy analysis works backwards. That is, after identifying the expected behaviours, policy design goes bottom-up asking what abilities are required by each process or unit in order to effect the target-behaviour. At the end of the design process it could be possible to formulate a policy that goes beyond standardized solutions and abstract statements.

The similarities between pragmatic and interpretive models are now evident. Both assume a bottom-up approach, both focus on local knowledge, and both suppose that direct action transforms policy into practice. The interpretive model assumes the active role of communities because actors in communities interpret the policy message according to their symbolic context. The pragmatic model assumes that an active community engages in rethinking the policy through their practices.

These models highlight the interaction between groups and the emergence of policy networks. Atkinson and Coleman (1992) argued that within these networks, decision power and actions are shared or distributed among the members. They noted that contemporary governance theory recognizes that communities are in direct contact with their problems and have a privileged understanding of their own situation. This is seen as a breakthrough from the classic technocratic approach that portrayed policy creation as a rational procedure based on defined general principles in a top-down structure. According to interpretive policy analysis, communities could be portrayed as interpretive groups that use their particular interpretational frameworks to make sense of the policy messages within their practices. Policy communities are active participants in the policy development process because they make use of their own frameworks of reference in order to make sense of the policy and enact it.

**Educational policy analysis and Actor-Network Theory.** According to Fenwick and Edwards (2012) actor-network theory (ANT) offers a useful theoretical framework to understand the enactment of educational policy:

Actor-network theory examines the associations of human and non-human entities in the performance of the social, the economic, the natural, the educational [contexts], etc. The objective is to understand precisely *how* these things come together – and manage to hold together, however temporarily – to form associations that produce agency and other effects: for example, ideas, identities, rules, routines, policies, instruments and reforms. (Fenwick & Edwards, 2010. p. 3)

Following insights form Latour (2005) and Law (2004), Fenwick and Edwards (2010) indicated that when humans and objects come together they enact particular contexts of practice. For example, particular educational practices can emerge when schools use certain classroom layouts, or certain textbooks. They argue that pedagogical material objects constantly mediate educational practices and those practices can change radically when the circumstances and the objects change. For instance, Waltz (2006) noted that the layout of the school's playground facilitates, but also hinders, the performance of certain activities by the children. The playground's disposition contributes to the child's social participation. It facilitates processes of inclusion, exclusion, and identity, among other social processes. As noted previously, some objects in school are manifestations of the policy that facilitate or inhibit action. A fixed-seating auditorium allows certain pedagogical practices and not others. The same goes for interactive whiteboards, chalkboards, projectors or textbooks: the introduction of these devices in the classroom could reconfigure the educational practices that take place in the school. The practices that emerge as school actors interact with these objects are concrete manifestations of the policy in the classroom. Latour (1991) argued that objects compel activity due to their design, cultural value, and symbolism. For example, a large fob attached to a hotel-room key contributes to a change in the hotel's guest behaviour. Hotel guests tend to leave the key in the hotel's reception instead of pocketing it and taking it with them. This is how some hotels and gas stations enforce their policies on the use of their facilities by their customers. According to actor-network theorists, objects and people form assemblages that account for action, agency and intention. Actor-network theory

offers a framework that includes the objects in the environment as elements in the explanation of the motives for action. Assemblages are networks of objects and people that interact in particular ways and articulate practices and actions.

Regarding the relation between educational policy and teaching practices, ANT analyses indicate that complex networks of people and objects that are situated in specific cultural contexts enact educational policies. Fenwick (2010) noted that teaching practices are situated in particular policy contexts. In this regard, Nespor (2002) explained how tests of student achievement are instruments of educational policy that shape educational practices in schools. Policies on accountability are often "translated" into test categories that promote certain types of teaching practices and also discourage certain types of instruction. A particular educational policy on assessment "mobilizes a whole series of events and people to align with its forms: administrators force curricula to conform to the test's demands, teachers drill classes in test preparation, remedial classes are arranged to improve students' test achievements" (Fenwick, 2010, p. 123). The specific local assemblages in the schools articulate networks of people and artefacts that enact the policy through practices. This explains why the enactment of the policy differs form school to school (Fenwick & Edwards, 2012).

Hamilton (2009) offered one example of how schools recontextualize policy. She showed how a standardized individual learning plan that was intended as a formative assessment tool was transformed into an administrative instrument for measurement and quality assurance in a school. Teachers and administrators acted to incorporate the tool into their practices but the introduction of different formats to track the initiative, and the additional paperwork to synchronize the adoption of the tool across teachers, instantiated a number of accountability practices that diverged from the initial goal of the policy, which was to provide a literacy self-assessment tool for individuals. Law and Singleton (2005) offered a notable example of how the ontological assumptions in the policy are transformed by the practices of practitioners. In their study of the treatment of Alcoholic Liver Disease in a city in the UK, they found that the actual object of the disease, the

damage of the liver, was conceived differently in the hospital, the substance abuse centre, and the general practitioner's office. "In the hospital, it is a lethal condition that implies abstinence. In the substance abuse centre, it is a problem that implies regulation and control. In the GP's surgery, it is a reality that is better than hard drugs" (p. 347). Additional to these different understandings of what is the object of Alcoholic Liver Disease, the diagnosis, the treatment, and the treatment effects were different in the community treatment centre, the hospital and the physician's office. This incongruence is particularly dramatic because "diagnosis and evidence-based treatment protocols depend on the assumption that a disease is a singular, distinct and identifiable object" (Fenwick, 2010).

Actor-network theory provides a situated framework to study policy enactment. It highlights the importance of the interaction between people and objects in the configuration of actions and practices that enact policies. As an approach to policy analysis, ANT portrays policy enactment as occurring in particular contexts of practice and constituted by complex interactions between artefacts and people.

**Understanding policy and enacting policy.** As I indicated at the beginning of this section, formal models of policy analysis tend to view institutions as objective structures that exist independently of human action (Meyer & Rowan, 2006). In contrast, the perspectives on policy analysis that I have reviewed so far tend to focus on how actors create institutions through their practices. These ideas coincide with the notion of New Institutionalism: "The emphasis in the new-institutionalism, then, is on how people actively construct meaning within institutionalized settings through language and other symbolic representations" (Meyer & Rowan, 2006, p. 6). Indeed, a growing number of authors have explored the role of sense making in the institution-building process, and particularly, in the school context.

For example, according to Spillane, Reiser and Gomez (2006) the school actors' understanding of policy is usually overlooked in policy analysis. They found that when people try to make sense of policy initiatives they usually impose

their own frames of reference, resulting in practices that differ from school to school (Spillane 2004; Spillane, Reiser & Reimer, 2002). In their view, a better understanding of the way people interpret policy initiatives would provide a better understanding of policy in practice. Spillane, Reiser & Gomez (2006) underscored "how reform ideas are worked out in formal and informal school level practices" (p. 61) and argued that the sense-making of educational policy is a "coproduction of students and teachers". Many authors and researchers have expressed interest for the way school actors make sense of policy. For instance, Fullan (2007) indicated that the objective of education reforms is to transform the meanings shared by the members of the educational community, which implies that in order to generate change through intervention, policy designers must identify the reference frameworks that people use within the school. Also, Feuer (2006) wondered whether "the so-called cognitive revolution, the study of human decision making and rational judgment, could help explain the apparent non-rationality of education policy and discourse" (p. x-xi). That is, Feuer asked whether the study of the way school actors make sense of educational policy would contribute to a better understanding of the, sometimes contradictory, practices that emerge in schools as a consequence of reform initiatives.

Hill (2006) showed how some teachers and students used the traditional concepts about mathematics in order to make sense of a new mathematics curriculum in California. The result was a hybrid between the new and the old mathematics curriculum that created more confusion and did not transform the students' mathematical knowledge. Spillane (2004) reviewed similar cases in Chicago's curriculum reform. Similarly, Coburn (2001) showed how a group of teachers made sense of a policy on literacy using their own frames of reference. She found that the teachers' understanding of the policy was a situated process that resulted in idiosyncratic classroom practices. Other approaches to sense making in institutional contexts could be seen in Rogoff & Lave's communities of practice (Rogoff & Lave, 2000; Wenger, 2007) or Schön's notion of reflective practitioners (Schön, 2007).

Some authors have used cognitive models to explain the constitution of nationwide educational systems. For example, Ramirez (2006) discusses how the concept of *modern university* has shaped universities worldwide. In his study, he compared the Oxford University model with the Stanford University model and asked why the later has been replicated more often than the former. Ramirez argued that the success of the Stanford model reflects the "influence of epistemic communities of educational and related expertise" (p. 130). In his view the Stanford model is "socially embedded" which generates more opportunities for interaction between scholars, students, and society in general. Such interaction generates particular organizational identities that reinforce a particular concept of modern university.

Levy (2006) noted that, according to evidence, different forms of higher education are emerging worldwide partly due to the influence of the private sector. Higher education institutions, especially in the developing world, have produced adaptations to their specific contexts, generating particular understandings of the role of higher education. Similarly, Meyer (2006) studied the idea of common school in the U.S. He argued that the public education model in the U.S. flourished due to the "legitimacy of the common school ideal and the associated ideas that schools can level socioeconomic differences and bridge religious-moral divides" (Meyer & Rowan, 2006). However, Meyer is not too optimistic about the prevalence of this ideal. He indicated that recent political and social developments are eroding the policy actors' understanding of public education.

**From the Individual to the Situation:  The Problem of the Boundaries of the Mind**

In the previous section I reviewed different theorizations in policy analysis that focus on the role of thought and action to analyse the enactment of policy. In this section I review some of the main arguments offered by philosophers interested in a description of the mind. As I indicated in the introduction, in this thesis I want to study what constitutes educational policy sense making, and in

20

order to answer this question, I will review some of the literature that has aimed to explain what constitutes cognitive processes. I start by recounting the debate between two conflicting views in relation to the constitution of cognitive processes: individualism and externalism. The former portrays cognitive processes without any reference to extra-cranial elements. The latter portrays cognitive processes as constituted by both intra and extra-cranial elements. I elaborate on some of the challenges to the individualist theorizations of the mind and then I present different conceptualizations of the externalist alternatives to individualism.

**Individualism.** Individualism, as I use the term here, is a doctrine about the characterization of properties in scientific explanation. In general, an individualist, or internalist, taxonomy of a property $P$ says that $P$ must be characterized by reference to the intrinsic properties of $P$ and not by reference to any external property to $P$, for example, diabetes is an internal state of an organism characterized for an excess of glucose in the blood. External factors such as the abundance of calories, carbohydrates and fat in the food can be causally related to having diabetes, however, having diabetes is still seen as an internal state of the organism. An *externalist* taxonomy would take into account environmental or external elements to the organism when characterizing a property $P$, for example, an externalist characterization of a bee sting would need to include the sting of a bee as part of the description. It is the case that an intradermal injection of apitoxin, the toxin found in the bee stinger, would produce effects that are intrinsically indistinguishable from the effects of a real bee sting. However, characterizing a bee sting requires an externalist perspective because an intradermal injection of apitoxin is not a bee sting, even if the effects of both have the same intrinsic properties.

In cognitive science, individualism has been defined as the thesis that psychological states should be characterized without any reference to elements external to the individual who possesses those states, or more specifically, without reference to the environment in which the bearer of the psychological states

exists. According to R. Wilson (2004), individualism in psychology is a "putative constraint on the sciences of cognition" (p.10); indeed, individualism has a normative character that stipulates what a psychological state is and what a psychological state is not. Putnam (1975) formulated the individualist doctrine through the notion of methodological solipsism. In his view, methodological solipsism assumes that "no psychological state, properly so called, presupposes the existence of any individual other than the subject to whom that state is ascribed" (p. 136). Another way to express the individualist thesis was put forward by Stich (1983). He called his formulation the principle of autonomy, in his view, "the states and processes that ought to be of concern of psychologists are those that supervene on the current, internal, physical state of the organism" (pp. 164-165). R. Wilson (2001a) indicated that both the principle of autonomy and the notion of methodological solipsism rely on the idea that "psychological states should be *bracketed off* from the mere, beyond-the-head environments that individuals find themselves in" (para. 4).

   ***Challenging the individualist assumptions: Semantic externalism.*** In opposition to the individualist doctrine, Tyler Burge (1979) argued that folk psychology is incompatible with individualism. He argued that everyday folk psychological ascriptions require a non-individualistic construction of the content of mental states. That is, folk psychology that uses terminology like *belief, desire, perception,* and *memory,* needs to assign semantic content to those states. In Burge's view, mental content in folk psychology is non-individualistic in the sense that mental content is sensitive to the context in which the bearer of mental states exists. For example Burge asked us to imagine an English-speaking person who lacks knowledge of medical terminology and believes that the ailment in his thighs is arthritis. Any doctor would confirm that the patient's belief is false because arthritis is not a condition of the thighs but an ailment of the joints. However Burge asks us to consider the counterfactual situation in which, all else equal (including the internal make up), the patient grew up in a community in which the word *arthritis* is applied to both ailments in the thighs and joints.  In this case, the patient's belief about having arthritis in his thighs is true. Burge

points out that even though there are no physical differences between the actual and counterfactual contexts, there is a difference in the *content* of the patient's belief in the actual and the counterfactual situation. According to Burge, this difference is due to the fact that the social context plays a fundamental role when attributing content to the patient's belief. Burge's conclusion is that in order to characterize the patient's mental content of arthritis we must take into account the social context in which the individual exists. An individualist taxonomy does not take into account the social context to attribute content to a belief and fails to differentiate between factual and counterfactual situation in Burge's example. Therefore, an individualist taxonomy is insufficient to characterize mental content and externalism would be better suited to characterize mental content. In the following paragraphs I elaborate on the arguments for externalism.

Externalists propose taxonomies of mental states that make reference to elements beyond the individual bearer of mental states. The debate between externalists and individualists has been framed as a series of disputes over "what is in the head" and whether the environment causally influences the mind's contents. It should be noted, however, that this way to present the debate trivializes both positions because there is an obvious sense in which thoughts are in the head and the environment causally affects our minds (Wilson, 2004). Indeed, both individualism and externalism accept that the environment plays a causal role in determining the content of mental states. In other words, it is evident that we form our mental states through our interaction with our environments.

Fodor (1987), in defending an individualist perspective, argued that the content of our beliefs and desires plays a causal role in the production of behaviour. This is so, because mental states have the causal power required to initiate bodily motion. According to Fodor, behaviour is originated in virtue of the content of mental states. For example, if I believe that sharks are dangerous and I see a shark coming in my direction, my subsequent behaviour will be originated by the contents of my belief and related mental states. According to Fodor, this implies that causation in psychological explanation is local (i.e., localized in the

intrinsic features of the individual). In his view, the effects of the environment count only as they affect the individual's intrinsic features, so the environmental influence over the individual's behaviour lacks significance for psychological explanation.

Following the individualist's insight, whenever two or more individuals have the same internal make-up, they must have identical psychological states. Putnam (1975) challenged this assumption and argued that the semantic content of mental states is not determined only by the intrinsic features of an individual. He proposed a thought experiment primarily aimed to show that the meaning and reference of some concepts like natural kind concepts (e.g., water, gold…) depend also on features that are external to the individual. It must be noted that although the argument aims to clarify the meaning and reference of natural kind concepts, it has been argued that Putnam's example applies to mental contents as well (McGinn, 1989). In this thought experiment Putnam asks us to imagine a planet exactly like Earth in all aspects but one, namely that the chemical composition of the substance called "water" is XYZ. Although the composition of water in Twin-Earth is different form the composition of water in Earth, both substances have exactly the same macroscopic properties. One could not tell the difference by simple observation. Furthermore, let us imagine that this happened in 1750 before chemical analysis was developed. Thus, an earthling, say Oscar, transported to Twin-Earth would not perceive any difference between Twin-Earth water and Earth water. So it can be said that when Oscar uses the term "water" in Twin-Earth, "water" refers to the substance composed by $H_2O$ and does not refer to the substance composed by XYZ. If Oscar says: "this is water" pointing to a glass of Twin-Earth water, he would have said something false. The point here is that the reference of a term like "water" is not determined only by the ideas we associate with it or by the individual's intrinsic features, but also determined by external factors, like the physical environment, the social environment, or historical factors.

Let us imagine now that Earthling Oscar has an identical twin living on Twin-Earth, Oscar2. Imagine that Oscar and Oscar2 have lived identical experiences, learned identical concepts and thought identical thoughts.  Since they have identical history and are molecule-by-molecule duplicates, we must assume that they have identical brain structures. When Oscar and Oscar2 are asked about the liquid that fills the oceans, lakes and rivers, quenches thirst and freezes at 0 degrees Celsius, they both answer "water". However, according to our previous conclusion, the reference of "water" on Earth is different from the reference of "water" on Twin-Earth. Therefore their meanings are different. So, if Oscar on Earth points to a glass water and says "I believe that water will quench my thirst", and Oscar2 on Twin-Earth says, "I believe that water will quench my thirst", their beliefs will express different contents because their beliefs refer to different substances despite the molecule by molecule identity between Oscar and Oscar2. In other words, the contents of Oscar and Oscar2's beliefs are not instantiated by their intrinsic features.

Although the semantic content of the beliefs of Oscar and Oscar2 are different in virtue of the beliefs' relational properties, their beliefs' contents can be characterized as identical in virtue of their intrinsic properties. Such content, which is individuated in virtue of the intrinsic features of mental states is called "narrow content", and the content that is individuated in virtue of the external or relational properties of mental states is called wide content.  So one way to express the differences and similarities in the mental contents of Oscar and Oscar2 is to say that they have different contents in the wide sense but identical contents in the narrow sense. According to externalism, the type of content that matters for a taxonomy of mental states is the wide content, because it allows us to differentiate between individuals that otherwise have identical internal configuration.

The version of externalism that I have discussed so far stresses the idea that the environment plays a role in defining the content of mental states. Furthermore, Putnam (1975) and Burge's (1979) externalism still operates under the

assumption that mental processes take place inside the individual's brain. There are, however, alternative ways to portray cognitive processes, consisting in stretching the boundaries of cognitive agents outside the brain to include bodily, environmental or social features as components of the agents' cognitive systems. In the form of externalism proposed by Putnam (1975) and Burge (1979), the content of mental states is determined by distal and historical causes. For example, in Putnam's example, when Oscar thinks of water, the content of Oscar's thoughts about water depends on the causal-historical chain that ultimately links Oscar with $H_2O$. The causal-historical chains that play a relevant role in determining Oscar's mental contents are passive (Clark & Chalmers, 1998) in the sense that they do not exert a proximal influence in Oscar's present situation. The active, embodied or situated (Robbins & Aydede, 209) forms of externalism that I am about to review, focus on the here-and-now of cognitive processing; they assume that some cognitive processes can be characterized by the interaction between brain processes and elements beyond the boundaries of the brain.

I will start reviewing the hypothesis that some brain-bounded cognitive processes are aided or expanded by environmental resources. The external resources are seen as add-ons to brain-based cognitive processes. This thesis, known as the hypothesis of embedded cognition (HEC) (Rupert, 2004, 2009a, 2009b), does not necessarily contradict the individualist claim that cognitive processes occur within the boundaries of the brain. After discussing the embedded mind thesis, I will discuss the claim according to which other bodily organs different from the brain intervene in cognitive processing. And finally, I will discuss the extended mind hypothesis, according to which cognitive processes are to be characterized as constituted by both external and internal elements.

**The embedded mind.** There are cases in which cognitive processing seems to make use of the sensory organs coupled with environmental resources. For example, Kirsh and Maglio (1994) suggested that in some problem-solving cases we off-load our cognitive load to the environment in order to improve the use of

26

our cognitive resources. In their study they showed how expert players of a jigsaw-style video game called "Tetris", which requires the rotation of pieces in order to create appropriate matches that solve the puzzle, do not compute the piece rotations as an internal mental representation, but instead make the piece rotation manually on the screen to determine the correct position. According to Kirsh and Maglio, this strategy seems to be more effective than internal computation as players are constrained by time to complete the puzzle. In fact this phenomenon can be noticed also in the use of pen and paper to make calculations, or in the use of different types of abacus in ancient and modern cultures. The embedded image of the mind portrays organisms as engaging in complex interactions with the environment. Robbins and Aydede (2009) characterized these complex interactions with the idea of cognitive off-loading into the environment in this way: Intelligent agents exploit environmental resources in order to complete complex cognitive tasks. This is clear in the case of manual calculation systems like the Chinese abacus, the Inca quipu or the Cuisenaire rods, all of which serve as external resources that facilitate the user's calculation capacity. Indeed, they release working memory space allowing the user to focus her computational capacity on the calculation procedure. Strategies like the use of abacus, allow the user to drop some of her cognitive baggage into the environment in search of procedural efficiency and to extend her range of cognitive action. Kirsh and Maglio (1994) introduced the notion of epistemic action to account for situations in which cognitive processes are augmented by adding some environmental feature. They indicate that epistemic actions are "physical actions that make mental computation easier, faster, or more reliable, [they] are *external* actions that an agent performs to change his or her own computational state" (pp. 513-514). Similarly, when a person uses the abacus to calculate, the external movements of the abacus aid the cognitive processing involved in calculation.

A number of researchers (Brooks, 1991; Clark, 1997; O'Reagan, 1992; M. Wilson, 2002) have shown that agents rely on the world for gathering relevant information according to their needs instead of developing complex cognitive

strategies to retain information and model the world. "The suggestion that intelligent agents do best when they travel informationally light, keeping internal representation and processing to a minimum, informs a wide spectrum of research on cognition in the situated tradition" (Robbins & Aydede, 2009, p. 7). Clark (2003) made a similar point when he argued that evolved organisms often use environmental structures rather than building costly cognitive structures to process or store information.

Hutchins (1995) showed how in some situations where the cognitive load is high, cognitive agents offload their cognitive tasks to the environment, either with tools or by distributing a cognitive task among peers in order to improve efficiency in the information processing. Such is the case of naval crews where much of the information processing is distributed among crew members aided by a number of specialized instruments that allow them to accomplish intricate tasks in a more efficient way. Hutchins highlighted the importance of analysing cognition in its natural environment, namely, the contexts in which people perform cognitive tasks, like reasoning, remembering, and learning, where individuals take advantage of environmental resources to perform cognitive tasks. For example, in his study of a sailing crew, he noticed that the task to take the boat ashore was a complex one that required the execution of a series of interrelated tasks that not a single individual could accomplish on her own. His suggestion is that cognition should be studied in its cultural milieu, widening the unit of cognitive analysis beyond the skin of the individual.

> Instead of conceiving the relation between person and environment in terms of moving coded information across a boundary, let us look for processes of entrainment, coordination, and resonance among elements of a system that includes a person and the person's surroundings. When we speak of the individual now, we are explicitly drawing the inside outside boundary back into a picture where it need not be prominent. These boundaries can always be drawn in later, but they are not the most important thing. (Hutchins, 1995, p. 288)

Such widening of the unit of analysis provides a non-individualistic perspective to analyse human cognition. Indeed, it calls into question the issue of the boundaries of cognitive agents as the explanation based on the processing occurring in the brain becomes insufficient to account for complex cognitive processes.

   ***Embedded mind, enactment and sense making.*** Some authors (DiPaolo, 2005; 2009; Thompson & Stapleton, 2009; Varela, Thompson & Rosch, 1991) have introduced the notion of enactment to explain the nature of embedded cognitive systems (Wilson & Foglia, 2011). For instance, Varela, Thompson and Rosch (1991) indicated that a cognitive science that aims to overcome the limitations of individualism must look for an alternative to a representationalist theory of the mind. In brief, representationalism relies on a dichotomy between the external and the internal. Representations, according to traditional cognitive science, are internal mental objects, characterized by having intentionality, namely, the capacity to refer to or be about the world. Representationalism is individualistic in nature because it characterizes mental states by reference to the intrinsic properties of the cognitive system. Some authors, however, have offered non-individualistic accounts of representations. For example, Wilson (2004) refers to exploitative representations as forms of representation that take advantage of features in the world beyond the head in order to accomplish certain functions, so instead of encoding vast amounts of information about the world, exploitative representations make an efficient use of resources and exploit constancies in the environment. A case in point is Marr's (1982) indication that the main function of the visual system is to transform 2-D retinal images into 3-D representations of the world. Wilson notes that the constancies in the world are exploited by the visual system in order to generate visual images. Similarly, Shapiro (1997) indicated that when trying to solve a puzzle, "rather than trying to fit a given piece with other pieces drawn at random, one exploits various facts that constrain the choices one makes" (p. 135). For example, we try to fit pieces according to their shape and colour. These facts are contingent in the sense that they may change. In fact, these changes explain why some puzzles are more difficult than others.

The notion of representation that externalist authors argue against is the one that carries individualist resonances. According to Varela, Thompson and Rosch (1991) an alternative to the study of classic representationalism portrays cognition as embodied action.

> By using the term *embodied* we mean to highlight two points: first, that cognition depends upon the kinds of experience that come from having a body with various sensorimotor capacities, and second, that these individual sensorimotor capacities are themselves embedded in a more encompassing biological, psychological, and cultural context. (p.173)

These authors consider that perceptual abilities are not only embodied in the sensorimotor capacities but also embedded in the environment. In their view, perceptual abilities have the function to guide action and perception is defined by reference to its capacity to guide action in specific situations. They follow Merleau-Ponty (1962) in saying that perception cannot be studied abstracted from the specific situations in which action happens (Foglia & Wilson, 2013). According to Merleau-Ponty, perception and action are essentially linked, as one cannot be understood without the other.

Additionally, Varela, Thompson and Rosh (1991) indicated that perception and action, as they interact, contribute to enact the environment. An organism enacts its own environment when the organism plays an active role in establishing the characteristics of its own environment, and at the same time, the environment provides further possibilities for the organism's action. According to the enactive approach, the organism and the environment interact in mutual specification and selection. This is evident in the case of animals that partially alter their own ecological niches and obtain clear evolutionary benefit, like birds with their nests or beavers with their dams (Odling-Smee, Laland, et al., 2003). Needless to say that hominids have been altering their own environment for survival and adaptation purposes.

The idea of mutual interdependence between organism and environment sets the grounds for explaining the origin of cognition. Enactivist theorists take

examples from developmental psychology (Piaget, 1968; Vygotsky, 1978) and cognitive anthropology (Lakoff, 1986) to argue that cognitive structures emerge and develop from the continuous exchange, interaction and mutual dependence between organism and environment (Wilson & Foglia, 2011).

According to Thompson (2007) the enactivist approach aims to unify five different ideas under the same framework:

1. The idea that living beings are autonomous agents because they actively generate and maintain themselves, enacting their own cognitive domains.

2. The idea that the nervous system is a dynamic system because it actively generates and preserves its own patterns of activity in a coherent and meaningful fashion.

3. The idea that cognition is embodied action in the sense that cognitive processes and structures emerge from embodied patterns of perception and action: "Sensorimotor coupling between organism and environment modulates, but does not determine, the formation of endogenous, dynamic patterns of neural activity, which in turn inform sensorimotor coupling" (p. 13).

4. The idea that the world of a cognitive being is not represented internally in its brain, as a predetermined realm. Instead, the world of a cognitive being is a relational domain that is enacted through active engagement and coupling with the environment.

5. The idea that experience is central to the understanding of the mind, so a rigorous study of the mind should include phenomenology as an informing discipline.

More recently, DiPaolo (2009) indicated that enactivist models offer a rich explanatory framework to explain "autonomy, agency, normativity, and the nature of cognition" (p. 10). He argued that an enactivist approach answers questions about the aforementioned properties, such as:

How can we make sense of a cognitive system as an agent, with a perspective, values, norms, and even subjectivity? After tearing down the boundaries, in what sense can we recover an unprejudiced notion of an individual cognizer, a centre of activities and perspectives (and responsibilities) at all? (p. 11)

In his view, enactivism offers answers to these questions, preserving its anti-individualism (Thompson & Stapleton, 2009). I will finish this section with a short review of his argument.

DiPaolo began by indicating that enactivism portrays cognition as an "embodied engagement" in which the environment is actively influenced by the organism's activity, and simultaneously, the environment influences the organism's cognitive capacities. But, what is this embodied engagement? DiPaolo (2005) said that cognition is rooted in the organism's capacity for adaptivity, namely, the capacity to tolerate the environmental challenges as well as the capacity to monitor and regulate environmental perturbation in an active way. An organism that is robust enough to distinguish between the implications of different behaviours displays the property of sense making (Weber & Varela, 2002). This property is fundamental because an organism that is able to regulate its operation based on the distinction of potential implications of its behaviour becomes capable of a norm-regulated engagement with its world. Thus, Weber and Varela defined sense making as the hallmark of cognition. According to DiPaolo (2009), when the organism actively influences the environment through regulatory mechanisms like sense making, the organism should be seen as an agent. Cognition as sense making operates through the interaction between the agent and the environment. In relation to agency, R. Wilson (2010a) proposed a model of agency linked to the concept of intentionality. Agents operate based on representations, which have meaning and refer to something. However, he does not see representations as internal objects, but as practices and actions. An externalist conception of representation requires rethinking the problem of intentionality. It requires, first, the acknowledgment that practices and actions are

32

legitimate forms of representation; second, the recognition that representations are not objects; and third, a "methodological reorientation" (p. 183) because an externalist study of the mind no longer sees representations as objects or essences. An externalist study of the mind requires focusing on practices and actions, and therefore requires an interdisciplinary approach. So, agency, in R. Wilson's model, is not only a self-regulatory mechanism, like in DiPaolo's (2009) model, but the capacity to operate in the world based on embodied representations.

R. Wilson (2010a) introduced an analogy between an externalist account of cognitive properties and an externalist account of organismic development and inheritance in biology. In his view, Developmental Systems Theory (DST) (Oyama, 1985, 2000) offers a good example of a non-individualistic taxonomy of biological properties. Indeed, DST portrays the most basic units of agency required to understand biological phenomena as developmental systems. Genes, for instance, are one among many other elements in developmental systems. According to DST, genes by themselves do not explain biological inheritance or organismic development. In fact, what explains biological properties is the operation of several developmental resources. Genes are one among the multiple resources that comprise a developmental system. More importantly, According to R. Wilson (2010a), "since such resources always operate within the context of some developmental system or other, they should be viewed as neither ontologically nor epistemologically more fundamental than those systems" (p. 178). The components of the system do not explain the biological processes. It is only through the study of the system's operation that biological processes can be characterized. Similarly, an embodied view of cognitive processes should focus on the activities or acts of representing, instead of trying to find the essence of representations.

**The embodied mind.** Wilson and Foglia (2011) indicated that the embodiment thesis suggests that "many features of cognition are embodied in that they are deeply dependent upon characteristics of the physical body of an agent, such that the agent's beyond-the-brain body plays a significant causal role, or a

physically constitutive role, in that agent's cognitive processing" (2011, ¶ 30). They indicate that the body can function as a constraint, a distributor, or a regulator of cognitive activity. As a constraint, the body, its functions and characteristics limit or bound the nature and content of the agent's representations. As a distributor, "an agent's body functions to distribute computational and representational load between neural and non-neural structures" (2011, ¶ 39). As a regulator, the agent's body "functions to regulate cognitive activity over space and time, ensuring that cognition and action are tightly coordinated" (2011, ¶ 43).

Shapiro (2011) elaborated on the embodiment hypothesis and indicated that there are three general themes that authors in the embodied cognition literature tend to emphasise: conceptualization, replacement, and constitution. The fact that these themes can be distinguished does not mean that they are "incompatible" (p. 4). Indeed, some authors merge them in their work (Clark & Wilson, 2009).

*Conceptualization*. By conceptualization Shapiro referred to the idea that the organism's understanding of the world is constrained by the organism's bodily properties. The concepts that the organism uses for understanding its surrounding environment are determined by the kind of body the organism has. Therefore, different kinds of bodies generate different understandings of the world. The idea of replacement states that an embodied conception of the mind should replace the classic taxonomies based on symbolic representations. The underlying assumption is that the characterization of cognition as processes that span beyond the brain is incompatible with the traditional idea that cognition consists in the operation of symbols in the brain. The idea of constitution indicates that the body or elements in the world play a constitutive role rather than a causal role in cognitive processing. In this section, I will review the thesis according to which cognition depends on bodily properties and bodily organs additional to the brain. The idea that some cognitive processes are extended beyond the boundaries of the body will be the topic of the next section.

According to the classic, individualist, conception of cognitive architecture there must be a distinction between low-level sensory systems and high level-processing systems. Hurley (1998) called this separation the "sandwich model" (p. 21), because it portrayed perception and action as separate systems in charge of input and output respectively. Between these two systems, like ham in a sandwich, cognition plays the role of central processing. In the sandwich model, the commanding and processing functions are not shared with the input/output systems. Cognition is seen as separate, dependent on perception for information and dependent on action for output. In this layered model, the relations between perception and reasoning are seen as causal, because even though they function separately, they can influence each other. For example, in this model, the cognitive processing of an image in the visual field requires that low-level perceptual systems receive some environmental input that is further processed at the high-level. The raw perceptual input is not given any intentional content until it has been processed by the high-level cognitive systems and action is seen as a causal product of the cognitive processing.

Continuing with the conceptualization theme, Shapiro indicated that the thesis of the embodied mind seems to provide an answer to the symbol-grounding problem, which is "the problem of how linguistic thought, or thoughts more generally, acquire meaning" (Shapiro, 2011, p. 96). In the classic layered or sandwich-model (Hurley, 1998) representations are at the upper level and are independent of the sensory organs' operation. The explanatory value of these representations depends on the meaningfulness these representations have for the agent that uses them. However, the meaningfulness of the representations cannot depend on the representations themselves, otherwise the explanation would be circular. The embodied model of the mind presents an alternative to the sandwich model as it proposes grounding cognitive capacities in the capacity for perceiving the world and acting in it. Anderson (2003) has proposed that the meaningfulness of representations resides in the capacities the agent has for perceiving and acting in the world. In this model, cognition is not seen as an independent system in charge of central processing; instead, cognition is seen as essentially integrated to

35

the sensory-motor systems (Lakoff & Johnson, 1999). Thus, in relation to the symbol grounding problem, an embodied view of thought acknowledges that grounding a symbol, or assigning meaning to a symbol, requires the involvement of skills, abilities and experiences (Anderson, 2003). Anderson explains that grounding the symbol "chair" involves not only the capacity to recognize chairs, but also the different skills required to use chairs. Giving meaning to the symbol "chair" is a process that is essentially integrated with our perceptual and motor skills.

*Replacement*. Another hypothesis that is central to the embodied account of the mind is the replacement hypothesis. According to Shapiro (2011), advocates of the replacement hypothesis have suggested that "the computational and representational tools that have for so long dominated standard cognitive science are in fact irremediably defective, and so must be abandoned in favour of new tools and approaches" (p. 68). For example, Gallagher (2005), highlighting the embodied aspects of thought, distinguished between body image and body schema. A body image is a representation, a conceptual model of the body created by the brain. A body schema includes "motor capacities, abilities, and habits that both enable and constrain movement and the maintenance of posture" (p. 24). To Gallagher, the body schema cannot be reduced to brain functions or representations because it includes complex bodily structures. It is dynamic in the sense that its realization depends on the body and its performances. The notion of body schema assumes that cognition is constituted by the body and the brain altogether.

The thesis of the embodied mind comes from a notable tradition in philosophy. For example, Maurice Merleau-Ponty (1962) in his *Phenomenology of perception* said that the idea of an organism that passively perceives the world does not do justice to the way we respond to worldly events because there is in fact a continuous interplay between the whole body and the world around us.

> The body is our general medium for having a world. Sometimes it is
> restricted to the actions necessary for the conservation of life, and

36

accordingly it posits around us a biological world; at other times, elaborating upon these primary actions and moving from their literal to a figurative meaning, it manifests through them a core of new significance: this is true of motor habits such as dancing. Sometimes, finally, the meaning aimed at cannot be achieved by the body's natural means; it must then build itself an instrument, and it projects thereby around itself a cultural world. (p.146)

So in Merleau-Ponty's view, the meaning derived from some skills or "motor habits" (Dreyfus, 1996) does not necessarily depend on the biological nature of the skills; the meaning derives from the cultural milieu in which body motions turn into actions.

Hubert Dreyfus highlighted the use Merleau-Ponty made of the concept of "embodiment". According to Dreyfus (1996), Merleau-Ponty foresaw most of the themes that cognitive science has grouped as embodied cognition (see also, Gallagher, 2010). To Merleau-Ponty it is the whole body that performs the perceptual activity and not just the brain or the nervous system. So, for example, the use of tools to improve our cognitive capacities must enter into the equation when trying to explain action (Clark, 1997). According to Dreyfus (1996) the world and the body are in an intimate relationship: "Embodied skills are acquired by dealing with things and situations and. . . these skills in turn determine how things and situations show up for us as requiring our response"(Dreyfus, 1996, ¶ 12)

There are remarkable similarities between Merleau-Ponty's concept of embodiment and James Gibson's notion of affordance (1979). In brief, an affordance is a property of the situation in which both an agent and an object are immersed. For instance, under certain circumstances, a chair affords seating, however a chair would afford door blocking under different circumstances. To Gibson, an analysis of human action must take into account the affordances in a situation in which the objects in the world and agent become the unit of analysis (Wilson & Foglia, 2011). Gibson goes beyond the idea of perception as the

subjective representation of the world and casts perception in terms of action. To Gibson, the perceptual field is largely a field of opportunities to act. Perception does not happen in a void, on the contrary, perceptual action is situated, or in other words, is framed in a context. So if we understand perception as action and action is situated, then the agent's perceptual skills must be understood in terms of the situation in which the agent takes part.

The consequence of accepting an embodied image of the mind is a rejection of the "sandwich model", resulting in an image of cognition that includes the sensory organs as constitutive parts of cognitive processes. "Without the cooperation of the body, there can be no sensory inputs from the environment and no motor outputs from the agent –hence, no sensing or acting. And without sensing and acting to ground it, thought is empty" (Robbins & Aydede, 2009, p. 4).

*Constitution.* Shapiro (2010) also identified the constitution theme as key motif in discourses on embodiment. The constitution theme indicates that brain-bounded processes are not the only constituents of cognitive processes. For example, M. Wilson (2002) indicated that sensorimotor skills are exercised on-line or off-line. In the on-line situation the agent actively engages with the environment in a cognitive task, using the sensory organs and some element from the environment along with the brain for processing the information. In the off-line situation the cognitive processing does not make direct use of the sensory organs like some cases of remembering or imagining. Indeed, cognition operates off-line when we decouple from the environment in order to perform abstract operations like planning, remembering, imagining, or performing conceptual cognitive processes detached from our immediate situation. M. Wilson indicated that although off-line embodiment does not make direct use of external input, sensorimotor areas in the brain are still active during off-line activity. She noted that the function of sensorimotor resources is to simulate portions of the physical world in order to represent information or draw inferences. She pointed out that "mental structures that originally evolved for perception or action appear to be co-

opted and run "off-line," decoupled from the physical inputs and outputs that were their original purpose, to assist in thinking and knowing" (Wilson, 2002, p. 663).

Clark and Chalmers (1998) argued that some cognitive processes could be analysed as extended or coupled with the environment. The focus in their analysis changes from studying what determines the content of mental states (Putnam, 1975; Burge, 1979) to studying what constitutes the cognitive processes in the here-and-now. Clark and Chalmers highlighted the dynamic and situated character of cognitive processes. This is the reason why they call their form of externalism "active externalism". In what follows I will elaborate on the idea of active externalism introducing Clark and Chalmers' arguments. To see Clark and Chalmers' (1998) argumentation at work we can consider a very familiar scenario. Many Alzheimer patients often rely on environmental support to cope with daily tasks, for instance, some use notebooks to write down any new information they learn. Clark and Chalmers argued that there are no relevant differences between the Alzheimer's patient case and a person without the disease in terms of information retrieval procedures. Although the former does not seem to require the same environmental support as the latter, in the end, both persons are able to act based on the retrieved information. One of the conclusions that stems from the example is that cognitive systems do not need to be defined as internal to the organism. Indeed, the notebook functions as an information storage system that is permanently accessible and plays a key role in the patient's daily life. Just as the biological memory of a non-Alzheimer person.  Also, regarding the characterization of an Alzheimer patient as a cognitive agent, it can be said that the information in the notebook plays a pivotal role in defining her identity. This person can be "regarded as an extended system, a coupling of biological organism and external resources" (Clark & Chalmers, 1988, p. 18). In the same line of argumentation, Clark (2003) has pointed out that "human biological brains are, in a very fundamental sense, incomplete cognitive systems. They are naturally geared to dovetail themselves, again and again, to a shifting web of surrounding structures, in the body and increasingly in the world" (p. 189). He indicated that a large amount of research in cognitive neurology, and cognitive

psychology in the works of Piaget, Vygotsky, Gibson, and Bruner, among others, has showed that the environment is critical for brain development in the sense that an environment that is rich in possibilities for cognitive extension and coupling has a major influence in developing certain cognitive abilities. Clark deems humans as natural-born cyborgs (Clark, 2003) because we require an environment rich in computational possibilities in order to develop our cognitive capacities.

*Some criticisms to the extended mind hypothesis.* The extended mind hypothesis has raised a series of critical responses in the work of Rupert, (2004, 2009a, 2009b), M. Wilson (2002), and Adams and Aizawa (2008, 2009). A useful way to start is by contrasting between the hypothesis of extended cognition (HEC) and the hypothesis of embedded cognition (HEMC) (Rupert, 2004, 2009b). According to Rupert, HEC portrays cognitive processes as constituted by elements external and internal to the individual, whereas HEMC indicates that cognitive processes are enhanced, but not constituted, by elements external to the individual. In Rupert's view, HEMC is less radical than HEC because the assertion that the mind enriches and enhances its capacities by using environmental resources does not require a controversial claim about the mind being constituted by elements external to the individual. Cases of cognitive enhancement can be constructed as cases of embedded cognitive processes, like in the use of calculation tools such as the abacus or the modern electronic calculator, which can be seen relieving the user's working memory in favour of other cognitive capacities such as reasoning or decision making. In these cases, the HEMC thesis can be used to argue that cognitive processes are enhanced by the use of add-ons, but this thesis does not imply that the add-ons are essential parts of the cognitive process. In what follows, I elaborate on the arguments that support Rupert's conclusion. I will review arguments from Rupert (2004; 2009a, 2009b), M. Wilson (2002) and Adams and Aizawa (2008, 2009).

According to Margaret Wilson (2002), causal interaction is not sufficient for defining cognitive properties. She indicated that the extended mind hypothesis proposes that cognition must be studied as distributed across the situation. In her

view, the distribution of cognitive properties depends on the assumption that there is a causal connection. According to her, the fact that distributed causality is involved in cognition is not sufficient to argue for distributed cognition. She noted that the sum of the causal interactions a system has at a given time and place is not necessarily a description of that system. Indeed, not all the elements that have a causal impact in the functioning of a system are necessarily part of that system. For example, she indicated that although the sun may have a vital impact in a certain ecological system where organisms depend on each other, this does not mean that we must include the sun in a description of that ecological system. This is so, because ecosystems, like many other systems, are *open systems*. They interact with outside elements without necessarily compromising their identity.

M. Wilson (2002) also argued that systems are defined in light of the functional relations among their elements, so the identity of the system depends on the preservation of such relations. Further, she pointed out that systems could be "facultative or obligate" (p. 630). Facultative systems are short-lived. They are organized for particular situations and break up rapidly. Obligate systems are more permanent. They remain organized during the lifetime of their components. M. Wilson observed that following the distributed view of cognition, most cognitive systems must be facultative because they become organized as systems only for the time a certain task is performed, and cease existence once the task is finished. A person would be involved in numerous facultative systems during her daily life.

In M. Wilson's view the acceptance of extended cognitive processes implies a dilemma. On the one hand if we accept the extended view of cognition and the idea of an open system that comes with it, we must accept that cognitive systems are facultative and impermanent. On the other hand, if we want a permanent system that retains its identity across time, then we must adhere to an obligate view of systems. However, an obligate system would be insufficient to explain the multiple interactions in which humans are involved in their daily lives. Accepting an obligate view of cognitive systems will take us back to a position in

which cognitive systems are constituted within the individual body, open to environmental influence and interaction. In this view, the environment is seen as providing causal input to the cognitive system, but no external element is seen as part of the system. This conclusion contradicts the initial premise in the extended mind argument according to which some elements in the environment are part of the cognitive system.

In a similar fashion, Rupert (2004, 2009b) pointed out that if HEC is true, then it is not clear how the extended cognitive processes persist through environmental changes. A model of a cognitive system, such as the ones proposed within artificial intelligence (A.I.), requires the stability that self-containment brings. Furthermore, if cognitive processes were seen as extended over the environment, then the system's stability would be automatically threatened because the changes in the environment would imply changes in the objects that integrate the cognitive extension. The object's impermanence and the alteration of the cognitive extension's integrity would compromise the identity of the extended cognitive processes. It would be difficult to characterize the cognitive process if the process is unstable due to the environmental changes or changes in the objects that constitute the cognitive extension. In Rupert's words:

> the intelligence of A.I. systems consists largely in their flexibility as self-contained units that function effectively in various environments. In contrast, putting more of the environment into an A.I. system seems to make it less flexible, making it difficult to see what would be intelligent about such an extended system (2004, p. 426).

Another example brought by Rupert is the case of developmental psychology. The inclusion of environmental elements in the definition of cognitive processes would affect the explanatory power of developmental psychology. Indeed, in order to make developmental psychology compatible with HEC, advocates of HEC must show how the developing system is integrated with the environment at the level of specific cognitive processes. Consequently, in order to account for specific cognitive processes, the specific objects that integrate the extended

cognitive processes must be shown to be permanent. However, it is clear by empirical observation that individuals do not maintain a stable and continuous interaction with objects in their environment. In fact, the interaction between individuals and objects in the environment varies greatly, and the interaction with specific objects is generally temporary. In cases in which the cognitive integration between the individual and the object is short-lived, then HEC advocates would need to explain how it is that cognitive processes retain their character over time.

Similarly, M. Wilson (2002) was pessimistic about the contribution of the extended mind argument to our understanding of the nature of cognitive processes. She indicated that if "the goal of science is to find underlying principles and regularities, rather than to explain specific events, then the facultative nature of distributed cognition becomes a problem" (p. 631). This is so because in her view, distributed cognitive systems are specific short-lived events different from the "single, persistent, and obligate" (p. 631) body-bounded cognitive system.

Rupert (2004), reviewing the example of the Alzheimer's patient and his notebook in Clark and Chalmers (1998), noted that these authors proposed four general criteria for ascribing an extended belief to Otto:

> First, the notebook is a constant in Otto's life – in cases where the information in the notebook would be relevant, he will rarely take action without consulting it. Second, the information in the notebook is directly available without difficulty. Third, upon retrieving information from the notebook he automatically endorses it. Fourth, the information in the notebook has been consciously endorsed at some point in the past, and indeed is there as a consequence of this endorsement (Clark & Chalmers, 1988, p. 17).

According to Rupert, the first three criteria satisfy the spirit of the hypothesis of extended cognition (HEC). First, the notebook's information must be relevant for action; second, the notebook's information is easily retrievable, and third, the

notebook's information is endorsed by Otto as soon as he retrieves it; the fourth criterion, according to Rupert, does not seem to be in line with the idea of extended cognition. In his view, the condition that the information in the notebook had to be consciously endorsed in the past generates a problem for HEC and seems to fit with HEMC's framework instead. Rupert argued that the condition according to which the information had to be consciously endorsed previously by the individual in order to be considered part of the extended belief seems to contradict one of HEC's central ideas, namely, that the internal processes, bounded by the skin or the skull, have no pre-eminence over external factors when it comes to ascribe extended beliefs. His point is that

> if an extended (or any) belief requires conscious endorsement in order to be a genuinely held belief, and conscious endorsement is ultimately an internal process (that is, one that takes place within the organismic boundary), then the traditional subject is privileged in a deep sense, after all (Rupert, 2004, p. 405).

The problem, according to Rupert, is that HEC's appeal to consciousness implies the assumption that the skin-bounded subject is the ultimate source of cognitive authority regarding whether a belief is relevant for explaining action. If the skin-bounded subject still rests his/her cognitive authority on internal processes like consciousness, then a more appropriate view about cognition would be to say that the subject makes use of external cognitive resources instead of saying that the cognitive processes extend beyond the subject's boundary.

In addition to the previous arguments, Rupert (2004) argued that in the case of memory, HEC relies on a weak conceptualization of memory that provides unsound support for the claims such as: "at least with regard to the memory systems possessed by modern human beings, there is no sound theoretical reason for setting up a dichotomy between internal memory processes and external aids to those processes" (Rowlands, 1999, p. 121). One example Rupert highlights is the use of external storage. As external storage of information becomes widely used, the strategies for memorizing change and subjects start to rely on the

external sources. The result is that the external storage becomes indispensable for cognitive processes including remembering. Based on the fact that individuals depend heavily on external resources for remembering information, HEC theorists have assumed that "the relevant states of external stores become proper parts of the cognitive process of remembering" (Rupert, 2004, p. 408). Rupert argued that HEC's view is mistaken and that the empirical data shows a different picture of memory. He indicated that in the context of day-to-day conversations, people do not rely on external sources to guide the conversation. In fact, it seems that in conversations, the internal storage is the prevalent memory resource. He took Clark and Chalmer's (1998) Otto example to the extreme and imagined a person who has to write down all the facts that arise in conversation. For that person and her interlocutor, the simplest verbal exchange would become slow and tedious. Rupert's point is that the key for verbal communication is the existence of an internal working memory that allows speakers to recall facts and maintain a model of the ongoing dialogue.

Many arguments for the extended mind appeal to a "parity principle" that relies on the idea that when two systems are shown to have the same cognitive properties both systems have the same cognitive status. In Clark and Chalmers' words, "if, as we confront some task, a part of the world functions as a process which, were it to go on in the head, we would have no hesitation in accepting as part of the cognitive process, then that part of the world is (for that time) part of the cognitive process" (1998, p. 8). For example, in explaining Otto's behaviour, the information written in the notebook plays the same explanatory role as the brain-coded information plays in the explanation of any other person's behaviour, so it does not make any difference to the psychological explanation whether the cognitive resource exists outside or inside the brain. Indeed, as far as the external resource is shown to play the same role played by the internal resources, the constitutive differences will be irrelevant in order to characterize the extended process as a cognitive process in its own right.

Adams and Aizawa (2008; 2009) have argued that the extended mind arguments confound coupling relations with constitutive relations in what they call the coupling-constitution fallacy. Their argument goes in the same line of M. Wilson (2002) and Rupert's (2009b) reasoning according to which the appeal to causal relations is not sufficient to explain cognitive processes. In Adams and Aizawa's view most arguments in the extended mind literature incorrectly move from "the observation that process X is in some way causally connected (coupled) to a cognitive process Y to the conclusion that X is part of the cognitive process Y" (Adams & Aizawa, 2009, p. 81). Adams and Aizawa exemplified the fallacy by means of a non-cognitive example:

> Consider the bi-metallic strip in an ordinary thermostat. The expansion and contraction of this strip is closely coupled to the ambient temperature of a room and the air conditioning apparatus for that room. Nevertheless, this gives us no reason to say that the expansion and contraction of the strip extends beyond the limits of the strip and into the room or air conditioner (Adams & Aizawa, 2009, p. 81).

The bimetallic strip expands when the room is too hot turning on the air conditioning, and conversely, when the room is too cold the strip contracts turning off the air conditioning. In Adams and Aizawa's view, the fact that the ambient temperature and the operation of the air conditioning have a causal interaction with the strip does not mean that the properties of the strip extend beyond the strip into the room or the air conditioning.

Similarly, Rupert (2004), argued that HEC theorists have mistakenly inferred HEC from HEMC by assuming what he calls the "principle of epistemological dependence . . . [meaning] we cannot understand human cognition unless we consider the context in which it is embedded, and thus, the embedding context must be part of cognition itself" (Rupert, 2004, pp. 395 – 396). In Rupert's view, the principle of epistemological dependence rests on the following structure: "in any case where cognizance of A's relation to B is significantly relevant to our understanding of A, we should posit a system, A-B,

as a single unit of study" (p. 369). The problem with this reasoning, according to Rupert, is that the assumption that A-B is a system does not follow from the observation that A is related to B. Rupert's conclusion is that HEC theorists have erroneously inferred HEC from HEMC.

According to Clark and Chalmers (1998), coupled systems are constituted by both internal and external components that interact in causal fashion:

> All the components in the system play an active causal role, and they jointly govern behaviour in the same sort of way that cognition usually does. If we remove the external component the system's behavioural competence will drop, just as it would if we removed part of its brain. Our thesis is that this sort of coupled process counts equally well as a cognitive process, whether or not it is wholly in the head. (pp. 8-9)

According to Adams and Aizawa, Clark and Chalmers need to provide additional support to their argument as it is not clear in what sense their account of cognition, based on the "active causal role" of the system's components, establish a difference between cognitive causal processes and non-cognitive causal processes. In other words, Adams and Aizawa, argued that Clark and Chalmers have not provided a satisfactory answer to the problem of the mark of the cognitive. Indeed, according to Adams and Aizawa (2008, 2009), portraying cognitive processes in terms of causal processes misses the difference between what is cognitive and what is not cognitive, as there are causal processes that are not cognitive processes. Similarly, Rupert (2009b) has called for a "principle of demarcation", that is, a principle that would establish a distinction between cognitive and non-cognitive processes. In Rupert's view, HEC theorists have not offered a compelling argument to show the difference between a causal contribution to cognition and a cognitive process: "not just any old cause of a cognitive phenomenon counts as cognitive; the cause must contribute in a nontrivial and distinctive way" (Rupert, 2009, p. 19).

Adams and Aizawa (2009) argued against a thesis that they call "transcranialism", meaning the thesis that "maintains that organism–environment interactions are to be understood as entirely cognitive processes rather than merely partially cognitive and partially non-cognitive processes" (p. 81). In their opinion, there is no reason to accept that cognitive processes are constituted by body-bounded mechanisms plus external extensions. Furthermore, their concern is that transcranialism, by confusing coupling with constitution, fails to provide an adequate characterization of what is cognitive as opposed to what is non-cognitive.

Adams and Aizawa (2009, p. 87) pointed that two main features characterize cognitive processes. First, cognitive processes involve non-derived content, that is, semantic contents "that do not depend on the existence of other content-bearing, representational, or intentional states", but depend on the satisfaction of certain naturalistic conditions, for example, that intentional content can be explained in terms of the natural sciences, like evolutionary biology (Dretske, 1981). The second feature that characterizes cognition, according to Adams and Aizawa (2008; 2009), is that cognitive processes follow principles that operate mainly in the brain and there is no reason to think they would operate somewhere else. They say that "even though many things could, in principle, be organized to form a cognitive processor, it is reasonable to conjecture that only neuronal processes are in fact so organized" (Adams & Aizawa, 2008, p. 69). For example, according to Adams and Aizawa, Weber's law is a good example of a principle that is "found to operate in the brain but not elsewhere" (2009, p. 87). Weber's law asserts that the smallest change in a stimulus that will be perceived is proportional to the intensity of the original stimulus. So if I'm driving my car under the sun on a bright and shiny day, I will not notice if my headlights are on, because the headlights' brightness does not add much variation to the sunlight reflection on the road. In their view, an account of Weber's law operation does not require positing "combinations of brains, bodies, and environments" (2008, p. 61). Positing the brain as the centre of cognitive activity suffices for explaining how Weber's law works. In Adams and Aizawa's view, while it is true that brains

process information, it is also true that not all information processing is cognitive processing. They indicate that "any theory of the cognitive that does not notice the difference [between a computer and a brain] is clearly missing something relevant to cognitive psychology" (2009, p. 87). In their view, Clark and Chalmers need to provide an account of the cognitive that establishes a difference between cognitive processes and non-cognitive processes.

Menary (2010), Clark (2010) and Theiner (2011) have replied to these criticisms. Menary (2010) distinguished between two types of readings of the extended mind hypothesis. One is a trivial reading that portrays cognitive processes in the brain as causally influenced by environmental features. The other one is a more robust reading that characterizes cognitive processes as constituted by the cognitive extensions in the environment. I have shown so far that the proponents of the extended mind hypothesis argue for the second reading while the critics argue that the best we can do is to justify the first reading.

Clark (2010) indicated that Adams and Aizawa's reading of the Otto and his notebook example is misleading. For example, Adams and Aizawa caricature Clark's position with the following joke:

> Question: Why did the pencil think that 2+2=4?
>
> Clark's Answer: Because it was coupled to the mathematician (Adams & Aizawa, 2010, p. 67)

Clark's response was that it is incorrect to ask whether a component of the system possesses the cognitive quality that is ascribed to the whole system. Similarly, scientists do not ask whether a specific neuron sees, or thinks or remembers. In order to understand a cognitive process, it must be shown how the different components contribute to the entire cognitive process. Menary (2010) indicated that the nature of externalism is evident in the here-and-now of the causal couplings between organism and environment. As I noted before, Clark and Chalmers (1998, p. 29) said that the organism-environment link creates a "coupled system that can be seen as a cognitive system in its own right".

49

In Menary's opinion, the critics of the extended mind have misinterpreted the notion of cognitive coupling by failing to understand cognitive couplings as systems "in their own right" constituted by the organism and its extensions. In his view, cognitive integration depends on the existence of a symmetric influence in which the internal and external elements have a "mutually constraining causal influence on one another that unfold over time" (Menary, 2010, p. 4). That is, in the case of Otto and his notebook, both processes, internal and external, govern Otto's future behaviour. There is a causal reciprocity between Otto's internal processes, like reasoning, and the retrieving information processes in consulting his notebook. "In so far as brain, body, and world can be shown to be reciprocally coupled in this way, we can consider them to be a coupled system" (Menary, 2010, p. 4). R. Wilson (2010b) made similar points when arguing for extended vision. He introduced the concepts of integrated system and functional gain to characterize a system in which two processes function as an integrated whole, as a unit that produces certain effects in specific contexts. When the integrated system enhances its existing function or produces a novel function, as a result of the integrative coupling, then it can be said that the system shows functional gain. R. Wilson indicated that if an externalist account of vision assumes that the purpose of vision is to guide action, then the explanation of how vision operates must show that "vision functions via boundary-crossing feedback mechanisms that link perception to action" (p. 12). The inseparability of perception and action implies a non-individualistic account of vision because in such an account, vision is extended beyond the brain's boundary (see also, Hurley, 1998).

Critics of the extended mind hypothesis tend to understand cognitive couplings as if the coupled element had an asymmetric influence (Menary, 2010, p. 3). That is, these critics understand cognitive extensions as mere causal connections that do not constitute a cognitive integration at all. In their view, the external elements simply add more capacity to the organism but do not constitute part of the cognitive system. Menary's point as well as Clark's (2010) is that in the case of cognitive extensions, behavioural capacity would decrease if the extension were interrupted exactly in the same way that behavioural capacity

would decrease if the internal elements in the organisms were tampered with. It is important to add that not all coupled systems are cognitive systems. However, Menary indicates that the parity principle, reviewed at the beginning of my discussion of the extended mind hypothesis, would provide a way to distinguish cognitive coupled systems from other types of coupled systems. Theiner (2011) indicated that the parity principle is an "epistemological move to shift the burden of proof to the psychological internalist, challenging her to show why the biological boundary of the organism (or the brain) should matter for the demarcation of cognition". As long as the externalist demonstrates the functional equivalence between the extended system and the internal system, it is the burden of the internalist to demonstrate that these two systems do not share the same cognitive properties.

According to Clark (2010), the arguments offered by Margaret Wilson (2002) and Adams and Aizawa (2009), according to which causal coupling cannot constitute a cognitive system itself, seem to suggest that there cannot be a unified science of the mind, because in these authors' views "the causal arrangements whereby external stuff contributes to considered action look to be very different to those whereby internal stuff does"(Clark, 2010, p. 49). In Adams and Aizawa's view, the best option is to keep both domains apart (internal and external) and aim for a unified science of the mental (internal) and a unified science of the non-mental (external). Clark indicates that the assumption that internal causal arrangements are different from integrated arrangements, does not constitute a reply to the parity principle according to which the interruption of transcranial integrated processes will produce the same drop in behavioural competence as if the internal causal arrangements were interrupted. If Otto's access to his notebook were interrupted, his behavioural competence would decrease the same way as if Inga's access to her memory were interrupted. So in order to argue that internal causal arrangements are different from transcranial cognitive integrations, it must be shown that the parity principle is false, or at least irrelevant for an account of cognitive processes, which has not been shown at least in M. Wilson (2002) and Adams and Aizawa's (2009) arguments.

In the next section I review literature on organizational theory that have highlighted the role of thought and action in the analysis of organizations. I will draw on several studies that have used concepts from philosophy and cognitive science to explain organizational practices.

**Thought, Action and Practices in in Organizations[1]**

My review of the literature on cognition in organizations has a historical focus. A historical review of the cognitive studies on organizational practices is in order because the theories derived from these studies (e.g., Senge, 2000) have exerted major influence in the literature about educational organizations (e.g., Fullan 2007). These theories have described schools as systems that process information and offer a group-level analysis of school functioning. An influential author in organizational theory is Herbert Simon (1957, 1958, 1969, 1989; Vera & Simon, 1993), especially because of his views on rationality and cognition (Haugeland, 1993). The rational model of organizations developed by Simon, March and others, exerted wide influence in the studies of educational organizations during the 1960's and 1970's. In the late 1980's, a number of alternatives to Simon's rational systems model of organizations were introduced, and some of these responses also influenced the research on school functioning (Feuer, 2006; Greenfield, 1993; Riveros, 2009; Riveros, In press a). In what follows I review the rational systems model as introduced by March and Simon (1958), and I review some developments and criticisms to this model, in particular Weick's (1979; 2001) challenges to Simon's model.

**Organizations as information processing systems.** The connection between cognitive studies and organizational theory is not self-evident. Spender (1998) has argued that inquiry about how the mind works is different from inquiry about how organizations work. In his opinion, cognition is perhaps one among several dimensions to look at when studying organizations. He indicated that

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[1] *A version of this section has been accepted for publication.* Riveros, A. (In press). Cognition and administrative practices in education. In D. Burgess & P. Newton (Eds.), *Theoretical Foundations of Educational Administration.* Edmonton: Henday Publishing.

organizational theorists became interested in cognition from the very beginning of organizational studies, when they noticed that organizations, when portrayed as systems, acted as if they were making decisions, and interpreting their environment. However, the early theorists from the 1920s to the 1950s lacked the theoretical tools to explore cognition in depth. It all changed with Herbert Simon's contribution.

Simon's (1957) work was influential because he tried to explain organizational functioning using the language of information processing theories. The operating assumption is the computational theory of mind, consisting in the claim that mental states involve symbolic representations. To be in a certain mental state means to be in a certain functional relation with a symbolic mental representation. For example to believe that it is raining is tantamount to being in a particular functional relation to a symbolic mental representation of the proposition "it is raining". A symbol has semantic and syntactic structures, so symbolic processes involve the manipulation of both syntactic and semantic structures. Now, according to the computational theory of mind "mental states are held to be "representational" in the sense of including, as constituents, symbolic representations having both semantic and syntactic properties, just as symbols employed in mathematical computations do" (Horst, 2009, ¶ 7).

According to Lant (2002) the information-processing model portrays organizations as scanning the environment and processing the obtained information in distinctive ways. For example, Aguilar (1967), Galbraith (1973), and Milliken (1990), suggested that organizations develop different strategies to search for information depending on environmental constraints. Sitkin (2001), based on Levinthal & March (1993), suggested that cognitive processes in organizations could be exploitative or explorative. Cognitive processes can be seen as enhancing the organizational capacity to exploit the well-known bits of the environment, or can be seen as enhancing the organizational capacity to explore the unknown portions of the environment. Similarly, Daft and Weick (1984) indicated that organizations scan the environment either passively (as part

of their normal operations) or actively (by improving or modifying their operations to search for new information). The scope of the scanning depends on how the environment is assumed to be analysable or incomprehensible.

**The group mind hypothesis and organizational theory.** There is an obvious sense in which cognition is present in organizations: organizations are made of individuals who have cognitive properties of their own, so cognition is present in organization as individuals are present in organizations. However, some authors in the field of organizational theory like Greeno and Moore (1993), Lant and Shapira (2001), Mach (2001) Walsh (1995), and Weick (1979), had a more radical understanding of the nature of cognitive properties in organizations. They seemed to assume that cognitive properties in organizations are better understood as distributed or situated within the organizational context. These authors seem to endorse the idea that organizations instantiate group minds. Indeed, these authors assume that some cognitive properties are instantiated in virtue of the group dynamics of organizations.

Before getting to grips with organizational theory's take on the idea of collective cognitive properties, I will say a few words about the concept of group minds and its history. There are two different ways to understand the group mind hypothesis (Wilson, 2004). One way to understand the group mind hypothesis is through a *literalist* conception that suggests that groups have minds in the same way individuals have minds (List & Petit, 2011; Theiner, 2011; Theiner, Allen & Goldstone, 2010). Indeed, ant colonies (Wheeler, 1911) and human social groups (Le Bon, 1895/1968) have been studied as single entities that literally have cognitive properties of their own. However, the cognitive properties instantiated by the groups may not be as complex as those instantiated by individuals. Most studies in the field of group cognition focus on specific mental properties, like memory (Wenger, 1986), decision-making (Hutchins, 1990, 1991, 1995) or agency (List & Petit, 2011). Another way to understand the group mind hypothesis is to see group minds as instances of the cognitive metaphor. According to the cognitive metaphor, individual cognitive traits can be used to

explain groups' behaviours, allowing researchers to treat groups as *if* they had a psychology of their own. According to this conception, the group mind hypothesis is used as a methodological tool to understand the behaviour of groups.

According to R. Wilson (2004) the idea of group minds is not new. He indicated that the idea could be traced to two independent traditions in psychology and biology: the collective psychology tradition and the superorganism tradition. The collective psychology tradition was epitomized by Le Bon (1895/1968) and McDougall (1920), and the superorganism tradition was represented by Wheeler (1911; 1923; 1928). In the collective psychology tradition, Le Bon argued that the concept of the crowd explained social changes and social movements. He claimed that history was influenced by the action of collectives that bring together and homogenize the individuals' behaviours. In his view, the mental unity that characterizes crowds cannot be reduced to individual psychology. It can only be studied as a collective phenomenon. According to R. Wilson (2004) the superorganism tradition was inspired by the available evidence on how organisms operate in harmonic fashion within their ecological niches. These observations applied initially to plant communities but were later extended to animals and found utmost resonance in Wheeler's (1928) studies of insects.

More recently, List and Petit (2011) argued that "we must think of group agents as relatively autonomous entities –agents in their own right, as it is often said, groups with minds of their own" (pp. 77-78). In their view, there are three features of agency that groups must satisfy: first, an agent has "representational states that depict how things are in the environment" (p. 19). Second, an agent has "motivational states that specify how it requires things to be in the environment" (p. 19), and third, and agent has "the capacity to process its representational and motivational states, leading to intervene suitably in the environment whenever that environment fails to match a motivating specification" (p. 19). In order to support their argument, they adopted a version of the principle of methodological individualism, that is, the idea that social phenomena can only be explained as a result of the action of individual agents (Weber, 1968): "Our theory maintains this

realist view of group agents without compromising the individualist claim that no psychologically mysterious forces should be invoked in giving an account of the social world" (p. 6). They argued that "the attitudes and actions of a group agent supervene on the contributions of its members" (p. 66) so groups must be treated as agents that offer explanations of social phenomena.

**Beyond individual cognition in organizations.** One way to study the idea of organizational cognition is through the notion of organizational learning. In this regard, the work of Donald Schön and Chris Argyris has been influential in the study of organizational learning and group dynamics. Argyris and Schön (1974) argued that organizations are learning systems and that people in organizations use *mental maps* to guide their actions in specific situations, for example, for planning, evaluation and reviewing courses of action in organizational settings. They use a metaphor to explain organizational structure:

> An organization is like an organism each of whose cells contains a particular, partial, changing image of itself in relation to the whole. And like such an organism, the organization's practice stems from those very images. Organization is an artifact of individual ways of representing organization . . . Hence, our inquiry into organizational learning must concern itself not with static entities called organizations, but with an active process of organizing which is, at root, a cognitive enterprise. Individual members are continually engaged in attempting to know the organization, and to know themselves in the context of the organization (Argyris & Schön, 1978, p. 16)

According to these authors, the mental maps people use for action do not necessarily correspond to the theories people explicitly endorse. They found that there is a split between theory and practice in organizational behaviour. This explains why some professional development strategies do not succeed in aligning the organizational goals with the peoples' attitudes and behaviours. Indeed, sometimes people espouse one theory of action but in practice use a different

theory to act in their daily organizational life. Argyris and Schön (1974) call the former espoused theory and the later theory-in-use.

Argyris and Schön (1974) characterized organizational learning as the detection and correction of error. In their view, learning occurs in loops. They indicate that there are two kinds of learning loops in organizations: single loop learning and double loop learning. The first kind of learning loop occurs when the rules, values and plans are operationalized, for example when the organization responds to a problem using the policies and regulations in place. The second kind of learning loop occurs when the rules, values and norms are questioned and revised as a consequence of the problem. The purpose of the double loop is not just to respond to a situation but to make the organization adaptable preventing new situations of the same kind.

Contrary to the view of organizations as cognitive systems, Spender (1998) indicated that cognitive analyses of organizations must clarify in what sense organizations are cognitive entities so researchers can extrapolate individual cognitive schemes to organizations. Also, in his view, computational models in general and Simon's model in particular assume that there is only one type of knowledge to be acquired and mapped, namely propositional knowledge. According to Spender, Simon's model remains silent about procedural knowledge, or tacit knowledge (Polanyi, 1962).

According to Fiol (2002, p.130) and Jones (1995) there is still a large amount of controversy regarding the appropriate account of cognition in organizations.

> Do influential individuals bring their own schema to the group causing it to become a frame of reference for the group? Do shared schemata emerge that characterize a group mind? Should researchers examine each individual's cognitive responses and treat them as nodes in a network? (Fiol, 2002, p.130)

To Greeno and Moore (1993) a situated perspective portrays cognitive properties as "interactions between agents and physical systems and with other people" (Greeno & Moore, 1993, p. 49). This view contrasts to an aggregate conception of cognition in organizations. According to the aggregate conception, cognitive properties exist only in the minds of the subjects. Organizational action is just the coordinated work of individual subjects.

Weick and Roberts (1993) made use of the concept of "collective mind" to argue that some organizational performances can be properly analyzed as the product of "heedful interactions" (p. 357). They indicated that "collective mind" does not mean "within-group similarity of attitudes, understanding, or language, nor can it be understood without close attention to communication processes among group members" (Weick & Roberts, 1993, p. 358). They viewed three models that assume the existence of collective cognitive properties. For example, Wegner (1986) and Wegner, Erber and Raymond (1991) proposed the notion of "transactive memory" to explain how people rely on one another to retrieve information developing an integrated and interdependent system that helps them remember information. In this case, the information is distributed among the individuals and is retrieved through the use of language.

Another contribution to the theory of group mind reviewed by Weick and Roberts is the work on connectionism in A. I. The notion of neural network has been extrapolated to organizations in order to understand group decision-making and information processing. In short, a connectionist network is a computational model that consists of several interconnected units. Information is represented as distributed in the connection patterns within the network, as opposed to residing in individual units. These patterns are created by inhibitory or excitatory stimuli differentiated by their strength (Rumelhart & McClelland, 1986).

According to Weick and Roberts (1993), connectionist models constitute a "shaky basis on which to erect a theory of organizational mind" (p. 359). These models are mostly designed to represent the nervous system's function, whereas organizations are loosely coupled systems where multiple actors interact. It is

hard to see how connectionist networks can account for the complexity of human interactions within organizations. For example, Sanderlands and Stablein (1987) argued that organizations could be characterized as neural networks, because organizations encode information through interrelated activities in a way similar to how neural networks encode information thorough the interaction of their units. Similarly, Hutchins (1990, 1991, 1995) has investigated how groups act in a coordinated fashion:

> The structure of the activities of the group is determined by a set of local computations rather than by the implementation of the sort of global plan that appears in the solo performer's procedure. In the team situation, a set of behavioural dependencies is set up. These dependencies shape the behaviour pattern of the group (Hutchins, 1990, p. 209).

Hutchins' ideas are helpful to understand cognition as a distributed property in human groups, without falling into the risks of reification pointed out by Spender (1998). Regarding organizational structures, Weick (1976) argued that organizations in general, and educational organizations in particular, are best portrayed as loosely coupling systems, namely as systems in which the different component elements can interact with each other without compromising their identity. In section 1, I mentioned the concept of coupling in the context of the discussion of the extended mind hypothesis. So it would be fair to ask whether there is any connection between Weick's idea of a loosely coupling system and the notion of cognitive coupling discussed in section 1 of this review.

Let us recall the main lines of the coupling–constitution debate. Clark and Chalmers (1998) indicated that the link between organism and environment creates "a coupled system that can be seen as cognitive in its own right" (p. 29). In response, Adams and Aizawa (2008, 2009) said that Clark and Chalmers mistakenly move from "the observation that process X is in some way causally connected (coupled) to a cognitive process Y to the conclusion that X is part of the cognitive process Y" (Adams & Aizawa, 2009, p. 81), a move that they called the coupling-constitution fallacy. Clark's (2010) reply to Adams and Aizawa

59

stressed that cognitive couplings are defined by the symmetric influence between the components, that is, the different parts involved in the cognitive process constitute a cognitive system altogether. In Clark's view, the components of an extended cognitive system are causally connected in the same way neurons are causally connected. However we do not say that a neuron thinks. We rather say that thinking is a process in which neurons are causally involved. So the dilemma between causal connection and constitution posited by Adams and Aizawa does not seem to be a dilemma after all, because according to Clark (2010) a cognitive system is in fact constituted by components that are causally connected. Clark also indicated that a key principle for the extended mind hypothesis is the parity principle, which states that in the case of cognitive extensions, the behavioural capacity would decrease if the coupling were interrupted, exactly in the same way in which behavioural capacity would decrease if the internal elements in the organisms were altered. In Clark's view, the alleged fallacy identified by Adams and Aizawa does not affect the parity principle.

An important difference between Weick's loosely coupled system and the notion of cognitive coupling used by the extended mind advocates, like Clark, (2010) is that Weick's notion focuses on the interactions between the different parts of an organization, whereas Clark is interested in the cognitive couplings between individuals and external elements. According to Theiner, Allen, and Goldstone (2010) the discussion on the extended mind hypothesis has generally focused on the interactions between individuals and external elements without paying much attention to the relations between the extended mind hypothesis and the hypothesis of group cognition. They consider that the case of group cognition is a special case of the extended mind hypothesis and argue that group cognition must be studied because of three reasons: first, psychological, anthropological and evolutionary evidence suggests that human beings are fundamentally social beings; second, there is an increasing connectivity between people, boosted by the information and communication technologies, for example, collectively designed web sites and open source software among others; and third, the hypothesis of group cognition provides another level of explanation of behaviour that enters in

60

competition with explanations at the individual level, providing a "useful case study for thinking about competition across explanatory levels" (p. 380).

Theiner, Allen and Goldstone also indicated that Clark's views on cognitive couplings apply to groups. They argued that the coupling-constitution fallacy does not apply to the case of group cognition:

> when we claim that an individual cognitive system X is in some principled way coupled to another individual cognitive system Y, we do not mean to imply that X is thus part of Y. Instead, what we assert is rather that the individuals who instantiate X and Y can engage in structured interactions so as to constitute an organized group-cognitive system Z that encompasses those individuals among its proper parts (Theiner, Allen & Goldstone, 2010, p. 390).

Their point was that in the case of group cognition, the interactions between individuals instantiate a cognitive system on its own right. We are now in a position to establish a connection between the extended mind hypothesis and Weick's idea of loosely coupled system. Following the argument of Theiner, Allen and Goldstone (2010), it could be said that groups in organizations can be studied as extended cognitive systems that instantiate cognitive properties of their own.

According to Weick, the groups within a loosely coupled system have internal coherence but lack rigid ties with other groups. This makes the group operation difficult to predict. "Loose coupling also carries connotations of impermanence, dissolvability, and tacitness all of which are potentially crucial properties of the 'glue' that holds organizations together" (Weick, 1976, p. 3). In contrast, a tight coupling implies rigidity in the operation, high dependence between groups and low capacity for adaptation. In a tightly coupled system, failures can propagate easily precisely because the links between groups are too rigid in the sense that there is high dependence due to an inflexible bureaucratic structure. When the organizational links are loosely coupled, failures have less

61

chance to propagate within the system, and groups working more independently have the autonomy to deal with irregularities and unexpected events.

Although Weick's early work draws from the information-processing model, he did not endorse Simon's idea that organizations are symbol-processing systems. He used the notion of "enactment" (Weick, 1979, Varela, Thompson & Rosch, 1992) to explain that an organised system plays an active role in creating its own environment through its actions. In what follows I will elaborate on the notion of enactment applied to organizations. Regarding the notion of enactment, Thompson and Stapleton (2009) said that "according to the enactive approach in cognitive science, cognition is grounded on the sense-making activity of autonomous agents—beings that actively generate and sustain themselves, and thereby enact or bring forth their own domains of meaning and value" (p. 23). Following this line of thought, Weick says that organizations as organized systems play an active role in the process of perceiving information.

**Educational organizations as loosely-coupled systems.** To translate the idea of loose coupling into an educational situation, Weick (1976) argued, based on Glassman (1973), that the degree of coupling between two systems depends on the shared activity between these two systems

> to the extent that two systems either have few variables in common or share weak variables, they are independent of each other. Applied to the educational situation, if the principal-vice-principal-superintendent is regarded as one system and the teacher-classroom-pupil-parent-curriculum as another system, then by Glassman's argument if we did not find many variables in the teacher's world to be shared in the world of a principal and/or if the variables held in common were unimportant relative to the other variables, then the principal can be regarded as loosely coupled with the teacher (Weick, 1976, p. 3).

Weick (1976, p. 6) claimed that a loosely coupled organization has better chances to perceive the environment and gather information from the environment leading

to better knowledge, which improves the organization's capacity to operate. Loose coupling enhances an organization's capacity to innovate because the high levels of flexibility promote adaptation.

Weick (1976) argued that schools are best portrayed as loosely coupled systems because the structures that support the attainment of educational goals in educational institutions are diverse and sensitive to context. Schools vary depending on their population, projects, programs, and even curriculum. Why, despite the differences, are structurally dissimilar institutions still labeled as "schools"? Or in Weick's words: "How can such loose assemblages retain sufficient similarity and permanence across time that they can be recognized, labelled, and dealt with? (Weick, 1976, p. 2) The answer to this question resides in the notion of practice. According to Weick, loosely coupled organizations are defined by their practices rather than by their structure. Indeed, structure-based discourses in organizational analysis portray organizations as tightly coupled systems that nonetheless deal with complex human interactions. The tension created, makes them prone to systematic failure. In contrast, a loosely coupled organization, gives priority to the subjects' practices, capturing the complexity of human interactions and focusing on the subjects' intentional activity in a context.

Furthermore, a focus on cognition allows for the introduction of the notion of practice to analyze organizations, because in Weick's model, practice is to be understood as part of the individuals' cognitive performance. How ought cognition to be portrayed in a loosely coupled system? In Weick's view, this type of organization exhibits coordinated patterns that suggest that mental properties are more than just an aggregate of individual cognitions. As I pointed out earlier, Weick and Roberts (1993) introduced the concept of collective mind to account for the cognitive properties that emerge in group practices within organizations. Consequently, they "tried to avoid reifying the organization or imbuing it with any ability to cognize in ways detached from the cognizing of its members" (Spender, 1989, p. 19).

Weick and Roberts (1993) introduced the notion of heedful interrelating to indicate that mental properties are better analyzed in the context of a collective situation and not in the heads of isolated individuals. Heedful performance is intelligent action and must be differentiated from habitual performance. The latter is mechanical action in which each performance is a replica of its predecessor. In the former each performance is transformed by its predecessor. It is the product of continuous learning and improving, whereas habitual performance is just the product of drill and repetition.

Weick and Roberts also made use of Asch's notion of "mutually shared fields" to define group performance (Asch, 1952). In their view, the groups' performance can be properly characterized by four defining properties. First, "individuals create the social forces of group life when they act as if there were such forces" (Weick & Roberts, 1993, p. 362). Second, when people pretend that there are such social forces, they correlate their own actions with a "social system of joint actions" (p. 365) that they envisage. Third, a situation in an organization is the product of interrelated activities. Individuals contribute to shape the situations by three different types of actions, namely "contributing", "representing" and subordinating". Members of the organization "contribute" to the organizational situations by means of action construction, individuals also "represent" or envisage a social system of joint actions, and they "subordinate" or correlate the constructed action with the envisaged system. Fourth, the effects produced by the system of interrelated activities can "vary as a function of the style (heedful-heedless) as well as the strength (e.g., loose-tight) with which the activities are tied together " (p. 364).

**Some challenges to the argumentative transition from individual cognition to group cognition.** R. Wilson (2004) distinguished between the group mind hypothesis and the social manifestation thesis. The social manifestation thesis states that some properties of the individual, including the psychological ones, are manifest only when individuals are in groups. The social manifestation thesis makes no claim about the emergence of group psychological properties. Its

central claim is that when individuals are in a group they manifest putative individual psychological properties that fit into the group situation. Wilson says that the proponents of the group mind hypothesis usually make an unwarranted transition from the social manifestation thesis to the group mind hypothesis. In other words, they conclude that groups have mental properties of their own from the fact that individuals display distinctive psychological properties when they are in a group. Wilson illustrates his point with an example:

> suppose that individual people become angry or aggressive in certain ways only when they form a certain type of group (for example a crowd). Then, unless they do so only because the crowd itself has a specific psychological profile, there is no need to posit group psychological properties, and so no role for the group mind hypothesis (Wilson, 2004, p. 281).

R. Wilson's point is that the argumentative transition from the observation of individual cognitive properties to the postulation of group cognitive properties requires a more solid empirical and conceptual grounding. In the arguments that I have reviewed so far, this argumentative transition from individual to group cognition is not evident. It is not clear how cognitive properties and processes are instantiated or supervene in groups. The attempts to defend this position have originated a field of study on its own (List & Petit, 2011; Theiner, 2011; Theiner, Allen & Goldstone, 2010) with numerous challenges and critiques (Rupert, 2005, 2010; Wilson, 2004, 2005).

In this dissertation, I will not undertake a detailed review of the arguments and controversies around the group mind thesis, and therefore, I will not explore its implications for policy analysis because, as I have shown, Wilson's (2004, 2005) argument raises reasonable doubts about the plausibility of the group mind hypothesis for the cognitive sciences in general. This critique also echoes Greenfield's (1982) position about the group mind hypothesis applied to conceptualizations of educational organizations. He noted that "it is the individual that lives and acts, not the organization. It is therefore the experience of individuals that we must seek to understand" (p. 4). In Greenfield's view,

conceptualizing educational organizations as entities with agency of their own tends to obscure the role of actors and their capacity for agency in schools. Wilson (2004) raised a similar point: "There can be no group-level focal cognitive processes and abilities without the activities of individuals, and in at least some cases those individuals are cognitive agents, agents with minds" (p. 307).

In the introduction to this dissertation I indicated that I am interested in the contributions of the theories of embodiment to educational policy analysis. I introduced Shapiro's (2011) taxonomy of theories of embodiment to characterize the conceptualizations about the body that have the potential to inform my argument. An analysis of the implications of the group mind hypothesis for policy analysis would require a separate and extensive treatment of this idea that would distract me from an analysis of the interactions between the body and the material manifestations of policy in schools. In an attempt to break with organizational theory's fascination with the group mind hypothesis some authors are exploring the implications of the theories of embodiment to our understanding of the questions of organizational theory (Dale, 2001; Hassard, Hollyday & Willmott, 2000). For instance, Harquail and Wilcox (2010) have opted for the notion of embodiment to characterize learning in organizations. These authors developed a theory of organizational identity (OI) based on the principles of the embodied mind. They suggested that members come to know about an organization as a product of their bodily experiences in organizational settings. They argued that "a member will construe an embodied definition of OI by considering not only what characteristics are central, distinctive, and continuous, but also what they can substantiate in their embodied experience of the organization" (p. 2). They complained that organizational theory has been too concerned with groups, and researchers have not yet fully explored the conceptual frameworks that would allow us understand how individuals develop an embodied understanding of their own situation within the organization.

**Practices as forms of thinking: Socio cultural explanations of action.**
Sociocultural theory has underscored the situated character of agents. Emerging

66

from the influential work of Lev Vygotsky (1962, 1978) and his colleagues (Luria, 1976), sociocultural historical models of practices indicate that individual development must be understood as situated in a socio-cultural context. Vygotsky (1962; 1978) for instance, indicated that cultural conventions, like words and certain objects, function as mediating tools that contribute to the individual's cognitive development. When individuals engage in activity, their use of tools and their interaction with peers function as mediations between the individual and the sociocultural environment. It must be stressed that in Vygotsky's view, culture and individual constitute each other. Indeed, people create the culture instantiated in cultural instruments, and cultural instruments configure people's cognitive development. Individual and culture "mutually constitute" each other (Rogoff, 2003, p. 51).

Drawing on the same argumentative line, Olson (1994) indicated that "writing systems provide the concepts and categories for thinking about the structure of spoken language" (p.100). Olson challenged the conventional view according to which the linguistic structure of the language is imposed on the writing system. In his view, the "awareness of linguistic structure is a product of a writing system, not a precondition for its development. If true, this will not explain the evolution of writing as the attempt to represent linguistic structures such as sentences, words, or phonemes for the simplest reason that pre-writers had not such concepts" (p.100). So in Olson's view, writing systems contribute to the development of new cognitive categories to understand language and particularly to characterize propositional thinking in terms of words and sentences. In a similar fashion, Rogoff (2003) indicated that people's participation in sociocultural activities that are performed, preserved, and transformed through successive generations, bring about the development of new and more elaborate forms of cognition. So as people transform their cognitive structures through the use of cultural artefacts, they simultaneously transform the cultural artefacts. This mutual determination is not just a temporal process, but also a historical process because it takes place in the context of culture.

Rogoff argued that individualistic analyses of human cognitive processes and general development, often overlook the relational aspects of human action, and focus on the internal processes, assuming that a description of internal causal process suffices for the explanation of action. Rogoff (2003) exemplified her point by asking her readers to guess what a certain child is doing in a picture in which the surroundings have been cut-off. At the beginning it is difficult to guess, but as soon as the different parts of the scene are added to the picture the child's action becomes clear. She says, "A general sense of interpersonal and cultural-institutional information is necessary to understand what this child is doing" (P. 56). In her view human activity is constituted by a number of interrelated aspects, the personal, interpersonal, and cultural-institutional. No aspect can be analyzed independently of the others.

These ideas have attracted the attention of researchers in education and a great deal of work in this area has focused on the fields of learning and instruction (Kirshner & Whitson, 1997). It is important to indicate that in this model, learning is not seen as a causal process located inside the individual's brain. Learning is a situated process that is influenced by the cultural tools, the interpersonal relations and the institutional context in which the individual is situated. The introduction of the institutional context as one of the determinants of human learning is important because it opens the door for the study of institutional practices as determinants of learning.

Lave and Wenger (1991) offered a theory of learning as an activity situated in institutional contexts. They provided a theoretical framework that characterizes cognitive processes such as learning as situated in the context of communities of practice. In their study, Lave and Wenger used the concept of legitimate peripheral participation to explain how learning takes place in the context of communities of practice. In their view, learning is not just a located mental process inside the individual's head. Instead, learning is situated in the contexts in which individuals participate collaboratively. This stance evidently implies a change of focus, because their question is not what kind of cognitive processes are

involved in learning, but what kind of social practices can be characterized as learning.

The idea of community of practice has been explored in the field of professional development and policy enactment (Wenger, McDermott, & Snyder, 2002). Coburn and Stein (2006), used this concept to study how a particular instructional policy was put in practice by a community of practitioners. They indicated that the fact that practitioners developed their own learning dynamics in their communities had an impact on the way the policy was enacted in the classroom. Communities are emergent rather than designed and the understanding of the policy is mediated by the institutionalized practices in particular communities. They suggested that policy makers must "design policy for participation rather that for use" (p. 43) because communities play a more active role than just passive receivers of policy documents.

**The "naturalistic coherentism" of Evers and Lakomski and the representation of practices in schools.** Evers and Lakomski's (1991, 1996, 2000) discussion of the representation of school practices is circumscribed to a systematic attempt to develop an epistemology of educational administration that takes as its starting point the coherentist theories of epistemic justification. Coherentism as a theory of epistemic justification starts as a critique of foundationalist models of epistemic justification. According to foundationalism, beliefs are ultimately justified by non-inferential beliefs or infallible foundational beliefs that constitute the basis of the entire structure of knowledge. Examples of classic foundationalism can be found in the empiricist claim that all knowledge rests in sense experience. The classic argument for foundationalism is that beliefs are justified via inference from more basic beliefs. If X is the justification of Liz's belief in Y, then Liz must believe in X and she must be justified in believing X, in virtue of some other belief, say, Z, which must be also believed by Liz in order for Liz to justify her belief in X. According to foundationalism, the regress of justifications will end at the point where the subject justifies the whole inferential chain by reference to a non-inferential belief or a set of non- inferential beliefs.

For example Bertrand Russell held the view that when a subject S believes she is in pain, the fact that justifies S in believing that she is in pain is that S is in direct and immediate acquaintance with her pain. There is no further belief or fact of the matter that justifies S in her belief besides S immediate and direct relation with her pain. Empiricists, like Russell, were not the only ones who held foundationalist views. Rationalists, like Descartes, also maintained that the inferential chain of justifications must end at some point, such as a set of indubitable beliefs that sustain the whole structure of knowledge (see also, Rorty, 1979).

Coherentists have reacted to foundationalism in a number of ways that I will not review in depth here. Kvanvig (2007) indicated that there are two main critiques made by the coherentists. First, coherentists challenge the very idea of foundational belief. It is not clear when the justification chain ends, because the question "Why do you believe this?" can always be asked. Second, coherentists question the idea that specific foundations can support the vast diversity of human knowledge, including knowledge about the past, beliefs about the future, unobservables, and abstract knowledge.

Evers and Lakomski (2000, p. 4) characterized their coherentism also as a reaction against the logical positivism that influenced early conceptualizations of schools' functioning. They indicated that logical positivism's influence in those early conceptualizations responded to the following principles:

> 1) A theory is a hypothetico-deductive structure . . . 2) Theories are justified by meeting certain conditions of empirical testability . . . 3) All the theoretical terms of a theory must be able to be given operational definitions . . .4) Scientific theories of educational administration exclude substantive ethical claims.

In response to these principles Evers and Lakomski characterized coherentism in the study of educational institutions by the following principles:

1. Theories … are part of a "continuous web of belief" included in the global theory we develop from childhood. "Statements at the perimeter, perhaps singular observation reports, are those which should be most readily revised in the light of experience" (p.7). At the centre of the structure they locate "logic, mathematics and branches of physics, [that] function as major organizing features of the web and are least revisable unless doing so makes for substantial gains in simplicity, or some overall gain in the coherence of the global theory" (p.7).

2. Theories are justified by the overall coherence of the whole web of belief.

3. Theoretical terms obtain their meaning by the conceptual relations they have in a particular conceptual scheme in a theory and not by their capacity to measure the world in a particular way.

4. Observation is value laden and values also make part of the web of belief. To Evers and Lakomski, values are subject to "coherent adjustment in the light of experience, [they] take it as uncontroversial that values are embedded throughout educational administration theory" (p. 7).

They indicated that this theory of knowledge also "cohere[s] with scientific accounts of how knowledge is acquired and represented by knowers" (p. 8). That is, there is a correlation between their coherentist theory of knowledge and the cognitive models used to represent the mind.

Evers and Lakomski called their model "naturalistic coherentism" indicating that their model intends to naturalize coherentist epistemology. Particularly, they aimed to provide a conceptualization of educational institutions that coheres with our knowledge of the natural sciences. To do so, they indicate that a model of the material mind would give us insights about the way administrators make decisions in schools. The model they chose for naturalizing

the knowledge of administrative practices in education is connectionism. Briefly, connectionism aims to explain cognition by using computational neural networks. These computational models are simplified representations of the brain in which the units or nodes in the network are seen as analogous of neurons. The units in the network are connected following a certain pattern. Units react to the incoming connections from other units and send further activation inputs to other units. The connections between units have different weights that can be measured numerically. The weight determines the strength of connections between units. In this way, connectionist networks can process information differently from a classic computer, because they do not require strings of symbols, rules or representations to function. In a connectionist network, the information is stored in a non-symbolic way, as it is distributed among the network's units (Rumelhart & McClelland, 1986).

Computational neural networks have achieved some success in the fields of face recognition, detection of simple grammatical structures and other simple tasks. Evers and Lakomski (2000), focused on the case of networks that learn and make decisions. They drew on Baxt (1990) who developed a neural network that predicted, with high levels of accuracy, when a patient had myocardial infarction. Baxt's network was given an input vector, a random selection of patients, half known to have infarction and half known to have no infarction. The network was set to compare the input cases with a known case and if any difference between the known case and the input case was found then it must report an error. The cases were run through the program again and again until the network developed a rule to distinguish infarction from no infarction. The results reported by Baxt indicate that after the network learned the rule, it was able to identify 92% of patients with myocardial infarction and 96% of the patients without myocardial infarction, which is an accuracy rate higher than the accuracy rate reported from trained physicians.

Evers and Lakomski (2000, p. 18) identified six implications of computational neural networks for understanding the decision making process in

educational administrators. First, neural networks may give us some insights into how humans represent their practical knowledge in a non-symbolic distributed fashion. Second, we learn our practical knowledge when we interact with our peers and the environment, and we receive feedback from them. Indeed, we do not learn our practical abilities at the first try. Third, connectionist models let us see reasoning processes as pattern processing rather than as following a set of rule-like sentences. They exemplify this principle as follows:

> When a school principal makes a decision, say, to admit a child with a particular disability into that school, instead of seeing the result as a deduction from a set of unarticulated premises, it is more plausible to see the input information as triggering a prototype of a successfully integrated child, a prototype that has been built up by experience (Evers and Lakomski, 2000, p. 18).

Fourth, if neural networks are able to process simultaneous inputs, then they would be better suited to represent human cognitive processing than classic computers, and would provide us a better understanding of the influence of different inputs in the decision-making process. Fifth, Evers and Lakomski think that it is useful to see "linguistic/symbolic formulations of knowledge as ways of *compressing* experience into a representation" (p. 18). However, they indicate that an algorithm that compresses a practice like teaching or leading is of little use if contextual factors dominate. In their view, fine-grained distributed representation of practices like leadership, decision-making or teaching would be useful if they took into account the contexts in which these practices are held. They suggested that connectionist networks would allow a way to create simulations for training purposes. In their view, connectionist models can be used to introduce contextual variables into the compressed representations so professional training based on connectionist models could be more useful and realistic than classic computational models. And sixth, connectionist models would represent thought in an accurate fashion because they model thinking as a "dynamic process that occurs in real time" (p. 18).

Evers and Lakomski suggested that connectionism provides the best theoretical framework to represent knowledge of practices in schools because connectionism allows for the introduction of contextual factors. They indicated that the traditional view of cognition as symbol processing in the head is insufficient to explain the complexity of practices in social contexts. In their view, connectionism can be used to explore cognition as "*distributed* between other knowers and their material contexts" (p. 37). Similarly, other authors have suggested similarities between connectionist networks and systems of distributed cognition (Smith, 2009; Mason, Conrey and Smith, 2007; Overwalle and Heylighen, 2006). It must be noted, however, that their argument for this methodological jump from the individual to the collective is not clearly revealed. They indicated that Hutchins (1991, 1995) and Clark (1997) endorsed connectionist principles. However, it must be noted that Hutchins (1991, p. 293) explicitly expressed some caution on this regard:

> Because the processing in connectionist networks is distributed across units in a network, and the processing in a system of socially distributed cognition is distributed across a number of people, there is a strong temptation to adopt a superficial mapping between the two domains, in which units in a network are seen as corresponding to individual people and the connections among units are seen to correspond to the communication links among people. In this way a single network would be taken as a community of people . . . this most obvious mapping is a quite likely a dead end.

In Hutchins' view, the real value of connectionism for the study of socially distributed cognition would be in the use of a more elaborated analogy in which individuals are represented as networks, and groups of individuals where cognition is socially distributed are represented as "communities of networks".

What are the implications of this theorization for our understanding of educational practices in schools? Evers and Lakomski (2000) argued that representing the knowledge of practice is paramount to understand school

74

functioning because encoding practices into concrete representations would have an impact on four areas. First, it will improve our knowledge of decision-making in schools. Second, it will improve our knowledge of leadership processes in education. Third, it will provide us with useful insights about the functioning of educational organizations. Fourth, a systematic knowledge of practices in education would have a positive impact in training programs for teachers and educational administrators.

According to Evers and Lakomski (2000, p. 157), neural networks can be used for "data extraction and analysis". Namely, they can be useful for "discovering patterns" through compression algorithms that "summarize the regularities the network has extracted from the data comprising its experience". In simpler words, connectionist models would allow us to identify regularities in the knowledge of practices. These regularities, once codified, would inform future practices and would constitute analytical tools to understand school functioning.

One final example: in Evers and Lakomski's view, one type of representation that is worth encoding is the prototype, that is, a set of learned principles and rules that an individual uses to process information. For example, when solving an administrative problem, an educational administrator uses a cognitive prototype of the decision making process appropriate to the problem at hand. This prototype has been learned and developed through years of experience. An explanation of the administrator's action should make reference to the prototype she used to deal with the problem. Evers and Lakomski's model is one of the most recent and systematic attempts to explain practices in schools by reference to cognitive theories. However it is worth noting that connectionist models such as the one endorsed by Evers and Lakomski rely on the individualistic assumptions that embodied theories of mind criticize. Indeed, connectionism aims to simulate the brain's neural connections, without taking into consideration the role of the environment in cognitive processing.

**Embodied perspectives on teacher learning.** Few researchers have taken embodied accounts of action seriously enough to study the questions in the field

75

(Bredo, 2009; Riveros, 2012; Riveros, Newton & Burges, 2012; Riveros & Viczko, 2012). One area that is studied frequently by researchers in education is teacher learning and professional development. Putnam and Borko (2000) indicated that most of the scholarship on learning from an embodied perspective has focused on students' learning but scarce attention has been paid to teachers' learning. They note that an individualistic view of learning has dominated the field. This individualistic view portrays "knowing as the manipulation of symbols inside the mind of the individual, and learning as the acquisition of knowledge and skills thought to be useful in a wide variety of settings" (Putnam & Borko, 2000, p. 4). They follow suggestions from Lave and Wenger (1991), and Greeno, Collins and Resnick (1996) regarding the role of activity in the learning process. These authors indicated that activity is always externally oriented because it takes place in physical and social contexts, and also pointed out that activity is an integral part of learning. According to Putnam and Borko (2000) teacher education programs should foster authentic environments, that is, contexts of teaching-related activity in which teachers can exercise problem-solving skills. They characterise these environments as discourse communities (Resnick, 1991) comprising people that share common interests and similar cultural codes, like a professional language, similar values or social-cultural background. According to these authors, mastering the community's discourse and participating in changes to the discourse are ways of learning. Similarly, Lave and Wegner (1991), characterized learning as a participatory process in which individuals gradually gain access to communities of practice. In this regard, Greeno, Collins and Resnick (1996) elaborated on a situated perspective on thinking and learning arguing that

> Success in cognitive functions such as reasoning, remembering, and perceiving is understood as an achievement of a system, with contributions of the individuals who participate, along with tools and artifacts. This means that thinking is situated in a particular context of intentions, social partners, and tools. (p. 20)

76

According to Putnam and Borko (2000) teachers' learning is intertwined with the particular contexts in which they act. Their research shows that teachers' practices are constrained and shaped by the particular classroom/school environments in which they teach. They found that when teachers engage in discourse communities to learn about their profession, their practices improve as they reflect meaningfully and critically about their classroom practices with other teachers. Carter (1990) and Carter and Doyle (1989) suggested that teachers' knowledge is event-structured or episodic, that is, teachers' knowledge is "developed in context, stored together with characteristic features of the classrooms and activities, organized around tasks that teachers accomplish in classroom settings, and accessed for use in similar situations" (Putnam & Borko, 2000, p. 13). Putnam and Borko (2000) stressed the socio-cultural environment of teaching. They assumed an embodied account of cognition as they portrayed teachers' learning as an activity that takes place in the interaction between the teachers and their surroundings.

**Understanding, practices, and the enactment of educational policy.**
James Spillane (2004) studied how policymakers and teachers made sense of science and math teaching standards in Michigan during the 1990's. He noted that school actors developed idiosyncratic understandings of the policy messages. Teachers and local policy makers understood math and science policy "as familiar ones, without sufficient attention to aspects that diverged from the familiar . . . [They missed] deeper, more conceptual core elements . . . the result was modest change in existing local understanding and thereby in the ideas about science education promoted by school-district polices" (p. 89). Spillane concluded that the cause of the modest transformation in the educational practices was the particular interpretational schemata used by teachers and administrators.

In another study, Hill (2001,2006) found that the teachers' attempts to make sense of mathematics and language arts standards in California resulted in practices that did not correspond to the policy objectives set by the policy makers, even though no resistance or opposition was reported at the classroom or district

level.  She pointed out that classroom practices remained unaltered after the policy introduction. Studies of this sort suggest that the gap between the policy as designed and the policy in practice is created, in some cases, by the interpretational schemata that the stakeholders use when they try to make sense of the new curriculum (Coburn, 2001). These cases have one element in common. They assume that individuals interpret information and act accordingly. For example, Yanow (2000) maintained that it is usually assumed that the relevant public or policy communities unambiguously understand the policy message. However, in her view, this is not always the case. The community, through processes of translation and meaning negotiation, could recontextualize the policy message (Yanow, 2000). Researchers who have made use of the notion of sense making have tried to describe how policy actors make sense of policy (Spillane, 2004).  Most of the work in this field has been centred on how individual cognition makes for individual differences and similarities, extrapolating the results to groups by generalization, but it is also acknowledged that more work needs to be done in order to understand policy sense making from an embodied perspective. For example Spillane, Reiser and Gomez (2006) said:

> We argue that cognition is an essential lens for understanding education policy implementation, especially the implementation of policies that demand significant shifts in teachers' practice, but that investigations of the role of cognition in policy implementation to date, including some of our own investigations, have failed to grapple with cognition as a distributed practice. (p. 48)

An embodied account of policy sense making would advance new understandings of policy enactments because it would provide a context-sensitive way to analyse how school actors adapt and recontextualize policy into their contexts of practice. This view mantains some similarities with Lave and Wenger's (1991) notion of communities of practice. According to this perspective, teachers are participants in structured practices that enable them to perform their actions in certain ways. Lave and Wenger's theory "locate[s] learning not in the acquisition of structure,

but in the increased access of learners to participating roles in expert performances" (Hanks, 1991, p. 17).

### Enacting Policy on Technology in the Classroom

In this section I begin with a brief review of policy documents that refer to the introduction of instructional technology in the classroom, paying special attention to the introduction of interactive whiteboards (IWBs) in the Albertan K-12 environment. Also, I review the studies that have examined the transformation of classroom practices after the introduction of IWBs. The examples will be used to provide a context to analyse the contributions of an embodied account of policy sense making to the study of educational policy enactment.

**Why IWBs?** One recent instance of educational policy that has received the attention of researchers is the policy on educational technology. According to the Alberta Commission on Learning (2003), the policies on technology in schools are driven by the perceived need to prepare students for current socio-economic demands; the current availability of technological resources in contemporary societies; and the societal demand for Information, Communication and Technology (ICT) literacy (Alberta's Commission on Learning, 2003). The Alberta's Commission on Learning suggested that each classroom in the province should have "one computer for the teacher; several computers for student use; a projection system; an interactive whiteboard, and online resources" (p. 109). Within this new landscape of instructional technology in the classroom, the use of interactive whiteboards (IWBs) has been positioned as an innovative alternative that increases students' motivation and adds to the teachers' pedagogical repertoire (Alberta Teachers' Association, 2011). I argue that the teaching practices in which IWBs are used constitute a relevant example of the enactment of an educational policy, and particularly, the practices in which IWBs are incorporated would provide an appropriate case for studying the relevance of the

notion of embodied policy sense making in the analysis of educational policy enactment.

**The policy documents.** To provide an account of the Albertan policy on technology in the classroom I focus on three sources: first, the Alberta Commission on Learning (2003), which provided a general framework for education in Alberta and is a point of reference for policy making in the province; second, Alberta Education, which has delineated the policy on technology in the classroom in a series of documents (Alberta Learning, 2003, 2004); and third, the Alberta Teachers' Association (2007, 2010), which has provided guidelines to its members regarding the implementation of technological tools in the classroom. I pay special attention to the policy documents related to the use of IWBs in the classroom.

The Alberta's Commission on Learning released a report in 2003 after a process of consultation and research. In this report the commission introduced a set of recommendations encompassing several areas such as: preschool programs, curriculum development, schools' organization and governance, evaluation, professional development, technology in schools (Alberta's Commission on Learning, 2003). The report devoted a full section to technology. It recommended the implementation of the *Learning and Technology Framework* (Alberta Learning, 2004) so that "students improve their learning with technology, not their learning about technology" (Alberta's Commission on Learning, 2003, p. 108). In relation to teachers, the report stated that technology should provide "an opportunity for teachers and principals to share best practices, participate in professional development, and continuously improve their students' outcomes" (p. 108). The commission suggested that teachers should integrate technology in the classroom and indicated that teachers should be expected to "plan and design effective learning environments and experiences supported by technology … [as well as] use technology to enhance their productivity and their professional practice" (p. 110). The commission specifically recommended the use of IWBs, among other technological tools, and indicated that "the critical factor is ensuring

that teachers are well prepared to fully integrate technology into their teaching practices" (p. 109).

The *Learning and Technology Policy Framework* (Alberta Learning, 2004) outlined the provincial goals regarding the use of technology in education. The framework was in line with the Commission's report and indicated specific goals for the use of technological tools in different areas of the educational system (governance, instruction, research, and management, to name a few). In relation to teaching practices the policy direction on professional growth stated that "educators will develop the necessary knowledge, skills, and attributes to use technology effectively to support learning and teaching" (p. 12). Also Alberta Education (Alberta Learning, 2004) urged teachers and school administrators to include ICT outcomes across the provincial curriculum. In order to accomplish this goal the framework calls for teachers to "continually learn new skills, enhance existing skills, and stay informed about professional practices that integrate emerging educational technologies into changing learning contexts" (p. 13).

Another key policy document in relation to technology in the classroom is the ICT curriculum developed by Alberta Learning (2003). The document indicated that "the ICT curriculum is not intended to stand alone, but rather to be infused within core courses and programs" (p. 1). The authors recommended including technological tools in all areas of the Albertan curriculum. They saw ICT as a "way of doing things" (p. 1), which suggests a technological dimension to teaching and learning practices. One way to interpret this claim is to say that some of our actions and practices in schools can be characterized by the use of technological tools. Technology is introduced as a dimension of practice that qualifies learning and teaching. That is, the ICT curriculum suggests that learning and teaching practices are permeated by technological elements, and technology-imbued practices have a distinctive character: "Technology is about the ways things are done; the processes, tools and techniques that alter human activity. ICT is about the new ways in which we can communicate, inquire, make decisions and

solve problems" (Alberta Learning, 2003, p. 1). The ICT curriculum highlighted the pervasiveness of technological artefacts in contemporary society and acknowledged the need to give more visibility in the curriculum to learning and teaching practices instilled with technology.

The Alberta Teachers' Association (ATA) proposed a framework for technology in the learning environment in a position paper authored in 1999 and revised in 2004 and 2007. The document started by indicating that "teachers are in the best position to determine the value of an emerging technology in terms of its potential for the enhancement of teaching and leaning" (ATA, 2007, ¶ 3). The ATA adopted a perspective according to which teachers play a fundamental role in the process of integrating new technologies in the classroom. They highlighted the importance of human interaction in teaching and learning and recommended teachers to be heedful in the use of technological tools in their own pedagogical practices: "teachers must use critical judgment when determining how technology should be integrated into the curricular and pedagogical dimensions of their teaching practice. Teachers must be vigilant in ensuring that technology is used to enhance, not displace, the human dimension and purposes of education" (¶ 12).

The ATA was cautious in positioning technology as complementary to teaching as they portrayed technological tools as supportive of classroom practices. Therefore, the document exhorted teachers to be "flexible, responsible and creative in working with students. Technology must support, not constrain, these aspects of the teaching process" (¶ 11). The authors encouraged teachers to emphasise human interaction adopting technological tools insofar as they "expand and extend the educational experiences of students" (¶ 11).

**Selected case studies: IWBs in the classroom.** The cases chosen for this review explored teachers' incorporation of IWBs into their instructional practices. My goal is to provide cases that would enable me to analyse how teachers make sense of policy through their embodied actions and practices. My focus specifically is the teachers' enactment of the policy on IWBs and what that reveals, more generally about how policy initiatives are enacted in the classroom.

82

Weinstein (1981) indicated that the physical layout of a classroom affords and or constrains certain behaviours in teachers and students. Moss et al. (2007) distinguished between three types of interactivity between humans and IWBs: technical, physical, and conceptual. Technical interactivity refers to the interaction "with the technological facilities of the board" (p. 40); physical interactivity refers to the manipulation of elements on the board using the hands, fingers and markers; and conceptual interactivity refers to the exploration and construction of curriculum concepts and ideas. According to Moss et al., the way teachers understand interactivity in the classroom seems "to be shaped by the pedagogical theories of learning that underpin particular teachers' practice, and circulate more broadly in a subject department or school" (p. 40).

Gillen et al. (2007) examined the claim that IWBs "influence established pedagogic practices, communicative processes and educational goals" (p. 243). They observed elementary classrooms in the UK and questioned whether the introduction of IWBs is technology-led or education-led, that is, whether the IWBs were introduced because they are available or were introduced because they have educational potential. In their opinion, the first type of introduction is especially problematic, as the new tools do not respond to the teachers' perceived needs and expectations. In particular, Gillen et al. investigated

> how IWBs actually function as communicative and pedagogic tools in classroom interactions, how they are used by teachers to pursue their educational goals and how they are used to build shared frames of reference and "common knowledge" between teachers and pupils (2007, p. 245).

Gillen et al. video recorded some lessons in elementary schools and analysed the transcripts in order to find evidence of IWBs functioning as a "communicative and pedagogic tool in teacher-pupil interactions . . . [as well as] specific features of the interaction around the IWBs" (p. 246). They examined their data "by studying interactions around the IWB, situating the use of this specific mediating artefact within established procedures, strategies and patterns of interaction

employed by the teacher" (p. 247). Their goal was to identify the types of communicative approaches that emerged in the classroom interaction around the IWB. They presented seven different instances of IWB classroom use. In the first situation the teacher used class pictures taken during a previous activity in an English lesson on writing instructions and recipes. The students had to approach the IWB and label the pictures using a marker to represent the correct sequence in the recipe. The second situation involved the use of the IWB as a medium to organize the correct sequence of text in a recipe. Students were asked to indicate the steps in the recipe and later encouraged to organize the different steps in a coherent sequence. In this case the teacher was able to arrange the text on the board in a way that may encourage children to think about the implications for action. For example, putting oil on the pan before the batter will have different result than putting the batter on the pan before the oil. The third situation shows, according to Gillen et al., the use "of the provisionality afforded by the IWB" (p. 250). Provisionality is "the facility to change something that has been produced" (Deaney, Chapman & Hennessy, 2009, p. 366). The teacher used the IWB's projector to show a list of the recipe's ingredients. The students received the same list in a template on a sheet of paper. One student noted that the template did not include the amounts of the ingredients. The teacher acknowledged this situation and asked the student to write the quantities on the board. According to Gillen et al. this shows how the IWB can be used with a great degree of flexibility that can adapt to the students' learning demands. The fourth situation involved the use of a video to engage the class in the lesson. The teacher recorded an experiment and projected it on the IWB to the class. The teacher paused the video at certain points to allow discussion and dramatic effects, like suspense. The fifth situation showed student involvement in a dialogue about object categorization. For this situation Gillen et al. did not indicate what was the specific use of the IWB. The sixth situation involved the use of the IWB in another categorization exercise using pictures: The students had to approach the IWB and use the marker to circle the object that corresponded to the right category. Gillen et al. said that this activity allowed students' participation and assessment opportunities. In this particular

case the teacher took the opportunity to recast possible errors as learning opportunities as opposed to opportunities for ridicule in front of the class. The authors also noted that students had to weight the risk of being exposed in front of the class against the opportunity to use the IWB.

Gillen et al. followed Smith's et al. (2005) distinction between technical interactivity and pedagogical interactivity. As a technical tool, the IWB affords interaction with technology in terms of accessing and manipulating information. As a pedagogical tool, IWBs may afford innovative teaching practices and meaningful learning opportunities, although there is also the possibility of reinforcing traditional teaching styles. The authors recommend teachers to pursue non-authoritative and interactive forms of communication with the students by allowing children to use the IWB more often. In Gillen's et al. view, an effective use of IWBs would involve a "balance between providing a clear structure for a well-resourced lesson and retaining the capacity for more spontaneous or provisional adaptation of the lesson as it proceeds" (p. 254), avoiding traditional teacher-centred interactions.

Glover and Miller (2003) offered a typology of teacher management styles associated with the adoption of IWBs. In their view, teachers can be described as missioners, tentatives, or luddites. Missioners are the teachers who have adopted the IWB in their classroom practice and continuously seek for new adaptations of curriculum content. Tentatives are teachers who require additional training due to lack of technology skills. They feel comfortable with one-to-one peer coaching until they achieve self-sufficiency in the use of the tool. Luddites are those who perceive technology as a threat to their classroom practices and are more likely to experience frustration with the adoption of IWBs.

Davidson and Pratt (2003) investigated "how the visual and kinaesthetic affordances of interactive whiteboards support the cognitive aspects of learning" (p. 30) In order to answer this question they proposed "to clarify and categorise the affordances of interactive whiteboards as perceived by teachers" (p. 30) and they also investigated how IWBs impacted the learning of specific curricular

contents given the visual and kinaesthetic affordances of IWBs. In regard to the visual affordances, the teachers reported that IWBs facilitate attention and understanding given the size and colour of the images projected in the screen, which resonate with specific types of learning. The quality of the graphics also allows for better understanding of curricular contents, such as 7$^{th}$ grade geometry for this particular study. Regarding kinaesthetic affordances, IWBs are perceived to allow students' movement, making the learning experience more vivid. Although Davidson and Pratt reported learning benefits derived from the kinaesthetic affordances of the IWBs they did not explore further the kinaesthetic affordances of IWBs and limited their comments to the motivational aspects of movement: "movement helps prevent boredom as pupils don't like sitting down, and hence movement aids concentration and thus learning" (p. 31). They indicated that the IWB also allows for teacher manipulation of images on the screen generating more "dramatic and memorable" (p. 31) presentations. Finally, Davidson and Pratt categorized the different uses of IWBs: "teacher led visual only; teacher led with use of kinaesthetic affordances; pupil use with mainly visual affordances; pupil participation that makes use of the kinaesthetic affordances" (p. 31).

Deaney, Chapman and Hennessy (2009) followed a teacher during six history lessons and analysed the way this particular teacher used the IWB technology in the classroom "to support a dialogic approach to knowledge construction in history" (p. 365). They found that this teacher exploited the IWB's features in a way that it increased the availability of multiple sources (photos, videos, internet links, etc…); it allowed textual and graphic annotation on the screen to facilitate public sharing and discussion; it allowed focusing, spotlight, magnification, hide and reveal to maintain attention on key concepts; and occasionally, it also allowed the use of the drag and drop function to facilitate the practice of classification. The uses that Deaney, Chapman and Hennessy documented suggested that "technological resources were employed as visible, manipulable objects of joint reference " (p. 373).

Another affordance documented by these authors was the *archiving and revisiting* feature, which allowed the teacher to recall and revisit previous work from the computer's memory onto the IWB screen in order to generate feedback loops, sequences and reflection during instruction. Deaney, Chapman and Hennessy noticed that the teacher in their study used non-ICT resources along with the IWB. For example, using ordinary whiteboards to make supplementary notes as an interactive sequence was presented on the IWB. Also, the researchers found that the teacher used the IWB as a "rehearsal" (p. 374) mechanism that allowed students to plan ahead, discuss, and deepen their understanding of the unit's topics. The authors concluded that IWBs constitute a resource that "both shaped and enabled activity deliberately exploited by the teacher to facilitate collaborative learning" (p. 385).

Armstrong et al. (2005) investigated the interactions between students, teachers and technology in UK classrooms. They adopted a socio-cultural approach, which sees human action as mediated by tools. In their perspective IWBs are tools that mediate teaching and learning in the classroom. The use of these tools is influenced by several cultural factors including individual history and experiences. Armstrong et al. indicate that "when faced with a new technology a teacher is likely to make sense of it in terms of previous experiences with older technologies. This suggests for example, that many teachers are likely to use digital whiteboards as an extension of the non-digital whiteboard" (p. 458). The same goes for students; Armstrong et al. found that students tended to use a video games language to refer to the IWB applications. For example, when a student failed to complete a task on the IWB, other students referred to this event as "being killed" in clear reference to the language used in video gaming.

Armstrong et al. examined how IWBs afford interaction in classrooms. They found that IWBs allow interactivity by means of the different ways an application can be manipulated by the users. This also means that "the affordances of the IWB are inextricably linked to the software used . . . [which also suggests] that there are no absolute properties of the IWB which enable us to predict the

87

effects that it will have on teaching and learning" (p. 459). In their study, Armstrong et al. suggested that when teachers bring their own pedagogical expertise to engage in long-term sustained experiences with IWBs, they would be more likely to integrate this tool into their teaching practices.

In one of their classroom visits they noted that the teacher was "using the IWB as a shared semiotic text, drawing on the dynamic elements of the software to consolidate and support the learning of the students in relation to the designed intentions of the session" (p. 465). So in this particular classroom, the teacher used the IWB to create a dialogical space in which students engaged with each other in meaningful conversation around the lesson's topic. In Armstrong et al.'s words "this is evident within the video, through observation of gestural and whole or part body movement, pupil's verbal engagement with each other and the teacher, and their responses using other tools to the activities they observe around them" (p. 465). In another scenario, Armstrong et al. videotaped a grade eighth English teacher who used a feature on the IWB that allowed the user to drag and drop words displayed on the IWB's screen. For this particular lesson on voice and narratives, the teacher combined six of his own sentences with those of a student. The teacher asked another student to come up and arrange the text using the drag and drop movements afforded by the IWB. The rest of the class helped edit the text through joint discussion in order to create a coherent narrative. Armstrong et al. commented:

> The ease with which the text could be moved meant that there was a
> fluidity about the text which pupils seemed particularly responsive to . . .
> Ian's case study demonstrates that even with very simple software, by
> manipulating texts in this way, the IWB becomes an extremely effective
> teaching tool not only for the whole class discussion. Furthermore, it
> suggests that the ability to physically interact with text and language in
> this way can also be very powerful for the learner (p. 467).

In this scenario the physical interaction with the IWB contributed to the student's learning experience. The manipulation of the words on the screen through the

drag and drop movements can be seen as a factor that facilitates the student's understanding of the notions of voice and narrative structure. Armstrong et al. indicated that the IWB alone is not a guarantee of better learning outcomes. They suggested that the introduction of IWBs into the classroom requires training and ongoing support for teachers who also require a wide selection of software to support their classroom practices. Kennewell and Beauchamp (2007) indicated that the scholarship on IWBs has highlighted their benefits for teaching, such as efficiency, versatility, multimodal presentation and interactivity. They acknowledged there is less clarity regarding the IWBs benefits for learning. Kennewell and Beauchamp listed a set of possible actions in the classroom that can be structured through the use of IWBs:

| Action | Meaning | Example |
|---|---|---|
| Composing | Ideas can be recorded accurately as they arise | Students annotating work in IWB |
| Editing | The data stored and displayed can be changed easily with no trace of the original | Individual students revising their reports of science experiments after group or whole-class discussion. |
| Selecting | Choice of resource or procedure can be made form a list | Students select the appropriate words from a list of vocabulary in a language exercise |
| Comparing | Features the same object from different views or different items displayed can be compared | Teacher displays pictures of flowers taken from different angles or different flowers looking for common features |
| Transforming | The way that the data are displayed can be changed | Students and/or teacher enter data in a spreadsheet and view in different graph formats to discuss which is most appropriate for task |
| Modeling | A process can be simulated by representing relationships between variables | Students enter different food quantities into spread sheet and watch effect on graphs representing high-energy foods, food for growth and so on |
| Revisiting | Repeating and activity or returning with a different focus | A list of ideas generated by the class at the start of the lesson is reviewed following an Internet search and discussion. |

Table 1-1, Actions afforded by the IWB. From: Kennewell and Beauchamp, 2007, pp. 232 -233

The IWB affordances identified by these researchers make visibile a range of actions that would contribute to a characterization of classroom practices in relation to the use of technology and particularly, to the use of IWBs (Beauchamp, 2006). According to Kennewell and Beauchamp (2006), this list of IWB features would open new avenues for planning professional development programs, software design and teacher education programs. Also, Beauchamp (2004) called for policy makers to explore the potential of the IWBs' affordances for educational policy design. Kennewell and Beauchamp (2007), summarized this point:

> The current level of integration of IWBs into teachers' pedagogical knowledge is an achievement which should not be underestimated, but if IWBs are to meet the expectations of policymakers and achieve the claims of practitioners, there may need to be a new wave of professional development in ICT which takes account of the extended list of ICT's features and the need to embed them in teachers' pedagogical knowledge and reasoning (p. 240).

In a study of four elementary classrooms in a school in Canberra, Australia, Bennett and Lockyer (2008) reported that teachers found immediate practical benefits to IWBs and integrated the tool into their classroom practices without modifying the focus of their teaching activities. In fact, these authors suggested that the rapid adaptation of IWBs to existing teaching practices indicate that the introduction of IWBs does not guarantee change in the pedagogic status quo, like teacher-centred pedagogies or presentation-based instruction.

**Some Alberta-related studies.** Crichton, Slater and Pegler (2010) explored the connection between teachers' age, their career cycle and their use of ICT in Calgary schools. They found that "if the technology was work related, a teacher's generation [age] has no statistically significant impact on his or her ability to use the technology" (¶ 7). The adoption of technological tools in the classroom seems to be influenced by the teacher's career cycle. The career cycle is the set of stages in a teacher's career (Steffy et al., 1999). The novice, who is

the one beginning to acquire the skills to teach in the classroom. The apprentice is the teacher who recently entered the profession, manages his/her own classroom and is developing a professional identity. The professional is the teacher who has gained self-confidence and is perceived by his/her students as "patient kind and understanding" (p. 7). *The* expert, is the teacher who supports his/her professional actions in educational research. Expert teachers connect with other expert teachers and have leadership roles inside and outside the schools. Distinguished teachers are those who have earned good reputations and respect because they always exceed expectations in their professional actions. Finally, the emeritus teacher is the retired teacher who remains involved in the profession by mentoring, volunteering, and serving his/her professional organizations. Critchton, Slater and Pegler's (2010) contrasted this typology with Prensky's (2001) distinction between digital native and digital immigrant, namely, those who were born before (immigrants) and after (natives) the popularization of digital technologies in the 1980s. A digital native was born in an environment in which digital; technology is part of daily life and her engagement with technology is essentially different from the engagement of someone who was born before the so-called digital age. Critchton, Slater and Pegler's (2010) main finding was that there is no direct correlation between ICT adoption in the classroom and teacher's age or generation (digital native or immigrant). Instead, they found that ICT adoption in the classroom is mostly correlated to the career cycle, and more precisely to the teacher's stage in Rogers' (2003) diffusion curve. A teacher can be an innovator by introducing a technological tool, or an early adopter, by using the tool ahead of the rest. After the innovation gains some momentum, Rogers posits the emergence of an early majority who contributes to the diffusion and attracts the rest, who are seen as a late majority. Rogers categorize as laggards those who take longer to adopt a given innovation. Crichton, Slater and Pegler's (2010) findings contrast with common conceptions about technology adoption in schools and teachers' age. Namely, young teachers would be more likely to adopt technological tools in their classrooms because they are digital natives and their digital immigrants counterparts would offer resistance to ICT innovations. Crichton, Slater and

Pegler's (2010) findings indicate that career cycle plays a more important role than previously acknowledged.

ATA (2011) conducted an extensive provincial study investigating the impact of digital technologies on Alberta teachers. The researching team found that 53 per cent of the surveyed teachers used IWBs frequently. They also found that a systemic lack of institutional support and time constraints are major hindrances to the integration of technology into classroom practices. A large number of teachers perceived IWBs as useful and relevant but lack of acquaintance with the use of the software. Overwhelming schedules and administrative duties are usually perceived as the most substantial threats to the integration of technology in general, and IWBs in particular, into classroom practices. The study found that the IWB is the most common technology used by teachers, mostly to display PowerPoint presentations. Teachers were asked to indicate the adequacy of their training to take full advantage of technological tools in the classroom and a majority of teachers (53%) considered that better training in the use of IWBs is highly desirable. Nonetheless, a large number of teachers (91.4%) reported having changed their teaching strategies as a result of access to new instructional technologies. These results match another report form Alberta Education (2010b) that referenced a number of school projects that focused on teaching literacy. Some of these projects aimed to promote literacy through the use of technology and, in particular, some of these projects made use of IWBs as the main tool to accomplish the goal of literacy development in their students. Teachers reported that IWBs constituted a useful addition to their classroom practices.

Alberta Education (2010a) published a report related to technology in the classroom. In this report the researchers looked at the relation between technology and students engagement and success in high school and indicated that technology has the potential to increase student engagement. The report highlighted the use of IWBs as an innovative tool that contributes to "student engagement through interactive games and competitions. As well, students are leading discovery style

learning using the interactive whiteboard and effectively teaching their peers" (p. 6). However, meaningful integration of IWBs is the exception to the rule according to the report's authors.

The review of research on IWBs shows that researchers are interested in understanding how these devices are incorporated into the classroom practices. In relation to policy documents, I have shown that Alberta Education and the ATA have issued extensive reports on the use of technology in the classroom. There seems to be a consensus regarding the perceived benefits of interactive whiteboards for teaching and learning. At the beginning of this chapter I reviewed some Albertan policies and policy documents on technology in the classroom (Alberta's Commission on Learning, 2003; Alberta Teachers' Association, 2007, 2010, 2011; Alberta Learning, 2003, 2004). These documents coincide in the need to integrate technological tools into classroom practices in order to equip schools for the challenges of contemporary society.

Some researchers have studied the way IWBs contribute to classroom practices centring their analyses on students' learning and teaching effectiveness (Moss et al., 2007; Gillen et al., 2007; Glover & Miller, 2003; Davidson & Pratt, 2003; Deaney, Chapman & Hennessy, 2009; Armostrong et al., 2005; Kennewell & Beauchamp, 2007). They are guided by questions about the added value of IWBs for students' learning experience in terms of motivation, school completion, and academic achievement. Also, some reviewed studies looked at the pedagogical gains of using IWBs, teachers' motivation, engagement and interest in this technology, as well as the teachers' process of coping and adapting technology to their own teaching practices. These researchers have found that the lack of institutional support, training and follow up is detrimental to a meaningful integration of technology into current teaching practices.

Although some authors have explored how action in the classroom is transformed through the use of technological tools, there is still scarce scholarship on the topic and particularly there is a lack of studies that propose conceptual frameworks to understand how technological tools are incorporated into

educational practices. My study aims to mend this absence by introducing a set of theoretical constructs to the conversation. The notion of embodiment has the potential to open new avenues to understand the processes by which teachers integrate technological tools into their classroom practices. Furthermore, my research aims to shed light into how teachers enact educational policy in the classroom, namely, the policies that promote the introduction of interactive whiteboards in schools.

The reviewed studies are illuminating as they provide concrete instances of this particular policy in place (Crichton, Slater & Pegler, 2010; Alberta Teachers' Association, 2011; Alberta Education, 2010a). I have reviewed some studies that show how teachers act when trying to integrate the IWB into their own practices, and I will propose in subsequent chapters new theoretical lenses to understand the process by which teachers put these policies in place in the classroom. These theoretical lenses derived from the theories of embodiment will provide a robust account of educational practices that will answer the questions about the ontological conditions for policy enactment. That is, the way the body and the elements in the environment interact or integrate in order to make sense of policy.

**Conclusions of this Literature Review**

I opened this review with a guiding question: How does an account of educational policy sense making from the perspective of embodiment inform our understanding of educational policy enactment?
In order to answer this question I proposed to answer the following sub-questions:
1.  What constitutes educational policy sense making?
2.  What constitutes educational policy enactment?
3.  What Specific Instances of Educational Policy Sense Making Illustrate the Enactment of a Policy?
I have laid the foundation for answering these questions by reviewing the relevant literature in four different fields that can make a significant contribution to our understanding of educational policy enactment. These fields are: educational

policy analysis, philosophy, organizational theory, and the studies on the introduction of IWBs into the classroom I have shown that these fields can provide important theoretical contributions to our understanding of educational policy sense making and educational policy enactment. In the following chapters I argue that an embodied account of educational policy sense making will inform our understanding of educational policy enactment.

In this review I have shown that contemporary perspectives on policy analysis (Yanow, 2000; Dyer, 1999; Crump, 1992; Fenwick, 2010), show that policies are performed and transformed through actions and practices in local scenarios. I have established the plausibility of the thesis that educational policy is enacted in educational practices. I moved to the philosophy of mind in order to establish a conceptual framework that will allow me to investigate what constitutes educational policy sense making. The notion of embodiment provides a robust theoretical framework for understanding how school actors make sense of policy in their contexts of practice. Organizational theory has been concerned about cognition and action since its inception in the early 20th century and some authors in the field have proposed models that aim to explain how people think, make decisions and act in the context of organizations. The reviewed studies reveal that some authors in the field give plausibility to an embodied account of sense making. Some researchers have taken a perspective congruous with the theories of embodiment to explain some instances of professional learning (Lave & Wenger, 1991). More recently, researchers have focused on the notion of practice to describe how educational policies are put in place (Coburn, 2001; Hill, 2001; 2006; Spillane, 2004; Yanow, 2000). In particular they argued that a study of the way teachers make sense of policy would reveal how the policy is enacted in the classroom. Situated models of human thought applied to schools such as the ones endorsed by Lave and Wenger (1991), Kirshner & Whitson (1997), Rogoff (2003), and Coburn and Stein (2006), have taken positions that are compatible with the central assumptions of a embodied account of the mind. That is, they portray learning as a situated activity that occurs in the context of communities of practitioners (Putnam & Borko, 2000). In contrast Evers and Lakomski (2000),

95

trying to explain teachers and administrators' decision-making in education, utilized theoretical frameworks that hold strong individualist assumptions evidenced in their emphasis on connectionist models. I indicated that connectionist models are individualist in the sense that they try to simulate the neural connections of the brain without acknowledging the role of extra-cranial elements in cognitive processing.

One particular conclusion that stems from this review is that there is lack of dialogue between the authors in the four fields that I explored. Indeed, there are few cross-referenced works between educational policy analysis, philosophy of mind, organizational theory, and studies of the introduction of IWBs in the classroom. Nonetheless, authors in the four fields agree that their respective fields will gain more explanatory power through an embodied characterization of sense making. Clearly, these four fields have potential to collaborate. Authors in these fields share similar assumptions about the mind and have the capacity to inform each other through research and theoretical reflection. The papers that follow this review aim to bridge the gap between these disciplines.

**References**

Alberta Learning. (2004). *Learning and technology policy framework.* Edmonton: Alberta Learning

Adams, F. & Aizawa, K. (2008). *The bounds of cognition.* Malden: Blackwell

Adams, F. & Aizawa, K. (2009). Why the mind is still in the head. In. P. Robbins, & M. Aydede, (Eds.). *The Cambridge handbook of situated cognition.* New York: Cambridge University Press.

Adams, F., & Aizawa, K. (2010). Defending the bounds of cognition. In. R. Menary (Ed.), *The extended mind. Cambridge*: MIT Press.

Aguilar, F. J. (1967). *Scanning the business environment. New* York: Macmillan.

Alberta Commission on Learning. (2003). *Every child learns, every child succeeds.* Edmonton: Alberta Commission on Learning.

Alberta Education (2004). *ICT program of studies: Rationale and philosophy. Retrieved* from: http://www.learning.gov.ab.ca/ict/ictfront.asp

Alberta Education. (2010a). *Technology and high school success: Year one report.* Edmonton: Alberta Education.

Alberta Education. (2010b). *Supporting the literacy learner II.* Edmonton: Alberta Education.

Alberta Learning. (2003) *Information and communication technology (K-12) curriculum.* Edmonton: Alberta Learning

Alberta Teachers' Association. (2011). *The impact of digital technologies on teachers working in flexible learning environments.* Edmonton: Alberta Teachers' Association.

Alberta Teachers' Associaton. (2007). *Technology in education.* Edmonton: Alberta Teachers Association. Retrieved from http://www.teachers.ab.ca/

Anderson, M. L. (2003). Embodied cognition: A field guide. *Artificial Intelligence, 149*, 91-130.

Argyris, C. & Schön, D. (1974). *Theory in practice: Increasing professional effectiveness.* San Francisco: Jossey-Bass.

Argyris, C., & Schön, D. (1978). *Organizational learning: A theory of action perspective.* Reading, Mass: Addison Wesley.

Armstrong, V., Barnes, S., Sutherland, R., Curran, S., Mills, S., & Thompson, I. (2007). Collaborative research methodology for investigating teaching and learning: The use of interactive whiteboard technology. *Educational Administration Abstracts,* 42(1), 87-112.

Asch, S. (1952). Social psychology. NJ: Prentice Hall.

Atkinson, M. & Coleman, W. (1992). Policy networks, policy communities and the problems of governance. *Governance, 5*(2), 154-180.

Audi, R, (1993). *The Structure of justification. New* York: Cambridge University Press.

Ball, S. J., Maguire, M., & Braun, A. (2012). *How schools do policy: Policy enactments in secondary schools. London*: Routledge.

Baum, J. A. C., & Rowley, T. J. (2002). Companion to organizations: An introduction. In Baum, J. A. C. (Ed.), *The Blackwell companion to organizations.* Oxford, UK: Blackwell.

Baxt, W. G. (1990). Use of an artificial neural network for data analysis in clinical decision-making: the diagnosis of acute coronary occlusion. *Neural Computation, 2*(4) 480-489.

Beauchamp, G. (2004). Teacher use of the interactive whiteboard in primary schools: Towards an effective transition framework, *Technology, Pedagogy and Education, 13,* 327–348.

Beauchamp, G. (2006). New technologies and 'new teaching': A process of evolution? In R. Webb (Ed.) *Changing teaching and learning in the primary school* (pp. 81–91). Buckingham: Open University Press.

Beer, R. (2012). Dynamical systems and embedded cognition. In K. Frankish & W. Ramsey (Ed.), *The Cambridge handbook of artificial intelligence*. Cambridge: Cambridge University Press

Bennett, S., & Lockyer, L. (2008). A study of teachers' integration of interactive whiteboards into four Australian primary school classrooms. *Learning, Media and Technology, 33*(4) 289-300

Biesta, G. (2010). *Good education in age of measurement: Ethics, politics, democracy*. Boulder, CO: Paradigm.

Block, N. (1980). Troubles with functionalism. In N. Block (Ed.), *Readings in the philosophy of psychology*. Cambridge, MA: Harvard University Press.

Braun, A., Maguire, M., & Ball, S. J. (2010). Policy enactments in the UK secondary school: Examining policy, practice and school positioning. *Journal of Education Policy, 25,*(4), 547-560.

Bredo, E. (2009). Is educational policy making rational –and what would that mean anyway? *Educational Theory, 59*(5), 533-547

Brooks, R. (1991). Intelligence without representation. *Artificial Intelligence*, *47*, 139-159.

Burge, T. (1979). Individualism and the mental. *Midwest Studies in Philosophy, 4,* 73–122.

Carter, K. (1990). Teachers' knowledge and learning to teach. In W. R. Houston, M. Haberman, & J. Silkula (Eds.), *Handbook of research on teacher education* (pp. 291-310). New York: Macmillan.

Carter, K., & Doyle, W. (1989). Classroom research as a resource for the graduate preparation of teachers. In A. Woolfolk (Ed.), *Research perspectives on the graduate preparation of teachers* (pp. 51-68). Englewood Cliffs, NJ: Prentice Hall.

Clancey, W. J. (1997). *Situated cognition.* Cambridge: Cambridge University Press.

Clark, A. (1997). *Being there: Putting brain, body and world together again.* Cambridge: MIT

Clark, A. (2003). *Natural born cyborgs.* New York: Oxford University Press

Clark, A. (2010a). Coupling, constitution, and the cognitive kind. In. R. Menary (Ed.), *The Extended mind. Cambridge*: MIT Press.

Clark, A. (2010b). Memento's revenge: The extended mind, extended. In. R. Menary (Ed.), *The Extended mind*. Cambridge: MIT Press.

Clark, A. & Chalmers, D. (1998). The extended mind. *Analysis, 58,* 10 – 23.

Cobb, P., McClain, K., Lamberg, T. S., & Dean, C. (2003). Situating teachers' instructional practices in the institutional setting of the school and district. *Educational Researcher,* 32(6) 13-24

Coburn, C. E. (2001). Collective Sensemaking about Reading: How Teachers Mediate Reading Policy in Their Professional Communities. *Educational Evaluation and Policy Analysis. 23*(2), 145-170.

Coburn, C., & Stein, M. (2006). Communities of practice theory and the role of teachers professional community in policy implementation. In M. Honig (Ed.), *New directions in education policy implementation: Confronting complexity* (pp. 65-82). Albany, NY: SUNY Press.

Cohen, D. K., & Ball, D. L. (1990). Policy and practice: An overview. *Educational Evaluation and Policy Analysis,* 12(3) 233-239.

Cohen, D. K., & Ball, D. L. (1990). Relations between policy and practice: A commentary. *Educational Evaluation and Policy Analysis,* 12(3) 331-338

Cole, M. (1996). *Cultural psychology: A once and future discipline.* Cambridge, Mass: Belknap Press of Harvard University Press.

Colebatch, H. K., Hoppe, R., & Noordegraaf, M. (2011). *Working for policy*. Amsterdam: Amsterdam Univ. Press.

Crichton, S., Slater, C., & Pegler, K. (2010). Understanding teaching technology use by generation, knowledge and career cycle. *ATA Magazine,* 91(1). Retrieved from: http://www.teachers.ab.ca/Publications/ATA%20Magazine/Volum e-91/Number-1/Pages/Understanding-Teaching-Technology-Use.aspx

Crump, S. (1992). Pragmatic policy development: Problems and solutions in educational policy making. *Journal of Education Policy. 7*(4), 415-25

Cuban, L. (1998). How schools change reforms: Redefining reform success and failure. *Teachers College Record. 99*(3), 453-477

Cuban, L. (2001). *Oversold and underused: Computers in the classroom*. Cambridge, Mass: Harvard University Press.

Cyert, R. M., & March, J. G. (1963). *A behavioral theory of the firm.* Englewood Cliffs, N.J: Prentice-Hall.

Daft, R. L., & Weick, K. E. (1984). Toward a model of organizations as interpretation systems. *The Academy of Management Review, 9*(2), 284-295.

Dale, K. (2001). *Anatomising embodiment and organisation theory*. Basingstoke: Palgrave.

Davison, I., & Pratt, D. (2003). An investigation into the visual and kinaesthetic affordances of interactive whiteboards. In Becta (Ed.), *Research bursary reports. Coventry*: Becta.

Deaney, R., Chapman, A., & Hennessy, S. (2009). A case study of one teacher's use of interactive whiteboard system to support knowledge co-construction in the history classroom. *The Curriculum Journal, 20*(4) 365 - 387.

Dennett, D. (1987). The intentional stance. Cambridge, MA: MIT Press.

Dewey, J. (1944). *Democracy and education: An introduction to the philosophy of education.* New York, NY: Free Press. (Original work published 1916)

Di Paolo, E. (2009). Extended life. *Topoi, 28*, 9-21

Dretske, F. (1981). *Knowledge and the flow of information.* Cambridge: MIT Press.

Dreyfus, H. (1991). *Being-in-the-world.* Cambridge: MIT Press.

Dreyfus, H. L. (1996). The current relevance of Merleau-Ponty's phenomenology of embodiment. *The Electronic Journal of Analytic Philosophy, 4,* 1-21, http://www.phil.indiana.edu/ejap/.

Dye, T. R. (2013). *Understanding public policy*. Boston: Pearson.

Dyer, C. (1999). Researching the implementation of educational policy: A backward mapping approach. *Comparative Education. 35*(1), 45-62.

Eraut, M. (1994). *Developing professional knowledge and competence.* London: The Falmer Press

Evers, C. W., & Lakomski, G. (1991). *Knowing educational administration: Contemporary methodological controversies in educational administration research.* Oxford: Pergamon.

Evers, C. W., & Lakomski, G. (1996). *Exploring educational administration: Coherentist applications and critical debates*. New York: Pergamon.

Evers, C. W., & Lakomski, G. (2000). *Doing educational administration: A theory of administrative practice.* Amsterdam: Pergamon.

Fenwick, T. J. (2010). (un)Doing standards in education with actor-network theory. *Journal of Education Policy,* 25(2) 117-133

Fenwick, T. J., & Edwards, R. (2010). *Actor-network theory in education*. Oxon: Routledge

Feuer, M. J. (2006). *Moderating the debate: Rationality and the promise of American education.* Cambridge, Mass: Harvard Education Press

Fiol, C. M. (2002). Intraorganizational cognition and interpretation. In J. A. C. Baum (Ed.), *The Blackwell companion to organizations* (pp. 120-137). Oxford, UK: Blackwell.

Firestone, W. A., Fitz, J., & Broadfoot, P. (1999). Power, learning, and legitimation: Assessment implementation across levels in the United States and the United Kingdom. *American Educational Research Journal, 36*(4) 759-793

Fodor, J. (1980). Methodological solipsism considered as a research strategy in cognitive psychology, *Behavioral and Brain Sciences, 3,* 63-110.

Fodor, J. (1987). *Psychosemantics*, Cambridge: MIT Press.

Foglia, L. & Wilson, R. (2013). Embodied cognition. *WIRES Cognitive Science, 4,* 319-325. doi: 10.1002/wcs.1226

Fullan, M. (2007). *The new meaning of educational change.* New York: Teachers College Press.

Giroux, H. A. (2001). *Theory and resistance in education: Towards a pedagogy for the opposition*. Westport, Conn: Bergin & Garvey.

Galbraith, J. R. (1973). *Designing complex organizations.* Reading, Mass: Addison-Wesley Pub.

Gall, M. D., Gall, J. P., & Borg, W. R. (2010). *Applying educational research: How to read, do, and use research to solve problems of practice.* Boston: Pearson

Gallagher, S. (2005). *How the body shapes the mind.* Oxford: Oxford University Press.

Gallagher, S. (2010). Merleau-Ponty's phenomenology of perception. *Topoi, 29*(2).

Gibson, J.J. (1979). *The ecological approach to visual perception.* Boston: Houghton Mifflin

Gillen, J., Staarman, J. K., Littleton, K., Mercer, N., & Twiner, A. (2007). A 'learning revolution'? Investigating pedagogic practice around interactive whiteboards in British primary classrooms. *Learning, Media and Technology, 32*(3) 243-256.

Glassman, R. B. (1973). Persistence and loose coupling in living systems. *Behavioral Science. 18,* 83–98.

Glover, D., & Miller, D. (2001). Running with technology: the pedagogic impact of the large-scale introduction of interactive whiteboards in one secondary school. *Technology, Pedagogy and Education,* 10(3), 257-278

Glover, D., & Miller, D. (2003). Players in the management of change: Introducing interactive whiteboards into schools, *Management in Education, 17,* 20-23

Greenfield, T. B. (1982). Against group mind. *McGill Journal of Education, 17*(1), 3-11

Greenfield, T. B. (1993). Organizations as talk, chance action and experience. In T. Greenfield & P. Ribbins (Eds.), *Greenfied on educational administration.* London: Routledge.

Greeno, J. G., & Moore, J. L. (1993). Situativity and symbols: Response to Vera and Simon. *Cognitive Science, 17*(1), 49-59.

Greeno, J. G., Collins, A. M., & Resnick, L. B. (1996). Cognition and learning. In D. Berliner & R. Calfee (Eds.), *Handbook of educational psychology* (pp. 15-46). New York: Macmillan.

Hamilton, M. (2009). Putting words in their mouths: The alignment of identities with system goals through the use of Individual Learning Plans. *British Educational Research Journal, 35*(2), 221-242Top of Form

Hanks, E. (1991). Foreword. In J. Lave, & E. Wenger. *Situated learning: Legitimate peripheral participation. Learning in doing.* Cambridge: Cambridge University Press.

Harquail, C., & Wilcox, K. A. (2010). Construing organizational identity: The Role of embodied cognition. *Organization Studies, 31*(12), 1619-1648.

Hassard, J., Holliday, R., & Willmott, H. (2000). *Body and organization*. Thousand Oaks, Ca: Sage.

Haugeland, J. (1993). *Artificial intelligence: The very idea.* Cambridge: MIT Press.

Heidegger, M. (1962). *Being and time.* New York: Harper

Heidegger, M. (1977). *The question concerning technology and other essays.* New York: Harper & Row

Hill, H. (2006). Language matters: How characteristics of language complicate policy implementation. In M. Honig (Ed.), *New directions in education policy implementation: Confronting complexity* (pp. 65-82). Albany, NY: SUNY Press.

Hill, H. C. (2001). Policy is not enough: Language and the interpretation of state standards. *American Educational Research Journal. 38* (2), 289-318.

Hogwood, B. W., & Gunn, L. A. (1984). *Policy analysis for the real world.* Oxford: Oxford University.

Horst, S. (2009). The computational theory of mind. In N. Zalta (Ed.), *The Stanford encyclopedia of philosophy.* Retrieved from: http://plato.stanford.edu/entries/computational-mind/#EmbEmbCog

Hurley, S. L. (1998). *Consciousness in action.* Cambridge: Harvard University Press.

Hutchins, E. (1990). The technology of team navigation. In J. Galegher, R. E. Kraut, & C. Egido (eds.), *Intellectual teamwork.* Hillsdale, NJ: Erlbaum.

Hutchins, E. (1991). The social organization of distributed cognition. In: L. B. Resnick, L, M. Levine, and S. D. Teasley (eds*.), Perspectives on socially shared cognition.* Washington, DC: American Psychological Association.

Hutchins, E. (1995). *Cognition in the wild.* Cambridge, Mass: MIT Press.

Jones, M. (1995). Organizational learning: Collective mind or cognitivist metaphor? *Accounting, Management & Information Technologies, 1*(5), 61-77

Kennewell, S., & Beauchamp, G. (2007). The Features of interactive whiteboards and their influence on learning. *Learning, Media and Technology,32*(3) 227-241

Kim, S. (2005). Externalism, epistemic artefacts and the extended mind. In R. Shantz (Ed.), *The Externalist Challenge. New studies on cognition and intentionality.* New York: Walter de Gruyter.

Kirshner, D., & Whitson, J. A. (1997). *Situated cognition: Social, semiotic, and psychological perspectives*. Mahwah, N.J: L. Erlbaum. Bottom of Form

Kish, D. & Maglio, P. (1994). On distinguishing epistemic from pragmatic action. *Cognitive Science, 18,* 513-549.

Kraft, M. E., & Furlong, S. R. (2007). *Public policy: Politics, analysis, and alternatives*. Washington, D.C: CQ Press.

Kvanvig, J. (2007). Coherentist theories of epistemic justification. In. E. Zalta (Ed.), *Stanford encyclopedia of philosophy.* Retrieved from http://plato.stanford.edu/entries/justep-coherence/

Lakoff, G. (1986). *Women, fire, and dangerous things: What categories reveal about the mind.* Chicago: University of Chicago Press.

Lakoff, G., & Johnson, M. (1999). *Philosophy in the flesh: The embodied mind and its challenge to western thought.* New York: Basic Books.

Lakomski, G. (2005). *Managing without leadership: Towards a theory of organizational functioning.* Amsterdam: Elsevier.

Lant, T. K. (2001). *Organizational cognition: Computation and interpretation.* Mahwah, NJ: Erlbaum.

Lant, T. K. (2002). Organizational cognition and interpretation. In J. A. C. Baum (Ed.), The Blackwell companion to organizations. (pp. 344-362) Malden, MA: Blackwell.

Lant, T. K., & Shapira, Z. (2001). *Organizational cognition: Computation and interpretation. LEA's organization and management series*. Mahwah, N.J.: Lawrence Erlbaum Associates.

Latour, B. (1991). Technology is society made durable. In J. Law, (ed.), *A sociology of monsters: Essays on power, technology, and domination* (pp. 103-131). London: Routledge.

Latour, B. (2005). Reassembling the social: An introduction to actor-network theory. Oxford: Oxford University Press.

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation.* Cambridge: Cambridge University Press

Law, J. (2004) *After method: Mess in social science research.* London: Routledge.

Law, J. & Singleton, V. (2005). *Object lessons.* Organization, 12, 3, 331 – 355

Le Bon, G. (1895). *The crowd: A study of the popular mind.* Dunwoody, GA: Norman, S. Berg, 1968.

Levinthal, D., & March, J. (1993). The myopia of learning. *Strategic Management Journal, 14,* 95-112.

Levy, D. (2006). How private education's growth challenges the new institutionalism. In H-D, Meyer & B. Rowan (Eds.), *The new institutionalism in education*. Albany: State University of New York Press

Levy, P. (2002). *Interactive whiteboards in learning and teaching in two Sheffield schools: a developmental study.* Retrieved from: http://dis.shef.ac.uk/eirg/projects/wboards.htm.

List, C., & Pettit, P. (2011). *Group agency: The possibility, design, and status of corporate agents*. Oxford: Oxford University Press.

Luria, A. R. (1976). *Cognitive development, its cultural and social foundations.* Cambridge, Mass: Harvard University Press.

March, J. G. (2001). The pursuit of intelligence in organizations. In T. K. Lant, & Z. Shapira (Eds.), *Organizational cognition: Computation and interpretation* (pp. 61-72). Mahwah, N.J.: Lawrence Erlbaum Associates.

March, J. G., & Olsen, J. (1976) *Ambiguity and choice in organizations*. Bergen : Universitetsforlaget.

March, J. G., & Simon, H. A. (1958). *Organizations*. New York: Wiley.

Marr, D. (1982). *Vision: A computational investigation into the human representation and processing of visual information.* San Francisco: W.H. Freeman.

Mason, W. A., Conrey, F. R., & Smith, E. R. (2007). Situating social influence processes: Dynamic, multidirectional flows of influence within social networks. *Personality and Social Psychology Review, 11,* 279–300.

Maturana H, & Varela, F. (1980) *Autopoiesis and cognition: The realization of the living.* Dordrecht: D. Reidel  Publishing.

Maturana, H. R., & Varela, F. J. (1992). *The tree of knowledge: The biological roots of human understanding.* Boston: Shambhala.

McDougall, W. (1920). *The group mind.* New York: Putnam

McGinn, C. (1989). *Mental content.* Oxford: Blackwell

Menary, R. (2010). The extended mind in focus. In. R. Menary (Ed.), *The extended mind.* Cambridge: MIT Press.

Merleau-Ponty, M. (1962). *Phenomenology of perception.* International library of philosophy and scientific method. New York: Humanities Press.

Merleau-Ponty, M. (2002). *Phenomenology of perception.* London: Routledge Classics

Meyer, H-D. (2006). The rise and decline of the common school as an institution: Taking "Myth and Ceremony" seriously. In H-D, Meyer & B. Rowan (Eds.), *The new institutionalism in education.* Albany: State University of New York Press

Meyer, H.-D., & Rowan, B. (2006). *The new institutionalism in education*. Albany: State University of New York Press.

Milliken, F. J. (1990). Perceiving and interpreting environmental change: An examination of college administrators' interpretation of changing demographics. *Academy of Management Journal, 33*(1), 42-63.

Moss, G., Jewitt, C., Levacic, R., Armstrong, V., Cardini, A., & Castle, F. (2007). *The interactive whiteboards, pedagogy and pupil performance evaluation* (Research report 816). London: DfES.

Nespor, J. (2002). Networks and context of reform. *Journal of educational change 3,* 365 – 382.

O'Reagan, , J. K. (1992). Solving the "real" mysteries of visual perception: the world as an outside memory. *Canadian Journal of Psychology, 46,* 461-488.

Ocasio, W. (2001). How do organizations think? In T. K. Lant, & Z. Shapira (Eds.), *Organizational cognition: Computation and interpretation* (pp. 39 - 60). Mahwah, N.J.: Lawrence Erlbaum Associates.

Odling-Smee, F. J., Laland, K. N., & Feldman, M. W. (2003). *Niche construction: The neglected process in evolution.* Princeton: Princeton University Press.

Olson, D. R. (1984). *The world on paper: The conceptual and cognitive implications of writing and reading.* Cambridge: Cambridge University Press.

Overwalle, F., & Heylighen, F. (2006). Talking nets: A multiagent connectionist approach to communication and trust between individuals. *Psychological Review,113* (3), 606-627.

Oyama, S. (1985). *The ontogeny of information.* Durham, NC: Duke University Press.

Oyama, S. (2000). *Evolution's eye: A systems view of culture divide.* Durham, NC: Duke University Press.

Ozga, J. (2000). *Policy research in educational settings: Contested terrain.* Buckingham: Open University Press.

Ozga, J., Seddon, T., & Popkewitz, T. S. (2006). *Education research and policy: Steering the knowledge-based economy.* London: New York.

Pal, L. (2009). *Beyond policy analysis: Public issue management in turbulent times.* Scarborough: Thomson/Nelson.

Perrow, C. (1984). *Normal accidents: Living with high-risk technologies.* New York: Basic Books.

Piaget, J. (1968). *The construction of reality in the child.* London: Routledge and Kegan Paul.

Piaget, J., & Inhelder, B. (1969). *The psychology of the child.* London: Routledge & K.Paul.

Polanyi, M. (1967). *The tacit dimension.* NY: Anchor Press.

Prensky, M. (2001). Digital natives, digital immigrants. *On the Horizon: The Strategic Planning Resource for Education Professionals, 9*(5) 1-6

Putnam, H. 1975. The meaning of 'meaning'. In K. Gunderson. (Ed.). *Language, mind, and knowledge.* Minneapolis: University of Minnesota Press.

Putnam, R. T., & Borko, H. (2000). What do new views of knowledge and thinking have to say about research on teacher learning? *Educational Researcher, 29*(1) 4-15.

Ramirez, F. (2006). Growing commonalities and persistent differences in higher education: universities between global models. In H. D. Meyer & B. Rowan (Eds.), *The new institutionalism in education.* Albany: State University of New York Press

Resnick, L. B. (1991). Shared cognition: Thinking as social practice. In L. B. Resnick, J. M. Levine, & S. D. Teasley (Eds.), *Perspectives on*

socially shared cognition (pp. 1-20). Washington, DC: American Psychological Association.

Rickles, D. (2006). Supervenience and determination. In J. Fieser, (Ed.), *Internet encyclopedia of philosophy*. Retrieved from http://www.iep.utm.edu/superven/

Riveros, A. (2009). Thomas Greenfield and the quest for meaning in organizations: A postponed dialogue with Ludwig Wittgenstein. *Journal of Educational Administration and Foundations*. *20*, (2), 51-67.

Riveros, A. (2012). Beyond collaboration: Embodied teacher learning and the discourse of collaboration in education reform. *Studies in Philosophy and Education, 31,* 6, 603-612.

Riveros, A. (In press a). Thomas Greenfield and the foundations of educational administration. In D. Burgess & P. Newton (Eds.), *Theoretical Foundations of Educational Administration.* Henday Publishing.

Riveros, A. (In press b). Cognition and administrative practices in education. In D. Burgess & P. Newton (Eds.), *Theoretical Foundations of Educational Administration.* Henday Publishing.

Riveros, A., Newton, P., & Burgess, D. (2012). A situated account of teacher agency and learning: Critical reflections on professional learning communities. *Canadian Journal of Education, 35,* 1, 202-216.

Riveros, A., & Viczko, M. (2012). Professional knowledge "from the field": Enacting professional learning in the contexts of practice. *McGill Journal of Education*, *47*(1).

Robbins, P. & Aydede, M. (2009). A short premier on situated cognition. In P. Robbins, & M. Aydede, (Eds.). *The Cambridge handbook of situated cognition.* New York: Cambridge University Press.

Rogers, E. M. (2003). *Diffusion of innovations.* New York, N.Y: Simon & Schuster

Rogoff, B. (2003). *The cultural nature of human development.* Oxford: Oxford University Press.

Rorty, R. (1979). *Philosophy and the mirror of nature.* Princeton: Princeton University Press.

Rowan, B. & Miskel, C.G. (1999). Institutional theory and the study of educational organizations. In J. Murphy & K.S. Louis (Eds.). *Handbook of research on educational administration.* San Francisco: Jossey-Bass Publishers.

Rowlands, M. (1999). *The body in mind: Understanding cognitive processes.* Cambridge: Cambridge University Press

Rowlands, M. (2006). Body language: *Representation in action.* Cambridge, Mass: MIT Press.

Rumelhart, D. E., & McClelland, J. L. (1986). *Parallel distributed processing: Explorations in the microstructure of cognition.* Cambridge, MA: MIT Press

Rupert, R. (2004). Challenges to the hypothesis of extended cognition. *Journal of Philosophy 101*, 389–428.

Rupert, R. (2005). Minding one's cognitive systems: When does a group of minds constitute a single cognitive unit?. *Episteme, 1,* 3, 177-188.

Rupert, R. (2009a). Innateness and the situated mind. In P. Robbins and M. Aydede (eds.), *The Cambridge Handbook of Situated Cognition.* New York: Cambridge University Press. pp. 96-116.

Rupert, R. (2009b). *Cognitive systems and the extended mind*. Oxford: Oxford University Press.

Rupert, R. (2010). Extended cognition and the priority of cognitive systems. *Cognitive Systems Research, 11,* 4, 343-356.

Sandelands, L. E., & R. E. Stablein (1987) The concept of organization mind. In S. Bacharach and N. DiTomaso, (eds.), *Research in the Sociology of Organizations.* (pp. 135-161) Greenwich, CT: JAI Press.

Schmidt, M.R. (1993). Grout: Alternative kinds of knowledge and why they are ignored. *Public Administration Review, 53(6),* 525-530.

Schön, D. A. (1987). *Educating the reflective practitioner.* San Francisco, CA: Jossey-Bass.

Schön, D. A. (Ed.) (1991). *The Reflective Turn: Case Studies In and On Educational Practice*. New York: Teachers College Press.

Shore, C., & Wright, S. (2011). Conceptualising Policy: Technologies of governance and the politics of visibility. In C. Shore, S. Wright & D. Pero (Eds.), *Policy worlds: Anthropology and the analysis of contemporary power* (pp. 1 - 26). New York: Berghahn.

Searle, J. (1992). *The Rediscovery of Mind.* Cambridge, MA: MIT Press.

Sellars, W. (1963). *Science Perception and Reality,* London: Routledge & Kegan Paul.

Senge, P. M. (2000). *Schools that learn: A fifth discipline field book for educators, parents, and everyone who cares about education.* New York: Doubleday.

Shapiro, L. A. (1997). A clearer vision. *Philosophy of Science,* 64(1), 131-153.

Shapiro, L. A. (2011). *Embodied cognition.* New York: Routledge

Simon, H. A. (1957). *Models of man: Social and rational; mathematical essays on rational human behavior in society setting.* New York: Wiley.

Simon, H. A. (1958). *Administrative Behaviour.* New York: Macmillan.

Simon, H.A. (1969). *The sciences of the artificial.* Cambridge: MIT Press.

Simon, H.A. (1989). *Models of Thought.* New Haven: Yale University Press.

Simons, M., Olssen, M., & Peters, M. (2009). *Re-reading education policies: A handbook studying the policy agenda of the 21st century.* Rotterdam: Sense.

Sitkin, S. (2001). The theoretical bases of organizational cognition. In T. Lant & Z Shapira (Eds.), *Organizational cognition: Computation and interpretation.* NJ: Lawrence Erlbaum

Smit, B. (2005). Teachers, local knowledge, and policy implementation. *Education and Urban Society, 37*(3)*,* 292-306.

Smith, E, (2009). Distributed connectionist models in social psychology. *Social and Personality Psychology Compass, 3(1)* 64 – 76.

Smith, E., & Conrey, F. (2009) The social contexts of cognition. In P. Robbins, & M. Aydede, (Eds.). *The Cambridge handbook of situated cognition.* New York: Cambridge University Press.

Smith, H. J., Higgins, S., Wall, K. & Miller, J. (2005). Interactive whiteboards: boon or band- wagon? *A critical review of the literature, Journal of Computer Assisted Learning, 21,* 91–101.

Spender, J. C. (1998). Dynamics of individual and organizational knowledge. In C. Eden & J.C. Spender (Eds.), *Managerial and organizational cognition: Theory methods and research.* London: Sage

Spillane, J. & Burch, P. (2006). The institutional environment and instructional practice: Changing patterns of guidance and control in public education. In H-D, Meyer & B. Rowan (Eds.), *The new institutionalism in education.* Albany: State University of New York Press

Spillane, J. P. (2004). *Standards deviation: How schools misunderstand education policy.* Cambridge, Mass: Harvard University Press.

Spillane, J. P., & Zeuli, J. S. (1999). Reform and Teaching: Exploring Patterns of Practice in the Context of National and State Mathematics Reforms. *Educational Evaluation and Policy Analysis, 21*(1) 1-27.

Spillane, J., Reiser, B., & Gomez, L. (2006). Policy Implementation and Cognition: The Role of Human, Social, & Distributed Cognition in Framing Policy Implementation in M. Honig (ed.), *New Directions in Educational Policy Implementation: Confronting Complexity*. New York: SUNY Press.

Spillane, J., Reiser, B., & Reimer, T. (2002). Policy implementation and cognition: Reframing and refocusing implementation research. *Review of Educational Research, 72(3)* 387-431.

Steffy, B.,Wolfe, M., Pasch, S., & Enz. B. (1999). *Life cycle of the career teacher.* Chapel Hill, NC: University of North Carolina

Stein, S. J. (2004). *The culture of education policy.* New York: Teachers College Press.

Stich, S. (1978). Autonomous Psychology and The Belief-Desire Thesis. *The Monist, 61(4)* 573–590.

Theiner, G., Allen, C., & Goldstone, R. L. (2010). Recognizing group cognition. *Cognitive Systems Research, 11*(4), 378-395.

Theiner, G. (2011). *Res cogitans extensa: A philosophical defense of the extended mind thesis.* Frankfurt: P. Lang.

Thompson, E. (2007). *Mind in life: Biology, phenomenology, and the sciences of mind.* Cambridge, Mass: Belknap Press of Harvard University Press.

Thompson, E., & Stapleton, M. (2009). Making sense of sense-making: Reflection on enactive and extended mind. *Topoi. 28,* 23-30.

Tsoukas, H. (2005). *Complex Knowledge: Studies in Organizational Epistemology. Oxford*: Oxford University Press.

Van Overwalle, F., & Heylighen, F. (2006). Talking nets: A multiagent connectionist approach to communication and trust between individuals. *Psychological Review, 113,* 606–627.

Varela, F. J., Thompson, E., & Rosch, E. (1991). *The embodied mind: Cognitive science and human experience.* Cambridge, Mass: MIT Press.

Vera, A. H., & Simon, H. A. (1993). Situated action: A symbolic interpretation. *Cognitive Science, 17,* 7-48.

Vygotsky, L. S. (1962). *Thought and language.* Cambridge: M.I.T. Press, Massachusetts Institute of Technology.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes. Cambridge:* Harvard University Press.

Walsh, J. P. (1995). Managerial and organizational cognition: Notes from a trip down memory lane. *Organization Science. 6*(3), 280-321.

Waltz, S. (2004). Giving artifacts a voice? Bringing into account technology in educational analysis. *Education Theory, 54*(2), 157:172

Weber, M. (1968). *Economy and society: An outline of interpretive sociology.* Berkeley: University of California Press.

Weber, A., & Varela, F. J. (2002). Life after Kant: Natural purposes and the autopoietic foundations of biological individuality. *Phenomenology and the Cognitive Sciences, 1*(2) 97-125.

Wegner, D. M. (1986). Transactive memory: A contemporary analysis of the group mind. In B. Mullen & G. R. Goethals (Eds.), *Theories of group behavior* (pp. 185–205). New York: Springer-Verlag

Wegner, D. M., Erber, R., & Raymond, P. (1991). Transactive memory in close relationships. *Journal of Personality and Social Psychology, 61*(6), 923-929.

Weick, K. (1976). Educational organizations as loosely coupled systems. Administrative science quarterly. 21 (1), 1-19.

Weick, K. E. (1979). *The social psychology of organizing. New* York: Random House.

Weick, K. E. (2001). *Making sense of the organization.* Oxford, UK: Blackwell.

Weick, K. E., & Roberts, K. H. (1993). Collective mind in organizations: Heedful interrelating on flight decks. *Administrative Science Quarterly 38* (3) 357-381.

Weinstein, C. S. (1981). *Classroom design as an external condition for learning. Educational Technology, 21*(8) 12-19

Wenger, E. (1998). *Communities of practice: Learning, meaning, and identity. Learning in doing.* Cambridge, U.K: Cambridge University Press.

Wenger, E., McDermott, R., & Snyder, W. M. (2002). *Cultivating communities of practice: A guide to managing knowledge. Boston*, Mass.: Harvard Business School.

Wertsch, J. V. (1985). *Culture communication, and cognition: Vygotskian perspectives.* Cambridge: Cambridge University Press.

Wheeler, W.M. (1910). *Ants: Their structure, development, and behaviour.* New York: Columbia University Press.

Wheeler, W.M. (1911). The ant-colony as an organism. In W. M. Wheeler (ed.), *Essays in Philosophical Biology.* Cambridge, MA: Harvard University Press.

Wheeler, W.M. (1923). *Social life among the insects.* New York: Harcourt Brace

Wheeler, W.M. (1928). *The social insects.* New York: Harcourt. Brace, and Co.

Wilson, M. (2002). Six views of embodied cognition. *Psychonomic Bulletin and Review, 9,* 625-636

Wilson, R. (2000). The mind beyond itself. In D. Sperber (Ed.), *Misrepresentations: A multidisciplinary perspective* (pp. 31-52). New York: Oxford University Press.

Wilson, R. (2001a). Individualism. In R. Wilson & F. Keil, (Eds.), The MIT encyclopedia of the cognitive sciences. Cambridge: MIT Press. Retrieved from http://cognet.mit.edu.login.ezproxy.library.ualberta.ca/library/erefs/mitecs/wilsonr.html

Wilson, R. (2001b). The mind in cognitive science. In R. Wilson & F. Keil, (Eds.), *The MIT encyclopedia of the cognitive sciences*. Cambridge: MIT Press.

Wilson, R. (2004). *Boundaries of the mind. Cambridge*: Cambridge University Press.

Wilson, R. A. (2005). Collective memory, group minds, and the extended mind thesis. *Cognitive Processing, 6,* 4, 227-36

Wilson, R. (2010a). Meaning making and the mind of the externalist. In. R. Menary, (Ed.), *The Extended Mind. Cambridge*: Bradford Book.

Wilson, R. (2010b). Extended vision, In, N. Gangopadhyay, M. Madary, & F. Spicer, (Eds.), *Perception, action, and consciousness: Sensorimotor dynamics and two visual systems*. New York: Oxford University Press.

Wilson, R. & Foglia, L. (2011). Embodied cognition. In N. Zalta (Ed.), *The Stanford encyclopedia of philosophy.* Retrieved from: http://plato.stanford.edu/entries/embodied-cognition/

Wittgenstein, L. (1953). *Philosophical investigations.* New York: Macmillan.

Wynne, B. (1992). Sheep farming after Chernobyl. In. B. Lewenstein (Ed.) *When science meets the public.* Washington, DC: American Association for the advancement of science.

Yanow, D. (2000). *Conducting interpretive policy analysis: Qualitative research methods, v. 47.* Thousand Oaks: Sage Publications.

Yanow, D., & Tsoukas, H. (2009). What is Reflection-In-Action? A Phenomenological Account. *Journal of Management Studies, 46*(8), 1339-1364

**Chapter 2[2]**

**Embodied Policy Sense Making: Gestures and Policy Enactment in Schools**

**Introduction**

In this paper I argue that the embodied engagements of school actors with the objects that are material manifestations of a policy on educational technology constitute instances of policy sense making. By embodied engagements I mean the interactions between the school actors' bodies and the objects when the actors incorporate the objects into their practices. An example of a bodily interaction is the hand gesture that a teacher makes in order to operate an interactive whiteboard. By policy sense making I mean the embodied process by which people understand a policy. Consequently, I defend the view that policy sense making is a process that includes the body in interaction with objects in contextualized practices. I provide concrete examples of this account of policy sense making by analyzing the adoption of interactive whiteboards in schools in the context of a provincial initiative on educational technology. In my analysis, I show that schoolteachers make sense of the policy by engaging in embodied interactions, through gestures, when operating the interactive whiteboards. I use the notion of policy enactment (Ball, Maguire & Braun, 2012) to refer to the process of recontextualization of a policy by school actors through their actions and practices. I conclude by showing the implications of an embodied account of policy sense making for the study of policy enactment.

The embodied account of policy sense making that I propose allows me to explain a widespread phenomenon in the field of educational policy: A growing body of research in educational policy implementation has shown that a single policy can be put into practice in multiple, diverse, and sometimes contradictory ways (Spillane, 2004; Spillane et al., 2002). How is this possible? I argue that this

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[2] A version of this chapter has been submitted for publication (Riveros, Submitted, a)

multiplicity of practices is related to the ways school actors make sense of policy when they engage in embodied interactions with the objects that are concrete manifestations of the policy. My intention in this paper is to offer an account of what makes policy sense-making possible. I do not offer an account of what makes a particular understanding of a policy correct or incorrect, true or false, accurate or inaccurate. I offer an account of what are the conditions so a policy is made sense of by the school actors in their contexts of practice. Asking what makes an understanding a correct understanding of a policy without asking what are the conditions of policy understanding is like putting the cart before the horse: you need to explain what makes it possible for school actors to make sense of educational policy before answering what makes a particular understanding of a policy true or false.

According to formal models of policy analysis (Hogwood & Gunn, 1984; Pal, 2009) policies are created in response to problems. They are defined and designed by policy makers, and they are to be implemented by the "policy audience" or the practitioners in charge of putting the policy into practice. In formal models, policy meaning is determined at the design level. The role of the policy audience is to correctly decode the policy and put it into practice. If the formal model story is an accurate representation of the policy process, then multiple instantiations of a single policy are not possible because the meaning of a policy is univocally fixed at the higher levels of the governance structure. I contend that formal models lack the conceptual tools to explain the emergence of multiple instantiations of a policy. Indeed, these models pay insufficient attention to the contexts where the policy practices take place, downplaying the role of the actors, their actions, and practices. Formal models of policy analysis underscore the idea that policy is channelled through the organizational structures from one level of governance to another. In this model, a policy is always originated and transferred from the higher levels to the lower levels of the bureaucratic structure.

Formal models assume that the main role of school actors in relation to policy is to accurately decode and implement the policy message. The failure to

decode the message is equivalent to the failure to implement the policy. By "decode" I mean to extract the policy message encoded in policy texts. I highlight the mechanical character of decoding and contrast it with "sense making" which is an agential process that includes the body in interaction with objects in contextualized practices. I argue that school actors are more than mechanistic decoders of policy messages, and instead, actively contribute to configure the policy in practice. The idea of sense making shows that the policy is not finalized at the top of the governance structure but instead shows that the policy is configured in processes that include the embodied engagements of school actors and objects in the material contexts in which the policy is put into practice.

This conclusion has larger implications for models of policy analysis. It means that policy making is a more complex process than what formal models have previously shown. An embodied account of policy sense making shows that the enactment of a policy is a situated and contextualized process. An embodied account of policy sense making also shows that school actors actively contribute to policy development through their actions and practices. This consequence points to a redefinition of policy as a context-sensitive process and not as a predefined message crafted at the top of the structure of governance.

In this paper I am exploring the interconnections between policy sense making and policy enactment. I show that they are intimately related and that an explanation of policy enactment requires an account of sense making. I argue that an embodied account of thought is better suited to explain how school actors understand policy in their contexts of practice and that an embodied account of policy sense making is key to understand the enactment of policy in the school settings. I argue that the alternatives to an embodied account of policy sense making cannot explain the complexity involved in the processes of enacting educational policy. Furthermore, formal models of policy analysis that portray the meaning of a policy as univocally fixed at the higher levels of governance also subsume a problematic conceptualization of the role of schools in a democratic society. In *Democracy and Education* Dewey (1916) argued that schools are

117

social institutions geared towards social change, based on the idea that education is inherently a democratic endeavour. A vision of school actors as mere implementers of predetermined policies with fixed meanings expresses an authoritarian conception of schools that is unacceptable from a perspective that acknowledges the democratic value of education and schooling.

In section one of this paper, I describe the formal models of policy analysis. In section two I argue that formal models of policy analysis face serious problems and that a different way to analyse policy processes is required. In section three I introduce the idea of policy enactment as a response to the flaws of formal models. In section four I introduce the concept of embodiment and argue that bodily gestures are constitutive of sense making. In section five I use the example of the introduction of Interactive Whiteboards (IWBs) in schools to exemplify how school actors make sense of a policy on educational technology by engaging in embodied interactions with the objects that constitute material manifestations of the policy. I conclude that an embodied account of policy sense making can effectively explain how policy is enacted in schools.

Before proceeding, I would like to clarify that in this paper I am not proposing a way to write or design policy. I will not offer a strategy to deal with policy, or to adapt it to particular contexts of practice. I will not offer an account of what is a good policy or an account of how to correctly understand a policy. In this paper I am offering an account of policy sense making. My account aims to enrich models of policy analysis based on the idea of policy enactment, that is, my account aims to provide a more robust account of how policy is articulated in the practices and actions of the school actors.

**The Narrative of Authoritative Instrumentalism**

Traditionally, the policy implementation literature portrayed local adaptations of policies as errors caused by failures at the implementation stage or failures in the policy design (Moran, Rein & Goodin, 2006; Pal, 2009). The answer to the implementation problems consisted in realigning the policy

objectives with the desired outcomes through a redefinition of the problem, a redesign of the policy, or a redesign of the policy implementation process (Pal, 2009). Policy analysts became less attracted to these approaches (Ball, 1994; Simmons, Olsen & Peters, 2009; Yanow, 2000) as these models focused only on the formal aspects of policy design without considering the input of local contexts to the process of policy development (Yanow, 2000). Colebatch, Hoppe and Noordegraaf (2010) called this approach to policy analysis the "narrative of authoritative instrumentalism":

> In the narrative of authoritative instrumentalism, governing happens when 'the government' recognizes problems and decides to do something about them; what it decides to do is called 'policy'. The narrative constitutes an actor called 'the government' and attributes to it instrumental rationality: it acts in order to achieve preferred outcomes. (p. 15)

Other authors have referred to formal models of policy analysis as technocratic (Shore & Wright, 2011; Webb, 2009), because in these models policy development is seen as the product of the influence of specialists located at the higher levels of the bureaucratic structure who work to identify a policy problem using specialized and technical knowledge. Once the policy problem is defined according to a technical framework, the policy specialists devise a solution in the form of a policy initiative. The policy formulation is followed by its implementation and the outcomes of the implementation are evaluated for adjustments, reinitiating the cycle of policy formulation again. In these models, policy development is conceived as a cycle (See figure 1) (Pal, 2009, Shore & Wright, 2011).
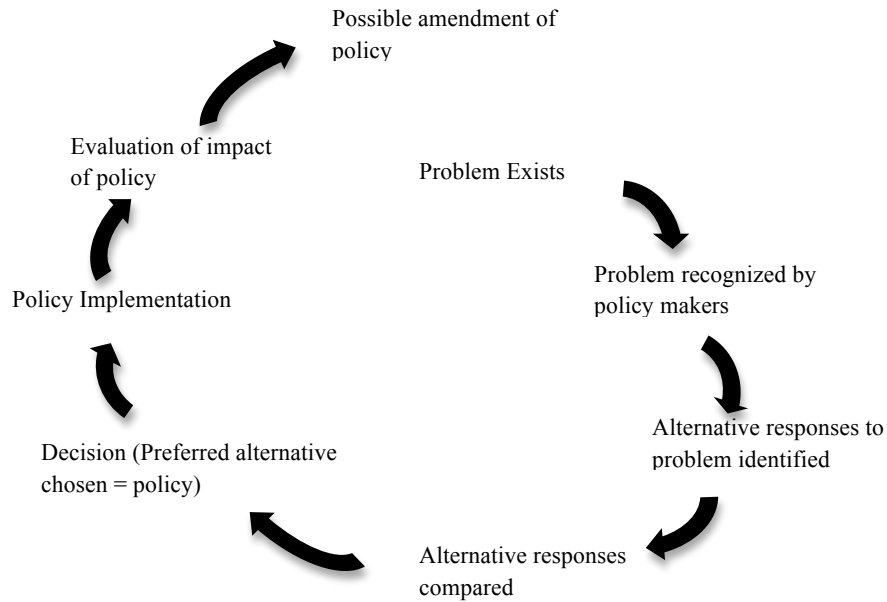
Figure 2-1. The policy cycle, taken from: Shore and Wright (2011, p. 4)

Note that in this model the policy is formulated in one stage of the cycle and arrives at the implementation stage as a finished product. One assumption in this model is precisely that actors at the implementation stage add nothing to the policy. The actor's role is to correctly decode and put into practice the policy message. An evaluation of the implementation would show if the implementation outcomes corresponded with the policy objectives. An evaluation is always necessary because it allows policy makers to reframe the problem and to reformulate the policy according to the reformulation of the problem.

**Problems with authoritative instrumentalism.** Seeing policy development as a formal, mechanistic and goal-oriented process has the consequence of portraying people at the implementation level as subjected to the policy process. The expectation is that people will comply with the directives channelled through the hierarchical structures (Riveros, Newton & Burgess, 2012). In this picture, issues of agency, volition, emotion, power and politics are mostly perceived as "noise" that hinders successful implementation (Simmons, Olsen & Peters, 2009). Indeed, several authors have argued that adopting a

mechanistic model of policy analysis clouds the contested nature of policy development (Apple, 2004; Ball, 1994; Ball, Maguire & Braun, 2012; Yanow, 2000; Webb, 2009). That is, formal models of policy analysis fail to acknowledge the processes of conflict and negotiation that take place in schools when policy initiatives are introduced.

One common theme in the critiques of formal and mechanistic models of policy analysis is that these models often portray actors as passive implementers of predetermined policy messages. Alternatively, portraying schools as arenas of democratic debate and contestation have the consequence of recasting school actors as agents that interpret and contextualize the policy to their own situation. For example, Ball, Maguire and Braun (2012) argued that school actors recontextualize the policy messages into practices, thereby adapting the policies to their concrete realities. In the remaining of this section I briefly review some studies that have shown that school actors can recontextualize policies in their own practices in ways that sometimes contradict the intentions of the policy designers (Coburn, 2001; Hill, 2001, 2006; Spillane, 2004; Spillane et al., 2002). I conclude by arguing that, if we adopt a mechanistic characterization of policy development, we would not able to appreciate the particularly creative ways in which people make sense of policy in schools (Braun, Ball, Maguire & Hoskins, 2011).

Hill (2001, 2006) showed how a policy that aimed at changing the mathematics curriculum in California failed to be put into practice because teachers and students used the traditional concepts about mathematics that the policy was aiming to change when trying to understand the new policy guidelines. Hill noted that there was no evidence of an interest to contest the policy by the school actors: there seemed to exist an agreement with the policy intentions. However, the use of the old concepts to understand the new ideas resulted in a hybrid between the new and the old mathematics curriculum that created more confusion and did not change the students' mathematical knowledge. Spillane (2004) reviewed a similar situation. He studied how policymakers and teachers

made sense of science and math teaching standards in Michigan during the 1990s. He noted that the school actors developed their idiosyncratic understanding of the policy. Teachers and local policy makers understood math and science policy "as familiar ones, without sufficient attention to aspects that diverged from the familiar… [They missed the] deeper, more conceptual core elements . . . the result was modest change in existing local understanding and thereby in the ideas about science education promoted by school-district polices" (p. 89). Spillane concluded that the cause of the insufficient transformation in the educational practices in these schools was the idiosyncratic understanding of the policy made by the school actors. Similarly, Coburn (2001) showed how teachers made sense of policy in their contexts of practice. She noted that teachers' understanding of policy is a contextually situated process that influences the resultant classroom practices. In a similar fashion, Lave and Wenger (1991) have shown that the practitioners' understanding of their professional standards is situated and contextualized within their own communities of practice.

Critics of authoritative instrumentalism in policy analysis (Ball, Maguire & Braun, 2012; Simmons, Olsen & Peters, 2009; Webb, 2011; Webb & Gulson, 2012; Yanow, 2000) argued that these models assume that, under ideal conditions, the policy audience should interpret the policy unambiguously. However, the research in this area has shown that this is not necessarily the case. Spillane (2004), Hill (2001, 2006), Coburn (2001) and many others (Cuban, 1998; Honing, 2004; Raywid & Schmerler, 2003) have concluded that the way school actors understand the policy message in the classroom, school, or district level may be different from the way policy makers understand the policy at the ministry or government level, which explains the different ways a policy may be enacted in the classroom. The previous examples (Coburn, 2001; Hill, 2001, 2006; Spillane, 2004) illustrate the need to study the contexts in which policy is practiced. Models of educational policy analysis that do not attend to the complexities and particularities of local contexts would be insufficient to explain how school actors put policy in practice (Riveros, 2012; Riveros, Newton & Burgess, 2012; Riveros & Viczko, 2012). Indeed, an exploration of how school actors make sense of

122

policy can give policy analysts additional insights to understand the way policy is shaped in the practices of the school actors. The reported cases show that school actors recontextualize the policy messages as they try to make sense of them. According to Spillane (2004) "this happens not because the players are intentionally trying to change the story; it happens because that is the nature of human sense-making" (p. 8). It should be noted that school actors do not exist in a vacuum. They are embedded in particular historical and social contexts. The practices that result from the sense making efforts of school actors cannot be studied without taking into account to the particular situations that circumscribe the actors and their practices.

**Policy Enactment: Analyzing Policy in Practice**

The previous examples show that school actors transform and adapt the policy as they try to make sense of it. As noted by Spillane, sense making is not something that school actors can turn the switch on or off. Sense making is an inevitable feature of policy processes. A more robust explanation of how educational policy is put into practice can be advanced by including an analysis of how school actors make sense of policy in their contexts of practice. Formal models of policy analysis seem to assume that the agents in charge of putting the policy in practice have little to add to the policy itself. In formal models of policy analysis, the policy designers define the policy and the policy message is transmitted through the governance structure until it reaches those in charge of putting the policy in practice. The examples provided in the previous section portray a story of the policy definition that differs from the formal model's story. The examples show that school actors make sense of the policy in ways that transform and adapt the policy to the actors' particular circumstances.

Traditionally, formal models of policy analysis used the term "implementation" to refer to the process of putting a policy initiative into effect (Pal, 2009, p. 21). According to Ball, Maguire and Braun (2012), the term "implementation" suggests a picture of policy development as a top-down process within a hierarchical structure: An authoritative actor defines the policy and

designs how the policy gets to be implemented. School actors are in charge of implementing the policy, which means carrying out the policy mandates. As shown in the previous examples, the practice of policy development does not correspond to this image. Policies are adopted in schools through complex processes of sense making consisting in meaning negotiation, translation and contextualization. According to Ball, Maguire and Braun (2012) "implementation" does not capture the complexities of the practices in which policy is materialized. As a concept that was appropriated and developed in the context of formal policy analysis, "implementation" fails to capture the active and creative efforts of agents who strive to make sense of policy in their particular contexts of practice. According to Ball, Maguire and Braun (2012) the notion of enactment better illustrates how school actors recast policy texts into concrete practices as part of an embodied process of meaning negotiation.

A model of policy analysis based on the idea of "policy enactment" requires new conceptual tools to illustrate how educational policy is put into practice through the sense making efforts of school actors. Educational policy is manifested in schools in multiple forms: CCTV systems, computers, software, chalkboards, uniforms, desks, and books are material manifestations and vehicles of policy. These objects mobilize people around them, constraining and enabling the emergence of certain practices. For example, providing new laptops for every student in a school could generate new classroom dynamics, such as more individual learning time and new forms of teacher-student interactions. However, the learning curve associated with the use of new software could disrupt the curriculum because teachers and students may need time to learn and troubleshoot the software, which may distract teachers and students from achieving the learning goals. Referencing the material contexts is crucial in an explanation of policy enactment (Ball, Maguire & Braun, 2102). The way actors interact with objects and the way objects facilitate or constrain policy-related practices is a central concern of studies in policy enactment. As noted in the analysis of the previous examples (Coburn, 2001; Hill, 2001, 2006; Spillane, 2004) the idea of

policy enactment also includes the ways in which agents try to make sense of policy in their contexts of practice.

So far I have argued that in order to understand how policy is put into practice we require a model of policy analysis that includes an explanation of how people make sense of policy in their contexts of practice. I followed Ball, Maguire and Braun (2012) and proposed the idea of policy enactment as an alternative to the idea of implementation. I claimed that "implementation" suggests a mechanistic model of policy development that does not capture the way actors interact and engage with the policy as they try to make sense of it. In the next section, I offer an account of embodied sense making and argue that bodily gestures are constitutive of thought. An embodied characterization of thought provides grounds for the thesis that some enactments of educational policy take place when school actors try to make sense of educational policy by engaging in embodied interactions with the objects that are material manifestations of the policy.

**Understanding with the Body: The Case of Gesturing**

Not without considerable debate, philosophers and cognitive scientists alike have formulated theories about the processes and elements that constitute our understanding of the world. One prevalent conception of the mind called *individualism* (Wilson, 2001, 2004) maintains that cognition occurs exclusively in the brain or the central nervous system. According to this conception, the body and the sensory organs are just gateways to cognitive processing. Sensory organs receive perceptual stimuli but the stimuli are not given any content or cognitive significance until the brain processes them. Hurley (1988) called this the "sandwich model" (p. 21), because it portrays perception and action as separate systems in charge of input and output respectively. Between these two systems, like ham in a sandwich, cognition plays the role of central processing. In the sandwich model, the commanding and processing functions are not shared with the input/output systems. Cognition is seen as separate, dependent on perception for information, and dependent on action for output. In this layered model, the

relations between perception and reasoning are seen as causal, because, even though they function separately, they can influence each other. For example, in this model the cognitive processing of an image in the visual field requires that low-level perceptual systems receive some environmental input that is further processed at the high-level. The raw perceptual input is not assigned any intentional content until it has been processed by the high-level cognitive systems. Action is seen as a causal product of the cognitive processing. According to Wilson (2004) individualism in psychology is a "putative constraint on the sciences of cognition" (p.10), individualism stipulates what a psychological process is and what a psychological process is not.

There are alternative ways to understand cognition that do not share the assumptions of individualism. These alternative models portray some cognitive processes as involving extra-cranial elements such as body organs, tools and other people. Cognition, in these alternative models, is portrayed as situated (Robins & Aydede, 2008), because cognitive processes could be located in specific material contexts that extend beyond the boundaries of the central nervous system. Shapiro (2011) used the term *embodiment* to refer to the same general idea. He noted three themes in the literature on embodied cognition:

1) Conceptualization: The properties of an organism's body limit or constrain the concepts an organism can acquire. That is the concepts on which an organism relies to understand its surrounding world depend on the kind of body that it has, so that were organisms to differ with respect to their bodies, they would differ as well in how they understand the world.

2) Replacement: An organism's body in interaction with its environment replaces the need for representational processes thought to have been at the core of cognition.

3) Constitution: The body or world plays a constitutive rather than a merely causal role in cognitive processing. (Shapiro, 2011, p. 4)

The idea of embodiment has a notable history in philosophy. Dewey (1896), for instance, indicated that the organism and the world interact through the agent's self-directed activity. In his view agents are not passive spectators of the world, they learn by actively manipulating the environment. Dewey indicated that the doctrine of mind-body dualism is just an abstraction, a convenient way to identify patterns of experiential interaction. Phenomenologists also contributed to the concept. Heidegger (1962) argued that the condition to form disengaged representations of the world is to be already engaged in the world through our bodies. Similarly, Merleau-Ponty (1962) argued that the body is not experienced as a bundle of organs or limbs, but as a unit, and such experience of the body as unit influences the way we understand the world and act in it.

Gallagher (2006) proposed two interrelated concepts, *body image* and *body schema,* to explain how the body and its movement play an important role in cognition. "A body image consists of a system of perceptions, attitudes, and beliefs pertaining to one's own body" (p. 24). It is the representational capacity that the agent has in relation to her own body. In contrast, a body schema is a system of sensory-motor capacities that function without awareness or the necessity of perceptual monitoring. He defined body schema as "motor capacities, abilities, and habits that both enable and constrain movement and the maintenance of posture" (p. 24). A body schema is a "dynamic, operative performance of the body, rather than a consciousness, image, or conceptual model of it" (p. 32). In Gallagher's view the body schema operates to accomplish movement even when the agent is not conscious of the movement. For example, imagine that someone immersed in conversation, inadvertently avoids an obstacle while walking. In this case, the obstacle is not brought to the immediate perceptual awareness. The body schema operates to regulate the body's movements and avoid the obstacle. A more dramatic case can be seen in contact sports, such as martial arts, or fast paced sports such as hockey or football where players manage to accomplish complex bodily movements without being perceptually aware of such movements. The body schema allows a non-representational engagement with the world that nonetheless guides the body in an intentional fashion. Gallagher followed

McNeill's (2005) insights noting that gesture has a symbolic component. It conveys meaning and makes integral part of the linguistic performance. This led McNeill to conclude that "the gesture, *the actual motion of the gesture itself*, is a dimension of thinking" (p. 98, emphasis in the original). Also, borrowing a term from phenomenology, Gallagher (2006) indicated that gestures are *pre-noetic* components of cognition because their operation is not presented to consciousness.

According to Merleau-Ponty (1962) body movements are fundamental components in the meaning of speech. Thought and language are realized via the living body, that is, the body is the primordial means to express thought (Riveros, 2012). To Merleau-Ponty, the spoken word is a form of gesture that conveys thought. Speech is produced in the body and therefore speech is an embodied manifestation of thought. He challenged the Cartesian image of thought as an internal theatre view and argued that there is not such a thing as an inner item that constitutes thought. Merleau-Ponty argued that gestures combine two dimensions of language. On the one hand, there is a conventional dimension of language that has been institutionalized by language users immersed in their cultural exchanges. He used the term *sedimented* to indicate that, through history, language structures have settled to the extent that they become conventional, providing a bedrock for communication. On the other hand, language is *spontaneous*: speakers engage creatively with the sedimented structures of language bringing about new linguistic forms and uses. Merleau-Ponty argued that sedimentation and spontaneity interact in a dialectic relation. Indeed, they seem to be different in principle: one is static and the other is dynamic, and nonetheless, they coexist in everyday linguistic use. Gesture aims to solve this tension by achieving a synthesis between the sedimented and spontaneous dimensions of language. The sedimented linguistic structures are incapable of communicating anything without the spontaneous capacities of speakers and the speakers cannot communicate anything without the sedimented structures that provide a foundation for their speech. Gesture is incarnated expression and comprises the encounter of these two dimensions of language. Cuffari (2011) summarized this point by noting that "a

gesture for Merleau-Ponty is the way that meaning inhabits a body and a body inhabits acquired ways of expressing, which is to say, the way that a particular existing, thinking, and communicating body-subject lives—and creates—a particular meaning" (p. 17).

Speakers usually accompany their speech with gestures. Even congenitally blind speakers move their hands when they talk. Iverson and Goldin-Meadow (1998, 2001) found that gestures are not just meaningless movements: gestures add meaning to the speech and are constitutive of some thought processes. Also, Ravizza (2003) noted that gesturing increases fluency and lexical access in people resolving tip-of-the-tongue states. Goldin-Meadow et al. (2001) designed an experiment to test whether gesturing contributes to reduce working memory when participants explain a problem. In this study participants were asked to solve a mathematical problem: simple addition for children and factoring for adults. Once the participants solved the problem they were shown a list of unrelated letters (for the children) or words (for the adults). The researcher asked the participants to memorize the letters or words and then they were asked to explain the solution to the mathematical problem. The participants were separated in three groups. Group one was allowed to gesture freely while explaining the solution to the problem. Group two was asked to perform a meaningless gesture while explaining the solution to the problem. Group three was asked not to make any movement when explaining the solution to the problem. After the participants finished their explanations they were asked to remember the letters or words.

Goldin-Meadow et al. (2001) observed that the group that was allowed to gesture freely had a higher retrieval rate than the other two groups. They explained this difference by arguing that gesturing is not only a communicative aid, but an active cognitive mechanism integrated into speech and thought that lightens the cognitive burden by enriching the way information is encoded. They hypothesized that this mechanism facilitates cognitive processing reducing retrieval effort and making it possible for the participants in the group one to have a higher retrieval rate. These authors argued that gesturing facilitates the

organization of information and therefore contribute to conceptualization. This experiment was reproduced by Wagner, Kuangyi and Goldin-Meadow (2012) with similar results. Goldin-Meadow et al. (2001) and Wagner, Kuangyi and Golden-Meadow (2012) concluded that gestures contribute to cognition as the physical movements become necessary to accomplish the cognitive task.

The previous examples add to the idea that gesture is not a random movement without purpose: gesture is a meaningful action that is constitutive of thinking (Clark, 2008; De Jaegher & DiPaolo, 2007; Gallagher, 2006; Johnson, 2007; Merleau Ponty, 1962; Noland, 2009; Streeck, 1994, 2009; Zahavi, 2005). Furthermore, gesture plays a significant role in the way people make sense of their own situations. The case of gesture provides a salient example of the embodiment of sense making that will be useful to illustrate the way school actors make sense of policy when they engage in embodied interactions with policy objects in their contexts of practice. In particular, the case of gesture will let us understand how school actors make sense of a specific policy on instructional technology when they engage in creative interaction with IWBs.

A dramatic example of how gesture and visualizations contribute to actors' sense making was presented by Alač and Hutchins (2004). They were interested in finding out how scientists construct meaning of complex *functional magnetic resonance images* (FMRI). The researchers video-recorded experts explaining to novices how to interpret an FMRI displayed on a computer screen. They found that experts generally draw a diagram on a sheet of paper to guide their explanation of the image on the screen. The diagram consisted of a chart indicating the different areas of the brain involved in the specific case presented in the image. After the chart was created, the expert and the novice tried to map the image on the computer screen onto the diagram on the paper.

Alač and Hutchins' analysis of the video recordings found that the experts' gestures were central to the meaning construction process. For instance, in one of the recordings the expert placed herself physically closer to the screen so "the expert's body movement functions as an initial indexing element in the upcoming

130

construction of the visibility of the image" (Alač & Hutchins, 2004, p. 639). The expert's body movements served to direct the novice's attention towards the image on the screen. According to Alač and Hutchins "the gesture participates in the organization of the speech: it highlights elements of the expert speech stream" (p. 640). Simultaneously, the gesture is involved in meaning construction: the expert's gestures add meaning to the explanation. For instance, in the video recording the expert can be seen making a squeezing gesture with both hands when explaining how the structures on the screen were represented by the chart on the paper. The squeezing gesture aimed to map the FMRI on the screen to the diagram on the paper: "The imaginary process of squeezing, evoked to accomplish the conceptual mapping between the two domains, is instantiated as a concrete, embodied process that unfolds in the environment of practice" (p. 643).

Alač and Hutchins argued that the purpose of the diagram was to turn the abstract ideas about the brain functioning into a concrete tangible representation. The expert was using the diagram to explain how the brain represents the visual field and at some point during the explanation she placed her hands in front of the diagram and made the squeezing gesture again, this time to signify the way the visual cortex of the brain experiences the visual field. The charts added flexibility to the explanation, as the expert was able to write on the paper, modify the diagram and add more visual information as required. The chart also provided an alternative medium of representation that provided a template that mapped onto the image on the screen and helped in the conceptualization process.

The gestures made by the expert in front of the chart invited the novice to imagine a living brain superimposed on the chart so the novice would be able to appreciate how the different cortical areas structure the visual experience when the brain is presented with visual stimulus. The hand gesture evoked the three-dimensional visual field that is squeezed by the cortical areas of the imaginary 3D brain in front of them. In a later interview the expert also suggested that the chart and the gestures that accompanied the chart helped her to "understand the task" (Alač & Hutchins, 2004, p. 645), that is, the gestures and the chart allowed her to

make sense of the brain representation on the screen so the data displayed on the screen could be explained to the novice. The explanation is not just a memory-retrieval process: it was a process of sense making.

> The fact that the construction of the chart was not just a simple translation of some internal structure (i.e., the knowledge previously acquired by the expert) into an external one, but a loop-like process, where the construction is gradually modified with respect to the feedback given from the chart's structure, is crucial. (Alač & Hutchins, 2004, p. 645)

The chart became crucial to the meaning-construction process because it allowed the expert to add a visual representation to the repertoire of tools required to accomplish the task: "This adding of an intermediate structure [chart] between showing and seeing, and by re-representation of information in a particular format made the task cognitively easier to manage" (Alač & Hutchins, 2004, p. 645). Indeed, gesturing and the use of graphic devices, like the chart, contributed to the sense making process. For instance, Alač and Hutchins reported that on many occasions the expert used her fingers to delineate areas on the screen in an attempt to match the areas represented on the chart. The gesturing in this case is not merely an indexical strategy. It is a more complex cognitive mechanism that facilitated the expert's understanding of the brain representation on the screen.

Alač and Hutchin's study is relevant to the present discussion on policy understanding and IWB use because it illustrates how actors make use of tools and materials available in order to make sense of the task. The expert, who acted like a teacher in this study, used gestures as a part of an embodied strategy to construct the meaning of a specific concept and to structure the explanation. The expert used a graphic device, namely the chart, to make sense of the information presented on the screen. The chart was a very powerful resource that contributed to the conceptualization process. Alač and Hutchins noted that the chart used by the expert was the latest iteration in a process of collective development. Experts in the laboratory have been using versions of this chart in order to explain to novices the brain's functioning and processes. The chart gets updated through trial

and error and it has certainly contributed to configure the teaching practices in the laboratory. Every use of the chart constitutes a new opportunity to update the chart's contents and adapt it to the teaching needs of the lab users. Alač and Hutchins quoted the expert: "The first version was really messy with many erasures as I was just figuring it all out. So I recopied it in a more orderly fashion " (p. 645) and drew some conclusions. "Accordingly, the chart inscribes into its structure the history of the collective laboratory endeavor, as well as the temporality of the expert's actual manufacturing of the artifact" (p. 645). Similarly to the creation of a chart and gesturing in front of a computer screen to explain a concept to a novice, school actors need to make specific gestures on the IWB screen in order to interact with it: swiping, tapping or delineating with the finger are gestures that allow school actors to interact with the IWB (Armstrong et al., 2007; Davidson & Pratt, 2003; Deaney, Chapman & Hennessy, 2009; Guillen et al., 2007; Kennewell & Buchamp, 2007; Moss et al., 2007) and subsequently enact the policy that circumscribes the presence of IWBs in the classroom.

In the following section I use the example of the introduction of IWBs in schools to exemplify how school actors make sense of a policy on educational technology by engaging in embodied interactions with the objects that constitute material manifestations of the policy. Specifically, I focus on the adoption of IWBs as a case in point to show that a model of policy sense making based on the ideas of embodiment can inform our understanding of policy enactment.

**Embodied Policy Sense Making and Policy Enactment**

At any given time a school could be enacting hundreds of different policies (Ball, Maguire & Braun, 2012). Discipline, grading, assessment, instruction, curriculum, safety, budget, administrative roles, are all dimensions of school life where policies materialize in the form of practices and actions. Similarly, policies are manifested in the material layout of schools: Laptops, iPads, classrooms, tables, desks, chalkboards, whiteboards and interactive whiteboards are material manifestations of policies in particular contexts of practice. As material manifestations of policies, the devices contribute to the

133

constitution of policy contexts that bound people's actions in particular ways. When school actors incorporate these devices into their practices, they are incorporating the material manifestations of the policy into their practices. Furthermore, when school actors interact with the devices that constitute material manifestations of the policy, they circumscribe their actions to the policy context that the devices contributed to create. A teacher operating an IWB is not just gesturing in front of a touch screen. She is enacting a policy through her actions and her actions are contextualized by the policy.

As an object that constitutes a concrete manifestation of a policy on instructional technology, the IWB enrols actors in practices that are circumscribed by the policy. The practices that emerge as actors interact with the IWB can be analysed as part of the context in which the policy is enacted. A clear example that policies create contexts that circumscribe practices can be seen in the case of the IWBs introduction. The IWB has been conceptualized as "instructional" thereby framing the practices around them as such. The teacher interacting with the IWB while teaching in class is enacting the policy on instructional technology: her practices are constituted with the help of the policy object. The teacher's practices, from a policy analysis perspective, are "instructional" not only because of the pedagogical component, but also because the policy allows conceptualizing the practice as "instructional". IWBs have been positioned as instrumental to accomplish the goals of educational reform (Cuban, 2003; Glover & Miller, 2001). In the case of instructional technology, the policies that frame the introduction of technological devices in the classroom are also conceptualized as means to offer teachers instructional alternatives and as ways to accommodate the classroom to the perceived needs of the students.

As noted before, when a school actor engages in a creative interplay with an IWB she is, through action, engaging with a material manifestation of the policy. I have argued that episodes of embodied interaction, such as gestures, constitute episodes of sense making. The embodied interaction, from a policy analysis perspective, is not just the interaction between a school actor and an

134

instructional device. From a policy analysis perspective school actors interact with material manifestations of the policy and they make sense of the policy by engaging in embodied interactions with the material manifestations of the policy. The policy becomes enacted in the school as actors participate in embodied performances that constitute episodes of sense making. Similarly, I have noted elsewhere (Riveros, 2012; Riveros, Newton & Burgess, 2012; Riveros & Viczko, 2012) that classroom practices constitute opportunities for school actors to develop a more sophisticated understanding of their own professional identity, as well as opportunities to develop deeper understandings of the normative constraints that bound their professional practice.

How do school actors interact with IWBs? An image is projected into a touchscreen and the user is invited to make certain gestures in order to interact with the content projected onto the screen. Some gestures include: Swiping to delete, highlight or underline; tapping on the screen to select an object, close a window or activate a function; tracing with the finger to delineate, draw, colour, or write; flick to move an object; apply left and right index fingers to the screen at the same time to zoom in, zoom out, and rotate an object.



Figure 2-2. Rotating Gesture. Screen capture from: Smart Classrooms (2012). Note the two-hands zoom in and rotating gesture.

135

School districts across Alberta, Canada, have encouraged schools to adopt educational technology and to integrate it to the curriculum. The character of this adoption and integration could be diverse and multifaceted (Alberta Education, 2010; ATA, 2011) and there is still lack of research in relation to the way school actors interact with IWBs in Albertan classrooms. Some studies have reported that IWB adaptations are diverse and complex. In a study that investigated the communicative and pedagogic uses of IWB in the classroom, Guillen et al. (2007) found that IWBs were "used to build shared frames of reference and 'common knowledge' between teachers and pupils" (p. 245).These authors found that the interactions around the IWB contributed to the emergence and consolidation of practices, pedagogical strategies and patterns of interaction in the classroom. Davidson and Pratt (2003) investigated how the visual and kinaesthetic affordances of IWBs supported specific classroom practices. They found that IWBs created the conditions for new forms of interaction in the classroom as these devices invited users to interact with the content creating the conditions for social interaction around the device. Deaney, Chapman and Hennessy (2009) found in their study of teachers using IWBs that these devices "were employed as visible, manipulable objects of joint reference" (p. 373). Armstrong et al. (2007) suggested that when teachers bring their own pedagogical expertise to engage in long-term sustained experiences with IWBs, they would be more likely to integrate this tool into their teaching practices. However, they also noted that "when faced with a new technology a teacher is likely to make sense of it in terms of previous experiences with older technologies. This suggests for example, that many teachers are likely to use digital whiteboards as an extension of the non-digital whiteboard" (p. 458). Kennewell and Beauchamp (2007) suggested that policy makers should see the potential of IWBs in terms of the integration between these devices and the teachers' pedagogical practices:

> The current level of integration of IWBs into teachers' pedagogical knowledge is an achievement which should not be underestimated, but if IWBs are to meet the expectations of policymakers and achieve the claims of practitioners, there may need to be a new wave of professional

development in ICT which takes account of the extended list of ICT's features and the need to embed them in teachers' pedagogical knowledge and reasoning. (p. 240)

An embodied account of policy sense making would help policy analysts to analyse how practitioners integrate IWBs into their practices and more importantly, how practitioners make sense of the policies on educational technology when they engage in embodied interactions with the IWB. The studies on gesturing conducted by McNeill (2005), Alač and Hutchins (2004), and Goldin-Meadow et al. (2001) showed that engaging in embodied interactions with the world was central to sense making. The case of gesturing illustrated how meaningful body movements, and the integration of an object into practices, constituted instances of sense making.

In the case of the IWB, students and teachers interact with the device by gesturing in front of it. As noted in this section, Guillen et al. (2007), Davidson and Pratt (2003), Deaney, Chapman and Hennessy (2009) and Kennewell and Beauchamp (2007) offered evidence that the interaction between school actors and the IWB instantiate new practices that articulate new ways for school actors to make sense of their own situation. Once we start analyzing classroom practices form an embodied perspective, classroom practices can be seen as instances of sense making that take place as the body interacts with the IWB.

How does policy enter the picture? I contend that policy is already in the picture. As noted above in this section, we can hardly find an aspect of the school life that is not subsumed by a policy. Take a look at the picture below:

Figure 2-3 Classroom. http://commons.wikimedia.org/wiki/File:Children_in_a_classroom.jpg#file.
Image released into the public domain by the U.S. National Institute of Health

Can you guess how many policies were being enacted in that particular moment when the picture was taken? According to Ball, Maguire and Braun (2012) a school can enact hundreds of policies simultaneously. From a pedagogical perspective this picture shows a group of students and a teacher in a lesson, but from a policy analysis perspective, this picture can show that many policies are taking place. Students are sorted by similar age, at the same time, in the same room, they are taught by one teacher, they are sitting in desks, organized in rows, reading from a book on a particular subject, at a particular time of the year, at a particular time of the day. The list could go on, but this brief inventory reveals the many practices that are instantiated as policies are enacted in the school.

The IWB, from a policy analysis perspective, is not just an instructional resource used by teachers and students. The IWB enters the classroom as a material manifestation of the policy on instructional technology. It is a concrete object that plays a key role in transforming the abstract idealizations of the policy texts into practices. The IWB enrols actors into practices by creating a context

that makes it possible for actors to make sense of the policy. Ball, Maguire and Braun (2012) argued that objects are central in the process of policy enactment:

> The artefacts and materials that are in circulation in schools can become part of the tools and techniques of governmentality in the policy work of the school, [policies are] discourses that produce material effects and are interwoven into the processes of policy enactment and, ultimately, governmentality. Indeed, to a great extent, policies are not possible without artefacts. (p. 136)

 "Governmentality" is a term coined by Foucault (2008) to refer to the many ways in which power operates, such as technologies, practices and discourses that organize society and individuals. Ball, Maguire and Braun (2012) studied how artefacts contribute to policy enactment. They reported how a group of schools in England used a series of posters to communicate to students and teachers the policy on uniforms. The posters displayed the correct and incorrect ways to wear the school uniform. According to Ball, Maguire and Braun "the policing of the uniform policy, in part through the creation and reproduction of posters demonstrating the correct uniform and how to wear it, functions as an overt form of policy enactment" (p. 129). The posters could be seen as decoration or merely wall covers, but in these schools the posters were used by teaches and students as shared objects of reference. They were central in the emergence of practices of supervision and inspection developed by the teachers as they could be used to produce the "'good' student who is dressed correctly (and the 'good' teacher who inspects, checks and enacts uniform policy on a daily basis)" (p. 129). The posters were material manifestations of the policy that enrolled teachers and students in practices that enacted the policy. Similarly, The IWB is a policy artefact that enters the classroom as a material manifestation of the policy.

The IWB materializes in a concrete object the abstract idealizations in the policy documents and discourses. By introducing the IWB in the classroom, the school actors enact the policy in their contexts of practice. The studies on gesturing show that people make sense of their own situation by engaging in

139

embodied interactions with objects. I have argued that for the purposes of policy analysis the IWB is a manifestation of the policy. When school actors engage in embodied interactions with The IWB, such as gestures, they are engaging with a concrete manifestation of the policy that enrols them into practices that enact the policy on instructional technology. When they enact the policy through their practices, school actors make sense of the policy. Gesturing to interact with the IWB constitutes episodes of policy sense making, because these interactions are part of practices that contextualize the policy up to the point that instructional technology in the form of IWBs becomes part of the daily life of the school. They become components of the educational practices. Just like other previous instructional innovations such as the individual desk, the chalkboard or the whiteboard.

A reader may ask how the notion of embodied policy sense making could be applied to other policy contexts, such as curriculum or assessment. Indeed, the example that I have chosen to exemplify the application of the notion seems to be inherently embodied. After all, the operation of the IWB requires the actors' engagement with the policy artefact through gestures. How would the notion play out in other cases? My contention is that the enactment of a policy is an embodied process, because policy sense making is necessary for policy enactment and in order to make sense of the policy school actors require an embodied engagement with the material manifestations of the policy. Ball Maguire and Braun (2012) argued that policies are enacted in "the interaction and the interconnection between diverse actors, texts, talk, technology and objects" (p. 4). For example, in the case of curriculum, an analysis based on the notion of embodied policy sense making would examine the embodied relations that school actors establish with the material manifestations of the curriculum, such as textbooks, worksheets and other artefacts. The analysis would highlight the practices that emerge as school actors integrate the material manifestations of the policy into their practices. In the case of assessment, an embodied account of policy sense making would focus on the way the policy is manifested in concrete evaluation practices. A particular policy on assessment may promote certain teaching practices and proscribe others.

140

Also, the evaluation practices that appear as the policy makes its way into the classroom may include artefacts such as scantron sheets or testing software. These artefacts enrol the school actors in the practices that enact the policy in particular ways. An embodied account of policy sense making offers a relational perspective that integrates the social and material elements into a characterization of policy enactment.

**Conclusion**

What do these ideas offer to a characterization of policy sense making? Policy analysts strive to understand the processes that make possible the practice of educational policy, that is, the conditions under which a given policy is materialized into practices and actions in school settings. Educational policy is manifested in the classroom in a myriad of ways: Classroom management models, assessment methods, standards, curriculum, and, more recently, instructional technologies, which are salient manifestations of educational reforms (Cuban, 2003). One prevalent example of instructional technology is the interactive whiteboard. These devices made their way into the classrooms, as policy makers, administrators, researchers and educators anticipated their potential benefit for the attainment of the goals of educational reform (Moss et al., 2007). The introduction of interactive whiteboards offers a dramatic case that illustrates how school actors make sense of policy in their contexts of practice. The enactment of a particular policy on instructional technology involves the embodied engagement of school actors with the objects that constitute material manifestations of the policy in practice. These embodied engagements are processes of recontextualization of the policy through practices. In order to elucidate the school actors' processes of embodied engagement with the policy, I focused on gestures as paradigmatic forms of creative and embodied engagement. Gestures are necessary to operate the IWB, in fact, they are the preeminent medium to interact with the artefact. I used Alač and Hutchins (2004), Goldin-Meadow et al. (2001), and McNeill's (2005) study to show that the embodied interaction with visual artefacts constitute episodes of sense making that facilitate further opportunities for thought and

action. Finally, I argued that some objects constitute material manifestations of the policy and, from a policy analysis perspective, the interaction between school actors and policy objects constitute instances of policy enactment.

I have defended the idea that the enactment of a policy is a process of recontextualization of the policy into practices, and the case of IWBs offered a relevant scenario to illustrate this thesis. IWB users are required to make some gestures on the screen in order to interact with the device. The gestures in the examples are not only constitutive elements of the users' sense making processes, but also instances of the policy in action, because devices such as IWBs are concrete manifestations of the policy, and as such, they contribute to the configuration of practices in the classroom. The school context is highly normative and the instructional performances of school actors in interaction with the device can be conceptualized as policy-oriented actions. This explains why an analysis of policy sense making cannot be detached from the policy context in which the policy is enacted. From a policy analysis perspective, when school actors interact with the IWB they are not just operating an instructional device, they are enacting a policy through their practices. School actors operating an IWB are not just making sense of the device; they are making sense of the policy of which the IWB is a concrete manifestation.

Foucault (1979, 1981) noted that the body has been disciplined into cultural practices that are sometimes met with resistance. In his view, the *docile body* has been conditioned to modes of cultural influence. These ideas can be easily transferred to the field of policy analysis: policies, as cultural artefacts, tend to normalize behaviours into conventional practices. The transformation of policies in schools could be interpreted as an attempt to break from normative imposition through resistance. It should be noted that Foucault's ideas do not imply a strict dichotomy between docile and resistant. School practices derived from creative acts of recontextualization of policies are not necessarily antithetical to the policy message (Riveros & Viczko, 2012). They can be variations on a theme and could be situated in a continuum instead of an oppositional scheme.

Noland (2009) argued that "kinaesthetic experience, produced by acts of embodied gesturing, places pressure on the conditioning a body receives, encouraging variations in performance that account for larger innovations in cultural practice that cannot otherwise be explained" (p. 2). The diverse iterations of the policy in schools respond to practices that reflect the particular context of the school and the situation of the actors in it.

I have reviewed studies that show that policies do not often look the same in practice (Coburn, 2001; Cuban, 1998; Hill, 2001, 2006; Honing, 2004; Spillane, 2004). Policies are general in scope, they are not written with a particular individual or institution in mind, they are meant to apply to a group of individuals or to a broad number of institutions. In this regard, policy texts are general and sometimes vague and abstract. They are written for the ideal individual or the paradigmatic institution. The abstract image of the school in the policy collides with the concrete realities of the classroom. The school actors' efforts to make sense of the policy in their own contexts produce mixed and sometimes contradictory results. I contend that an embodied account of policy sense making offers useful conceptual tools to understand the multiple enactments of policy that emerge as school actors engage in interactions with policy artefacts and practices in the school settings. In particular, practitioners could benefit from adopting this perspective to analyse policy in their contexts of practice because it would allow them to see how they are positioned to transform and readapt policy as they try to make sense of it. An embodied account of policy sense making recasts teachers and administrators at the school level as policy actors who are in a position to recontextualize policies in their particular contexts of practice. A teacher or administrator could reasonably ask: why does the enactment of a particular policy look so different across the schools in my district? An embodied account of policy sense making offers the conceptual tools to answer this question by pointing to the ways policy is materialized in schools, the idiosyncratic ways school actors engage with the policy, and the concrete practices that emerge as school actors try to make sense of the policies through their embodied practices. This means that an embodied account of policy sense making could offer

important insights to characterize policy enactments in general. As I pointed out before in this chapter this perspective allows researchers and practitioners to understand policy processes as comprising social and material relations that span over multiple contexts of practice. Policies are materialized in schools in diverse ways and it is worth saying that the analysis is not necessarily circumscribed to IWBs. Indeed, uniforms, computers, desks, classrooms, lecture halls, gyms, scoreboards, textbooks, and schedules are concrete manifestations of policies. An analysis of how school actors enter into embodied interactions with these concrete manifestations of the policy offers new and complex understandings of how policy is enacted in schools.

An embodied account of policy sense making offers an answer to a question I posed at the outset of this paper: how is it possible that a policy gets enacted in multiple ways? I offered an answer that avoids the reductionist analysis of formal models of policy implementation and instead, provides us with an analysis that highlights the embodied character of human sense making. Formal models of policy analysis are unable to explain and describe the processes that take place when a policy is put into practice. In this paper, I offered a different look at the way policies are adopted and contextualized by school actors. I aimed to show that exploring the way school actors make sense of the policy in their contexts of practice offers new avenues to inform our understanding of educational policy analysis.

**References**

Alač, M., & Hutchins, E. (2004). I see what you are saying: Action as cognition in fMRI brain mapping practice. *Journal of Cognition and Culture, 4,* 629-661.

Alberta Commission on Learning. (2003). *Every child learns, every child succeeds.* Edmonton: Alberta Commission on Learning.

Alberta Education. (2010). *Technology and high school success: Year one report.* Edmonton: Alberta Education.

Alberta Learning. (2003) *Information and communication technology (K-12) curriculum.* Edmonton: Alberta Learning

Alberta Learning. (2004). *Learning and technology policy framework*. Edmonton: Alberta Learning

Alberta Teachers' Association. (2011). *The impact of digital technologies on teachers working in flexible learning environments*. Edmonton: Alberta Teachers' Association.

Apple, M. W. (2004). *Ideology and curriculum*. Routledge.

Armstrong, V., Barnes, S., Sutherland, R., Curran, S., Mills, S., & Thompson, I. (2007). Collaborative research methodology for investigating teaching and learning: The use of interactive whiteboard technology. *Educational Administration Abstracts, 42,* 1.

Ball, S. J. (1993). *The micro-politics of the school: Towards a theory of school organization*. London: Routledge.

Ball, S. J. (1994). *Education reform: A critical and post-structural approach*. Buckingham: Open University Press.

Ball, S. J., Maguire, M., & Braun, A. (2012). *How schools do policy: Policy enactments in secondary schools*. London: Routledge.

Braun, A., Ball, S., Maguire, M., & Hoskins, K. (2011). Policy enactments in schools introduction: Towards a toolbox for theory and research. *Discourse: Studies in the Cultural Politics of Education, 32*(4), 581-583. doi: 10.1080/01596306.2011.601554

Clark, A. (2008). *Supersizing the mind: Embodiment, action, and cognitive extension*. Oxford: Oxford University Press.

Coburn, C. E. (2001). Collective Sensemaking about Reading: How Teachers Mediate Reading Policy in Their Professional Communities. *Educational Evaluation and Policy Analysis*. 23 (2), 145-170.

Colebatch, H. K., Hoppe, R., & Noordegraaf, M. (2011). *Working for policy*. Amsterdam: Amsterdam Univ. Press.

Cuban, L. (1998). How Schools Change Reforms: Redefining Reform Success and Failure. *Teachers College Record*. 99 (3), 453-477.

Cuban, L. (2003). *Oversold and underused: Computers in the classroom*. Cambridge, Mass: Harvard University Press.

Cuffari, E. (2012). Gestural sense-making: Hand gestures as intersubjective linguistic enactments. *Phenomenology and the Cognitive Sciences, 11,* 4, 599-622

Davison, I., & Pratt, D. (2003). An investigation into the visual and kinaesthetic affordances of interactive whiteboards. In Becta (Ed.), *Research Bursary Reports*. Coventry: Becta.

Deaney, R., Chapman, A., & Hennessy, S. (2009). A case study of one teacher's use of interactive whiteboard system to support knowledge co-construction in the history classroom. *The Curriculum Journal, 20,* 4, 365 - 387.

De Jaegher, H., & Di Paolo, E. (2007). Participatory sense-making: An enactive approach to social cognition. *Phenomenology and the Cognitive Sciences, 6,* 485–507.

Dewey, J. (1896) The Reflex Arc Concept in Psychology, *Psychological Review, 3,* 357-370.

Foucault, M. (2008). *The birth of biopolitics: Lectures at the Collège de France, 1978-79*. New York: Palgrave Macmillan

Foucault, M. (1979). *Discipline and Punish: The Birth of the Prison*, Harmondsworth: Penguin.

Foucault, M. (1981). *The History of Sexuality: An Introduction*, London: Penguin.

Gallagher, S. (2006). *How the body shapes the mind*. Oxford: Clarendon Press.

Gillen, J., Staarman, J. K., Littleton, K., Mercer, N., & Twiner, A. (2007). A 'learning revolution'? Investigating pedagogic practice around interactive whiteboards in british primary classrooms. *Learning, Media and Technology, 32,* 3, 243-256.

Glover, D., & Miller, D. (2001). Running with technology: the pedagogic impact of the large-scale introduction of interactive whiteboards in one secondary school. *Technology, Pedagogy and Education, 10,* 3, 257-278

Goldin-Meadow, S., Nusbaum, H., Kelly, S. D., & Wagner, S. (2001). Explaining math: Gesturing lightens the load. *Psychological Science, 12*(6), 516-522.

Heidegger, M. (1962). *Being and time*. New York: Harper.

Hill, H. (2001). Policy Is Not Enough: Language and the Interpretation of State Standards. *American Educational Research Journal.* 38 (2), 289-318.

Hill, H. (2006). Language matters: How characteristics of language complicate policy implementation. In M. Honig (Ed.), *New directions in education policy implementation: Confronting complexity* (pp. 65-82). Albany, NY: SUNY Press.

Honing, M. (2004). Where's the "Up" in bottom-up reform? *Educational Policy. 18,* 527-561

Hurley, S. L. (1998). *Consciousness in action.* Cambridge: Harvard University Press.

Iverson, J., & Goldin-Meadow, S. (1998). Why people gesture when they speak. *Nature* 396: 228.

Iverson, J. M., & Goldin-Meadow, S. (2001). The resilience of gesture in talk: Gesture in blind speakers and listeners. *Developmental Science, 4*(4), 416-422.

Johnson, M. (2007). *The meaning of the body: Aesthetics of human understanding*. Chicago: University of Chicago Press

Kennewell, S., & Beauchamp, G. (2007). The Features of interactive whiteboards and their influence on learning. *Learning, Media and Technology,32,* 3, 227-241

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge: Cambridge University Press.

McNeill, D. (2005). *Gesture and thought*. Chicago, Ill: University of Chicago Press.

Merleau-Ponty, M. (1962). *Phenomenology of perception*. London: Routledge & Kegan Paul.

Moss, G., Jewitt, C., Levacic, R., Armstrong, V., Cardini, A., & Castle, F. (2007). The interactive whiteboards, pedagogy and pupil performance evaluation (Research report 816). London: DfES.

Noland, C. (2009). *Agency and embodiment: Performing gestures/producing culture*. Cambridge, Mass: Harvard University Press.

Moran, M., Rein, M., & Goodin, R. E. (2006). *The Oxford handbook of public policy*. Oxford: Oxford University Press.

Ravizza, S. (2003). Movement and lexical access: Do noniconic gestures aid in retrieval? Psychonomic Bulletin & Review, 10(3), 610-615.

Raywid, M. A., & Schmerler, G. (2003). *Not so easy going: The policy environments of small urban schools and schools-within-schools*. Charleston, WV: ERIC Clearinghouse on Rural Education and Small Schools.

Robbins, P. & Aydede, M. (2009). A short premier on situated cognition. In P. Robbins, & M. Aydede, (Eds.). *The Cambridge handbook of situated cognition*. New York: Cambridge University Press.

Simons, M., Olssen, M., & Peters, M.A. (2009). Re-reading education policies: Part 1: The critical policy orientation. In M. Simons, M. Olssen & M.A. Peters (Eds.), *Re-reading education policies: A handbook studying the policy agenda of the 21st century* (pp. 1-35). Rotterdam: Sense Publishers.

Shapiro, L. A. (2011). *Embodied cognition*. New York: Routledge

Raywid, M. A., & Schmerler, G. (2003). *Not so easy going: The policy environments of small urban schools and schools-within-schools.* Charleston, WV: ERIC Clearinghouse on Rural Education and Small Schools.

Riveros, A. (2012). Beyond Collaboration: Embodied Teacher Learning and the Discourse of Collaboration in Education Reform. *Studies in Philosophy and Education, 31,* 6, 603-612

Riveros, A., Newton, P., & Burgess, D. (2012). A situated account of teacher agency and learning: Critical reflections on Professional Learning Communities. *Canadian Journal of Education/Revue canadienne de l'éducation*, *35*(1), 202-216.

Riveros, A., & Viczko, M. (2012). Professional Knowledge "From the Field": Enacting professional learning in the contexts of practice. *McGill Journal of Education*, *47*(1).

Shore, C., & Wright, S. (2011). Conceptualising Policy: Technologies of governance and the politics of visibility. In C. Shore, S. Wright & D. Pero (Eds.), *Policy worlds: Anthropology and the analysis of contemporary power* (pp. 1 - 26). New York: Berghahn.

Smart Classrooms, (2012, June 11). SMART Board 800 series interactive whiteboard –Touch gestures video [Video file]. Retrieved from http://www.youtube.com/watch?v=rAWb_NpcMB4

Spillane, J. P. (2004). *Standards deviation: How schools misunderstand education policy.* Cambridge, Mass: Harvard University Press.

Spillane, J. P., Diamond, J. B., Burch, P., Hallett, T., Jita, L., & Zoltners, J. (2002). Managing in the Middle: School Leaders and the Enactment of Accountability Policy. *Educational Policy, 16,* 5, 731-763.

Streeck, J. (1994). Gesture as communication II: The audience as co-author. Research on Language and Social Interaction, 27(3), 239–267.

Streeck, J. (2009). *Gesturecraft*. Amsterdam: John Benjamins Publishing Co.

Taylor, S., Rizvi, F., Lingard, B., & Henry, M. (2013). *Educational policy and the politics of change*. New York: Routledge.

Wagner, S., Kuangyi, T., & Goldin-Meadow, S. (2012). Gestures, but not meaningless movements, lighten working memory load when explaining math. *Language and Cognitive Processes, 27,* 4, 594-610.

Webb, P. T. & Gulson, K. (2012). Policy prolepsis in education: Encounters, becomings, and phantasms. *Discourse: Studies in the Cultural Politics of Education, 33*(1), 87-99.

Webb, P.T. (2009). Teacher assemblage. Rotterdam: Sense Publishers.

Webb, P. T. (2011). The evolution of accountability. *Journal of Educational Policy, 26*(6).

Wilson, R. (2001). Individualism. In R. Wilson & F. Kell, (Eds.), *The MIT encyclopedia of the cognitive sciences*. Cambridge: MIT Press.

Wilson, R. (2004). *Boundaries of the mind*. Cambridge: Cambridge University Press.

Whitty, G. (2002). *Making sense of education policy: Studies in the sociology and politics of education*. London: Paul Chapman Pub

Yanow, D. (2000). *Conducting interpretive policy analysis*. Qualitative research methods, v. 47. Thousand Oaks: Sage Publications.

Zahavi, D. (2005). Subjectivity and Selfhood: Investigating the First Person Perspective. Cambridge: MIT.

**Chapter 3[3]**

**Reencountering the Policy Sense Maker: Interactive Whiteboards and Policy Enactment in Schools**

**Introduction**

In Riveros (submitted a) I argued that the notion of embodied policy sense making provides a characterization of the way educational policy is put in practice. By "embodied policy sense making" I mean the processes by which people understand a policy through their embodied interactions with objects that constitute material manifestations of the policy. The notion of embodiment is a theoretical position in philosophy that portrays the body and its interactions with the world as central to explanations of thought, action, agency, and subjectivity. In that paper I offered a concrete example of the use of the notion of embodied policy sense making by analysing how school actors make sense of a policy on instructional technology when they engage in embodied interactions with interactive whiteboards (IWBs). I argued that IWBs are material manifestations of the policy and the embodied engagements between school actors and IWBs constitute instances of policy sense making. In this paper I build upon the idea of embodied policy sense making, and provide more detail about the notion of embodiment. How is embodiment manifested in the world? And more importantly, how does it apply to a concrete case in schools? I apply Shapiro's (2010) taxonomy of theories of embodiment to the analysis of the introduction of IWBs in the classroom.

I elaborate on the notion of embodiment by referencing three themes common to theories of embodiment and by showing how these themes apply to educational policy sense making. The three themes of embodiment are conceptualization, replacement and constitution (Shapiro, 2010). The conceptualization theme indicates that the way an organism conceptualizes the

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[3] A version of this chapter has been submitted for publication (Riveros, Submitted, b)

world depends on the characteristics of the organism's body. The replacement theme indicates that explanations of action and thought can be accomplished by reference to the body's characteristics and interactions with the world, which replaces traditional explanations of action and thought based solely on internal psychological states. The constitution theme indicates that for certain cognitive processes to take place it is required that the body and the world interact and work as a single and unified system. I offer examples of each one of these themes applied to the analysis of an educational policy on instructional technology. I argue that an embodied account of policy sense making offers a context-sensitive way to understand how educational policy is transformed and adapted by school actors in their contexts of practice when they engage in embodied interactions with the IWB. I base my argument on the idea that the IWB constitutes a material manifestation of the policy because it synthetizes the abstract ideas of the policy into a concrete reality that enrols and mobilizes actors in practices and actions around it.

I build upon Riveros (submitted a) in which I argued that an embodied account of policy sense making challenges authoritative-instrumentalist accounts of policy analysis. Authoritative instrumentalism portrays policy as a finished product designed at the higher levels of governance that is transferred through a hierarchical structure in order to be implemented by school actors. The arguments and examples in this paper offer additional support to a previous argument (Riveros, submitted) according to which educational policy is "enacted" (Ball, Maguire & Braun, 2012), that is, educational policy is recontextualized into practices by the school actors that make sense of the policy through embodied interactions with the world.

I am not offering here strategies to write, design, or deal with policy. I am not offering recommendations on how to adapt a particular policy to a context or a specific situation. I do not intend to offer an account of what is a good policy or to present an account of how to correctly understand a policy. I am offering an account of what policy sense making is based on a taxonomy of theories of

151

embodiment (Shapiro, 2010). By providing an embodied account of how school actors make sense of educational policy I am also providing an account of how policy is recontextualized by school actors in their practices.

This paper is divided in four sections. In the first section I offer a critique of authoritative-instrumentalism and argue that discourses of policy analysis require an account of policy sense making that would explain how people adapt and transform policies in their contexts of practice. I argue that the notion of policy enactment captures the notions of agency and sense making that instrumentalist accounts of policy implementation overlook. In section two I argue that some objects in school are material manifestations of policy, and when the material manifestations of policy are inserted into practices they contribute to enact the policy. I exemplify these claims with the introduction of IWBs in schools arguing that when school actors incorporate the IWB into their practices they are enacting a policy on instructional technology. In section three I argue that the notion of sense making offers a way to understand how educational policy is put into practice because it provides an account of how school actors enact educational policy by transforming, recontextualizing the policy to their contexts of practice. I argue that sense making is an embodied process and I elaborate on the notion of embodiment to show how the three themes of embodiment can be used to analyse enactments of educational policy. I apply the three themes of conceptualization, replacement and constitution to the analysis of the enactment of a policy on instructional technology as manifested by the introduction of IWBs in the classroom. In section four I summarize the argument and conclude that an embodied account of educational policy sense making offers a non-instrumentalist way to analyse policy enactments. I add that educational policy analysis can gain more explanatory power by attending to the interactions between school actors and the objects that constitute material manifestations of the policy. I conclude that an embodied account of educational policy sense making implies a redefinition of policy that does not portray it as a finished product crafted by authoritative individuals at the higher levels of the structure of governance, but as a complex process that spans over contexts of practice.

**Policy Enactment and Policy Implementation**

Traditional discourses on policy analysis portrayed policy making as a sequential and goal-oriented process in which policy is designed and created to solve problems (Moran, Rein & Goodin, 2006; Pal, 2009). For example, Pal (2009) defined policy as "a course of action or inaction chosen by public authorities to address a given problem or interrelated set of problems" (p. 2). In this account, policy work consists in conceptualizing a problem to find the possible solutions to it. After conceptualizing the problem, policy makers select the most plausible course of action, and then implement that course of action. An evaluation of the outcomes of the policy would allow policy makers to re-conceptualize the problem, or to redefine the implementation process. Since this perspective portrays policy work as instrumental to solve governance problems, some authors have called it "authoritative instrumentalism" (Colebatch, Hoppe & Noordegraaf, 2010; Shore & Wright, 2011). According to this conceptualization, policy is defined at one level in the bureaucratic hierarchy and then implemented at another level within that hierarchy (Hogwood & Gunn, 1984). Furthermore, as a problem solving mechanism, policy is seen as prescriptive. Authoritative instrumentalism portrays policy development as a mechanical process that can be analyzed following a sequence.

In authoritative instrumentalism, authoritative experts are in charge of the policy definition. People at the implementation stage are not seen as contributing to the policy definition. An analysis of agency within the narrative of authoritative instrumentalism is limited to the rational choice made by the authoritative experts in charge of defining the policy. Actors' agency at the implementation level is seen as irrelevant in the process of defining the policy. Indeed, an authoritative instrumentalist account of policy development seems to hold the assumption that people at the implementation level do not exercise their agency to add meaning to the policy, or to define the policy, because that is the job of authoritative experts.

Governments and authorities in general may follow this model to create and implement policy, but this does not mean that policy analysts have to follow

this model to analyse policy. In Shore and Wright's (2011) view, a critical approach to authoritative instrumentalism does not "deny that 'policy' works as an instrument of rule, which it clearly does; [the] point, instead, is that this narrow, instrumental vision of policy should not define the object of analysis or agenda of those who study policy" (p. 6). Indeed, policy scholars (Ball, 1994; Ball, Maguire & Braun, 2012; Simmons, Olsen & Peters, 2009) have questioned instrumentalist analyses of policy that conceptualize policy as a finished product crafted at the top levels of the governance structure on the grounds that these analyses are insufficient to explain the way policy is recontextualized by policy actors. These studies have shown that the discourses of policy analysis based on authoritative instrumentalism fail to recognize the role of discourses, contexts and practices in the process of policy development. Indeed, discourses based on authoritative instrumentalism focus on the formal or structural aspects of policy development without paying attention to the way policy actors incorporate and recontextualize the policies to their contexts of practice.

In particular, some authors (Ball, Maguire & Braun, 2012; Webb & Gulson, 2012) have questioned authoritative-instrumentalism's notion of policy implementation as a useful theoretical construct to analyse how policy is translated into practice. In authoritative instrumentalism, the notion of implementation suggests a mechanical process in which a finished product is transferred through a hierarchical structure without taking into account the way policy actors recontextualize the policy messages adapting them to their own contexts of practice. In brief, the notion of policy implementation does not convey the actors' role in translating policy into practices. Contrary to the notion of policy implementation, Ball, Maguire and Braun (2012), proposed the notion of "policy enactment" to convey the "creative processes of interpretation, that is, the recontextualization –through reading, writing and talking - of the abstractions of policy ideas into contextualizing practices" (Braun, Maguire & Ball, 2010, p. 586). The notion of enactment highlights the active role of actors in the process of recontextualizing and translating the policy into practices. The way actors make

sense of policy and incorporate it into their practices sheds light into the enactments of policy in schools.

The need of a more sophisticated conceptualization of the way policy is recontextualized by policy actors is evidenced in the lack of scholarship to explain the multiple transformations and adaptations of policy initiatives in schools. A number of studies (Coburn, 2001; Cuban, 1998; Hill, 2001, 2006; Honing, 2004; Spillane, 2004; Raywid & Schmerler, 2003) have reported that educational policy initiatives often get transformed after they enter specific contexts of practice. These authors found that in many cases the practices that enact the same policy initiative look very different from school to school. For example Cohen (1990) reported a case of a teacher who intended to put in practice a state-wide policy that aimed to replace mechanical memorization of mathematical principles. This teacher saw herself as revolutionizing her teaching. Her colleagues and the administration also believed that she developed innovative strategies for the teaching of mathematics. However, an observation of this teacher's instructional practices in the classroom revealed that she used the same approach to instruction that the policy aimed to eliminate. An authoritative-instrumentalist approach to policy analysis would claim that there was an error at the implementation stage because the teacher just misunderstood the policy. However, I contend that claiming that the teacher erred in her interpretation of the policy is a rather simplistic and uninteresting explanation that implies a conception of policy as a finished product crafted by some authority at the higher levels of the bureaucratic structure. It is simplistic because it relies on the assumption that policy development responds to a sequential structure in which policy is transferred in a mechanistic fashion from the policy makers to the end users. It is uninteresting because it does not take into account a more fundamental question for policy analysis, namely, how is it possible that policy actors recontextualize the policy into their own contexts of practice?

The notion of enactment offers a perspective that avoids the reductionist explanations of authoritative instrumentalism because it acknowledges the

agential elements in the process of translating the policy into practices. The notion of enactment highlights the creative processes of recontextualization of the abstract ideas of the policy into contextualized practices. Furthermore, instead of assuming that authoritative individuals have ownership over policy development, the notion of enactment offers a depiction of policy practices that emphasizes the processes of negotiation and conflict that take place when policy actors try to make sense of the policy (Ball, Maguire &Braun, 2012). The notion of enactment implies a redefinition of policy as a process that includes all sorts of policy actors enrolled in different contexts of practice including government officials, administrators, staff, practitioners, students, parents, and the general public, each one with different intentions, invested interests and levels of political power.

In addition to the previous points, it should be noted that authoritative instrumentalism conveys a problematic conception of the purposes of educational policy analysis. By portraying policy processes as mechanistic and hierarchical, policy analysis gets reduced to the evaluation of the effectiveness and efficiency of implementation, which also falls in line with recent tendencies towards increased accountability and control that limit democratic participation, contestation and debate in schools by introducing forms of technocratic rationality in the practices and actions of school actors (Apple, 2004; Ball, 1994). The idea of enactment challenges the authoritarian connotations of authoritative instrumentalism because it recaptures the notions of agency, contestation, and participation in the definition of policy.

In the next section I argue that educational policy is materialized in several ways in schools. In particular I argue that IWBs are material manifestations of the policy, based on theorizations from Braun et al. (2011), Ball, Maguire and Braun (2012), Fenwick and Edwards (2012), and Nespor (2012). I contend that when school actors engage in interactions with the IWB they are engaging in interactions with the material instantiations of policy. An explanation of the materiality of policy will pave the way for arguing, in section three, that school

156

actors make sense of policy when they engage in embodied interactions with material manifestations of the policy.

**Policy Materialized**

Authoritative-instrumentalist discourses of policy analysis tend to view policies as finished products crafted by authoritative agents at the top of a bureaucratic structure (Colebatch, Hoppe & Noordegraaf, 2010; Meyer & Rowan, 2006; Pal, 2009; Riveros, 2009, in press; Shore & Wright, 2011). In contrast, contemporary discourses of policy analysis tend to focus on how individuals make sense and recontextualize policy in their practices, that is, "how people actively construct meaning within institutionalized settings through language and other symbolic representations" (Meyer & Rowan, 2006, p. 6). Discourses of policy analysis based on the notion of enactment examine policy as a process of recontextualization of the policy messages through practices. The notion of policy sense making offers a way to examine how school actors construct the meaning of the policy in their contexts of practice. Studying the way school actors make sense of the policy in their contexts of practice allow us to understand how policy is enacted. Discourses of policy analysis based on the notion of enactment avoid the shortcomings of authoritative instrumentalism, namely, the mechanistic understanding of policy processes, the inability to explain how school actors recontextualize the policy, and the authoritarian connotations behind the idea that only authoritative individuals at the top of a bureaucratic structure have control over the definition of a policy.

Policy is pervasive; it is materialized in multiple forms in contemporary societies. The material manifestations of policy enrol people in a spectrum of actions and practices that range from blind compliance to conscious resistance (Barry, 2001). It is difficult to imagine a situation in which people, living in contemporary industrialized societies, could escape from policies' sphere of influence: pumping gas, paying with a credit card, driving on the right side of the road and stopping at the red light are examples of actions bounded by policies. A gas pump, a credit card, a road sign and a traffic light materialize aspects of

157

policies and enrol users in performances that put many different policies in practice.

Educational policy is materialized in multiple ways in schools too: technological devices, buildings, furniture, uniforms and even stationery are some of the material ways policy is manifested in schools (Braun et al., 2011). From a policy analysis perspective, some objects make their way into schools as material realizations of policies. For example, a set of policies that limits provincial funding to schools and simultaneously allows schools to seek non-public forms of funding through partnerships with the private sector (Henry & Garcia, 2004) can be manifested in schools in a variety of forms, like vending machines or sponsored scoreboards. When a student purchases a beverage from a vending machine in school she is not just performing an economic transaction. From a policy analysis perspective, she is also performing an act that enacts the policy. It has been reported (Ball, Maguire & Braun, 2012) that at any given time a school could be enacting hundreds of different policies simultaneously: Budgets, transportation, discipline, safety, and instructional technology are some of the many domains in which policy operates. Objects are often used as instruments that carry out policy, mobilizing people around it. For instance, a scantron sheet not only represents a particular policy on assessment, it mobilizes school actors around the policy as it materializes the abstract idealizations of the policy into concrete material practices (Nespor, 2002, 2012; Fenwick & Edwards, 2010). Instructional technology is another example of how policy is materialized in schools. Computers, interactive whiteboards, projectors, iPads and many other devices enter the classroom as manifestations of policies on curriculum, instruction, budget, discipline, and attendance (Daniels, Friesen, Jacobsen & Varnhagen, 2010).

According to the Alberta Commission on Learning (2003) the policies on technology in schools are driven by the perceived need to prepare students for current socio-economic demands, the current availability of technological resources in contemporary societies, and the societal demand for Information,

158

Communication and Technology (ICT) literacy (Alberta's Commission on Learning, 2003). For example, the Alberta Commission on Learning suggested that each classroom in the province should have "one computer for the teacher; several computers for student use; a projection system; an interactive whiteboard, and online resources" (p. 109). Within this new landscape of instructional technology in the classroom, the use of interactive whiteboards (IWBs) has been positioned as an innovative alternative that increases students' motivation and adds to the teachers' pedagogical repertoire (Alberta Teachers' Association, 2011).

From a policy analysis perspective, the IWB is not just an instructional device. It is an object that instantiates the policy on instructional technology in the classroom. Its presence in the classroom contributes to enrol school actors in practices and actions that enact the policy. Thus, when school actors engage in interactions with the IWB they are engaging in interactions with the policy as the policy is materialized in the object. This conclusion should not come as a surprise. Authors have been describing for decades (Ball, Maguire & Braun, 2012; Barry, 2001; Carolan, 2011; Foucault, 2008; Nespor, 2002, 2012) how policy is materialized in objects and how objects serve as vehicles of policy. Foucault (1986) coined the term "governmentality" as a way to refer to the techniques, practices discourses and socio-material assemblages that governments put in place in order to secure society's compliance with policies. Ball, Maguire and Braun (2012) reported in their study on policy enactment in schools in England that schools used posters to translate the policy on school uniforms and enrol students and teachers in practices that enacted the policy. In these schools, the posters were inserted into practices as they became an artefact or object of reference that conveyed the policy to school actors. Nespor (2012) indicated that terms like "artefact" are

> inclusive by design, but as such deflect attention from questions of who
> makes (or can make) a certain kind of device, who controls use of the
> device, how access to it is organized, who supplies the power for it, what

159

kinds of products it makes, how it moves, and how it is made visible to different observers. (p. 4)

These kinds of questions are central to understanding enactments of policy because their answers could reveal the complex relations subsumed by the presence of the artefact in the classroom. Objects have been invisible or deemed innocuous to traditional accounts of educational policy. At best, objects were seen as mere background to the implementation (Cuban, 2003). In contrast to accounts of policy analysis that pay scant attention to the role of objects in the classroom, analyses based on the notion of enactment give a preeminent role to the practices that emerge as school actors incorporate the material manifestations of policy into their practices. Sometimes, artefacts are protagonists in the process of policy enactment as they help to reconfigure the practices that instantiate the policy. Nespor (2012) studied cases in which devices were influential in the way educational policy is shaped and transformed in educational settings. For example, he reported the case of a student with cerebral palsy who was categorized as "untestable" (p.12) and therefore unsuitable for an inclusive classroom according to a district policy on special needs that was used to classify students. Following the policy, the student was sent to a segregated school that offered "severely profoundly handicapped classes" (p. 12). In the segregated school, the student used an experimental assistive-communication device that proved that the student was suitable to be in an inclusive classroom. The introduction of the device in the practices of the school actors, including the student, teachers, administrators, and parents, challenged and later transformed the way students were classified in the policy. Here, we have an example of a material object incorporated into practices that had an effect in the way the policy was transformed. Using the device "implied a re-drawing (or weakening) of school boundaries in a way that gave parents grounds for making legal demands for assistive technology" (p. 20).

The introduction of technological devices in schools is not a product of chance. The presence of technology in schools is the result of social, political, and

160

market interests that are manifested in the policy and ultimately are manifested in the classroom (Apple, 2004; Cuban, 2003). The perspective I am defending acknowledges the contexts that subsume policy development and portrays instructional technology as an expression of the policy in the classroom. Technological devices are not innocuous items that serve as a background of the policy. They constitute vehicles of the policy that enrol school actors in practices that contribute to the enactment of the policy.

In the next section I elaborate on the argument according to which the practices that enact policy in schools constitute instances of policy sense making (Riveros, submitted). I contend that school actors make sense of the policy when they engage in embodied interactions with the material manifestations of the policy. I elaborate on the notion of embodiment using Shapiro's (2010) taxonomy, and I conclude that the notion of embodiment offers conceptual tools to understand the process of policy sense making.

**Sense Making and Embodiment**

Some researchers of educational policy have turned to cognitive models aiming to describe how people make sense of policy messages (Spillane, 2004). Most of the work in this field has been centred on how individual cognition accounts for individual differences and similarities, extrapolating the results to groups by generalization. Such generalizations provided the grounds for using terms like "distributed leadership" (Spillane, Reiser & Gomez, 2006), "shared meanings" (Fullan, 2007), or "interpretive communities" (Yanow, 2000). For example Spillane, Reiser and Gomez (2006) said:

> We argue that cognition is an essential lens for understanding education policy implementation, especially the implementation of policies that demand significant shifts in teachers' practice, but that investigations of the role of cognition in policy implementation to date, including some of our own investigations, have failed to grapple with cognition as a distributed practice. (p. 48)

As noted previously, instrumental-authoritative discourses of policy analysis tend to view policies as finished products (Meyer & Rowan, 2006; Riveros, 2009, in press). In contrast, contemporary discourses of policy analysis tend to focus on how individuals negotiate the meaning of policies in their context of practice, that is, "how people actively construct meaning within institutionalized settings through language and other symbolic representations" (Meyer & Rowan, 2006, p. 6).

Spillane, Reiser and Gomez (2006) indicated that when people try to make sense of policy initiatives they usually impose their own frames of reference, resulting in practices that differ from the policy designers' intentions (Spillane, 2004; Spillane, Reiser & Reimer, 2002). In their view, a better understanding of the way people make sense of policy initiatives would provide a better picture of policy in practice because it would shed light on "how reform ideas are worked out in formal and informal school level practices" (p. 61). According to these authors educational policy sense making is a coproduction of a number of elements:

> What a policy means for implementing agents is constituted in the interaction of their existing cognitive structures (including knowledge, beliefs, and attitudes), their situation, and the policy signals. How the implementing agents understand the policy's message(s) about local behavior is defined in the interaction of these three dimensions. (Spillane, Reiser & Reimer, 2002, p. 38)

These authors noted that cognitive models put the school actor at the centre of the policy analysis process. Discourses of policy analysis that are sensitive to the way people make sense of policy are in a better position to explain the differences between the practices that emerge when the policy is translated into practices in school settings. In a similar fashion, Feuer (2006) wondered whether "the so-called cognitive revolution, the study of human decision making and rational judgment, could help explain the apparent non-rationality of education policy and discourse" (p. x-xi). Feuer asked whether the study of the way school actors make

162

sense of educational policy would contribute to a better understanding of the, sometimes contradictory, practices that emerge in schools as a consequence of reform initiatives.

As indicated above, some researchers have shown how cognitive accounts of sense making can inform educational policy analysis. However these studies have not explored the role of the body and its interactions with material objects in policy sense making. I argue that an embodied account of sense making will inform accounts of educational policy analysis. According to Shapiro (2011) the notion of embodiment portrays cognition as a process that encompasses the body and some of its interactions with material objects. In this section, I contend that the notion of embodiment enriches analyses of educational policy enactment. I show that the notion of embodiment offers new insights to understand how school actors make sense of policy by incorporating material manifestations of the policy into their practices. I propose that the notion of *embodied policy sense making* captures the situated character of school actors and their practices, which provides policy analysts with a more contextualized account of educational policy enactment. An embodied account of policy sense making highlights how some cognitive processes conducive to policy sense making are constituted in the interaction between school actors and the material manifestations of the policy. In particular, the notion of embodiment highlights the role of material manifestations of the policy in the process of policy sense making. As noted in the previous section, authoritative-instrumentalist accounts of policy analysis are oblivious of the role of policy artefacts in policy analysis.

**Theorizations of embodiment.** The idea of embodiment as a concept to explain human thinking and action can be traced to phenomenology, notably to Heidegger (1962, 1977) and Merleau-Ponty (1962). Dewey (1944), from the pragmatist camp, offered a number of insights that highlighted the essential role of the body in our understanding of the world. The idea of embodiment can be seen as a response to the Cartesian view of the mind according to which mental processes are essentially different from bodily processes. Although the

163

ontological distinction has been rejected by psychology and philosophy, the epistemological distinction between internal cognitive processes and external bodily actions still pervades talk about the human mind exemplified by the classic information-processing model, which characterizes cognition as a form of computation. An embodied account of thought rejects the implicit isolationism of the computational theory of mind and argues that the bodily and contextual factors play a fundamental role in explaining human thought and action (Glenberg, 2002). That is, according to theorists of embodiment the explanation of action should not rest exclusively on computational processes or internal features of the organism. Instead, action can also be explained by reference to the way the organism relates to the environment and the characteristics of the organism's body.

Shapiro (2011) has noted that there are three different themes to the idea of embodiment: *conceptualization, replacement* and *constitution.* In Shapiro's view, each theme entails different commitments, but this does not mean that they are incompatible. In most cases authors tend to emphasise one theme over the others, but the three themes are clearly discernible. They help to illustrate the different dimensions of embodiment. Shapiro defined the three themes as follows:

*Conceptualization*: The acquisition and use of concepts depends on the
characteristics of that organism's body. Two organisms with different
bodily constitutions may, as a result, have different ways to conceptualize
and interact with the world.

*Replacement*: Some cognitive activity of an organism takes place in the
organism's bodily interactions with its environment. Some cognitive
processes can be characterized as embodied processes that do not require
representational mental states to take place.

*Constitution:* Some cognitive processes are constituted by bodily and
environmental elements. That is, for certain cognitive processes to take

164

place it is required that the body and the environment interact and work as a single system.

Shapiro indicated that these themes do not usually appear separated in the literature on embodiment. In fact, these themes can easily overlap. For instance, we can think of an account of embodiment that portrays some cognitive processes as constituted by the interactions between humans and some elements in the environment. This account can also claim that these processes are not based on representational states and simultaneously support the idea that some concepts used by the organism depend on the way cognitive processes are constituted. In the following paragraphs I elaborate on these themes and show how they can inform our understanding of sense making. I apply these theorizations to specific cases of school actors interacting with IWBs and argue that the embodied interactions with material manifestations of the policy instantiate episodes of policy sense making.

     ***Conceptualization.*** Glenberg and  Kaschak (2002) argued that "meaning is embodied –that is, that it derives from the biomechanical nature of bodies and perceptual systems" (p. 558). According to these authors the indexical hypothesis provides an account of meaning that grounds it in action. According to the indexical hypothesis understanding is a process that involves three different stages. First, "words and phrases are indexed or mapped to *perceptual symbols*" (p. 559). That is, symbols that are represented under a modality (visual, auditory, tactile). Second, the perceptual symbols provide specific affordances to act towards objects in the world. Third, these affordances are "*meshed* under the guidance of syntactic constructions" (p. 559), namely, the grammatical form of the sentence directs specific forms of cognitive stimulation that determine how a sentence is understood". For example, "hang the coat on the upright vacuum cleaner" makes sense to someone who has had the relevant experiences with coats and upright vacuum cleaners. An expression like "hang the coat on the cup" may not make any sense to most people because of our experiences of cups and coats. "Hanging a coat" is not usually something afforded by a cup.

The experimental evidence seems to suggest that bodily experiences and bodily action play a fundamental role in conceptualization processes. Glenberg and Kaschak (2002) conducted an experiment in which two groups of participants were presented with three types of sentences: *Toward sentences*: sentences that implied a movement toward one's own body, for example, "Open the drawer" or "Put your finger under your nose"; *away sentences*: which implied an action away from the body, for example, "close the drawer" or "Put your finger under the faucet"; and *nonsense sentences*: that did not imply movement in any direction, for example "boil the air". The sentences were displayed on a screen and the participants were seated in front of a button box with a row of buttons, like very simple keyboard, arranged in a straight-line projection away from the body. The buttons on the board were arranged following a vertical pattern. For the first group of participants, if the displayed sentence was a *near sentence* then the participant was asked to press the "yes" button, which was located at the nearest position to the participant's body. If the sentence was an *away sentence* the participant was asked to push the "no" button, which was located at the farthest position from the participant's body. For *nonsense sentences* there was a button in the middle of the button row that the participants had to kept pressed all the time except when moving the hand to push the "yes" or "no" buttons. The middle button represented a neutral position. For the second group of participants, the researchers inverted the yes/no buttons, so participants were compelled to push "yes" at the farthest position to the body when presented a near sentence. Correspondingly, the participants were asked to push the "no" button, now located at the nearest position to the body. This group was presented with new "away", "near", and "nonsense" sentences. When presented an away sentence. Glenberg and Kaschak found that subjects were slower to push the button when the direction implied by the sentence was opposite to the direction of the movement required by the button arrangement on the button box. That is, the response time for the combinations *near sentence /near yes button* is shorter that the response time for the combination *near sentence / far yes button*. These authors concluded that this finding supports the notion that language understanding is grounded in

bodily action. "That is, the meaning of a sentence is given by an understanding of (1) how the actions described by the sentence can be accomplished or (2) how the sentence changes the possibilities for action… Real bodily action is at the root of meaning conveyed by language" (Glenberg & Kaschak, 2002, pp. 562-563). Other researchers have conducted similar experiments and have reported similar findings (Barsalou, 2008; Bergen & Feldman, 2008; Matlock, 2004; Lakoff & Johnson, 1999; Niedenthal et al. 2005; Varela, Thompson & Rosh, 1991). Lakoff and Johnson (1999) argued that we come to understand many basic concepts, such as the concepts of spatial-relations, by virtue of our embodied experience of the world. Concepts like "up", "down", front", "back", near", far" are experienced when the body enters in spatial relations with other bodies and objects in the world. For instance:

> The concepts front and back are body-based. They make sense only for beings with fronts and backs. If all beings on this planet were uniform stationary spheres floating in some medium and perceiving equally in all directions, they would have no concepts of front or back. But we are not like this at all. Our bodies are symmetric in some ways and not in others. We have faces and move in the direction in which we see. Our bodies define a set of fundamental spatial orientations that we use not only in orienting ourselves, but in perceiving the relationship of one object to another. (Lakoff & Johnson, 1999, p. 34)

The meaning of these basic concepts are fundamental to the understanding of more complex concepts, for example, following Lakoff and Johnson's insights, the meaning of a sentence like "the nearest galaxy is over 2 million light years" would depend among other things on the embodied concept of "nearness". In Lakoff and Johnson's words: "We do not see nearness and farness. We see objects where they are and we attribute to them nearness and farness from some landmark" (p. 30).

The experimental evidence reported by these authors can be extrapolated to the case of human-IWB interaction. The device affords certain movements and

167

certain types of interaction, such as some gestures to move, drag or drop an image displayed on the screen. These movements are meaningful; they are directed towards the device and produce certain effects reflected on the screen. The meaningfulness of the gestures depends upon the IWB's affordances: A malfunctioning device would not afford the same actions that a functioning device would. Furthermore, the IWB's affordances direct certain types of perceptual stimulation that guide action. For example, Smart Classrooms (2012a) reported on one physics application that invite the users to drag, drop and move objects on the screen in order to simulate the application of certain principles of physics.



Figure 3-1. Moving the parts of an image. Screen Capture from Smart Classrooms (2012a). The children in the video are moving parts of an image

The user is invited to drag and drop images to construct a larger object. The words *drag* and *drop* are used to represent the physical movement of dragging and dropping a physical object. The use of the words *drag* and *drop* in this case is metaphorical: The body, under one kinaesthetic modality, such as gesture, performs the embodied meanings of these concepts. By dragging their fingers on the IWB's screen the users simulate a movement that amounts to dragging and dropping a physical object. In this case, the words "drag" and "drop" are mapped to perceptual symbols (Glenberg & Kaschak, 2002), that is, symbols that are

represented under a specific modality, which in this case is a concrete gesture. These words make sense to the users because the words are associated with specific movements. Users are able to make sense of these words through the movements they perform during their interactions with the IWB. Here, we can see an application of the indexical hypothesis (Glenberg & Kaschak, 2002) to the use of IWBs in the classroom.

*Conceptualizing the policy through the body: The story of two teachers.* Moss et al. (2007) conducted a comprehensive study of the introduction of IWBs in schools in London, UK. They reported on how teachers incorporated these devices into their teaching practices. Teachers incorporated the IWBs in multiple ways that revealed the diverse forms in which they conceptualized the policy on technology. The examples show that the teachers' idiosyncratic ways to engage with the IWB are central to the way they make sense of the policy.

One of the participants in this study exemplified the way teachers made sense of the policy in their context of practice. This teacher constructed a graph on the board to compare two sets of data and asked the students to answer whether some statements he wrote besides the graph were true of false. At one point the teacher was "able to use the dragging function to illustrate how the graph would change if the input values were different" (Moss, et al., 2007, p. 27). The ability to drag and drop the values to change the information displayed on the chart was a novel function that the teacher had no access prior to the introduction of the IWB into his classroom. The drag and drop gestures are necessary movements required to operate the IWB and it is clear that this teacher has incorporated them into his instructional repertory. For this teacher, the incorporation of technology in the classroom has created new affordances. New practices have emerged as the IWB made its way into his classroom. These new practices, including these particular gestures and actions, are important components in the enactment of the policy on instructional technology. This teacher was instantiating the sense he made of the policy through his bodily interactions with the IWB. For this teacher, the IWB became part of an instructional practice that translated the policy on technology

into concrete actions in the classroom. The actions of dragging and dropping to change the chart's values were part of a practice that enacted the policy on instructional technology. Moss et al.'s study shows how the teacher was making sense of the policy in a process of recontextualization of the abstract ideas of the policy through his embodied engagements with the device. The practices that emerged in this classroom enacted the policy and showed how the teacher has recontextualized in his practices some of the abstract concepts in the policy such as "curricular integration", "demonstration and modelling", or "assessment" (BECTA, 2004, p. 3). As the teacher strived to make sense of the policy he adapted and reconfigured his practices in ways that helped him to make sense of the policy. Of course, I am not claiming that the gestures of dragging and dropping are by themselves sufficient to make sense of the policy. Or that one specific gesture can be mapped to one concept or proposition in the policy text. That would be a simplistic distortion of my argument. I have been stressing throughout this paper that enacting a policy is a contextualized or relational process that involves practices, contexts, actors and objects. Bodily engagements such as gestures are part of this process. My analysis shows how the body is a constituent in the process of policy sense making that enacts educational policy.

Let me contrast the previous example with another case reported by Moss et al. (2007). This case showed how a teacher appropriated the policy in a different way. His practices offered a glimpse into his sense making process that was reflected in the way the teacher incorporated the device into his teaching practices thus enacting the policy in a particular way. In this case, a math teacher

> wrote the date and the lesson title [on the IWB] before the students entered the classroom. The teacher asked the students to copy the title, the date and two shapes that he has drawn on the IWB into their exercise books. As the students are doing this he writes the angles values onto the shapes and asks the students to copy these into their books. (p. 34)

In this case the teacher was using the IWB as a conventional blackboard. The information was handwritten on the board's surface and displayed in front of the

students for visual reference. The teacher did not manipulate or transform the drawings using the computing capabilities of the IWB. In this case, the teacher's engagements with the IWB reveal a particular way to make sense of the policy on instructional technology. He incorporated the device into his teaching practices recreating the same functionalities of the traditional blackboard. The practices that were configured as the teacher introduced the IWB into his classroom reflected no particular changes relative to the practices that took place in the classroom before the IWB introduction. The teacher in this example recontextualized the policy through actions that recreated the use of non-digital technologies, such as the blackboard, and thus, made sense of the policy in an idiosyncratic way. For this teacher the abstract concepts in the policy related to "demonstration and modelling", "assessment", or "curricular integration" (BECTA, 2004, p. 3) were translated into practices that did not necessarily reflect the computational affordances of the device. Instead, the IWB was used as a luminous display that allowed students and teacher to write the answers on an unconventional surface.

The IWB symbolised the arrival of the policy in the classroom. By turning the device on and incorporating it into his teaching practices as a replica of a blackboard, the teacher signalled the particular way in which he made sense of the policy. Moss et al. (2007) commented: "the teacher recognized the potential of IWBs to behave like a traditional blackboard and adapted the technology in this light to his existing pedagogic practice" (p. 35). This comment is revealing because these researchers conceptualized the teacher practices as making sense of the policy on technology. That is, using the IWB as a conventional blackboard was his way to make sense of the policy. The notion of embodiment offers a theoretical framework to understand how school actors make sense of the policy. In the case of IWBs we can see how the bodily engagements of the school actors with the devices constitute instances of policy sense making that enact the policy in particular contexts of practice. The case at hand showed that the embodied relations that the school actors established with the IWB contributed to the construction of the policy meaning. Comparing the first and second cases shows how the practices that were configured after the introduction of the IWB created

171

completely different scenarios that reflected different understandings of the policy.

From a policy analysis perspective, the IWB is not just an object in the classroom. It is the concrete manifestation of a policy on instructional technology that has material significance in the practices that take place in the school. The policy on instructional technology is actualized in the practices of the school actors as they interact with the IWB. Indeed, the cases I just reviewed show how school actors make sense of the policy through their practices when they incorporate the device into their classroom performances. Policy sense making is therefore an embodied process that encompasses the material manifestations of the policy and the situated actions of school actors.

***Replacement.*** I have shown that the conceptualization theme highlights the role of the body in the acquisition and use of concepts. This idea seems to contradict the traditional conception of cognitive processes as representational processes that occur in the brain. A number of authors have proposed explanations of cognition that do not seem to require the notion of mental representation and ultimately *replace* the notion of mental representation with the notion of embodiment or situatedness (Shapiro, 2010). For instance, Thelen et al. (2001) noted:

> to say that cognition is embodied means that it arises from bodily interactions with the world. From this point of view, cognition depends on the kinds of experiences that come from having a body with particular perceptual and motor capabilities that are inseparably linked and that together form the matrix within which reasoning, memory, emotion, language, and all other aspects of mental life are meshed. (Thelen et al., 2001, p.1)

Central to this passage is the idea that cognitive processes arise from bodily interactions with the world. However, this is not a trivial claim as some critics could point out. Indeed, a critic could respond that the body is required in

172

cognition, and the sensory organs are needed to gather perceptual information that is later processed in the brain. So there is an obvious sense in which cognitive processes arise from bodily interactions. Thelen et al. claimed that cognitive processes arise, depend, and take place in the bodily interactions with the world. In their view, there is no need to put the brain at the centre of cognitive activity and, furthermore, there is no need to posit mental representations as the material upon which cognitive activity depends (Foglia & Wilson, 2013). Thelen et al. used these ideas to propose an explanation of what is called perseverative behaviour in infants.

In the famous A not B experiment, Piaget and Inhelder (1969) presented a child with a visually attractive object, like a toy, at reaching distance. The experimenter hid the object under A. They found that the child would typically reach under A to retrieve the object. On the testing stage, the experimenter captured the child's attention with the same object and hid the object under B. They observed that children between seven to twelve months kept reaching towards A, despite the fact that the child watched the object being placed under B.

Thelen et al. (2001) suggested that the A-not-B error is not produced by an impoverished concept of object permanence or by the lack of any kind of sophisticated representation, as Piaget and Inhelder (1969) thought. Instead, they proposed a dynamic systems model, which they summarized as follows: "the cornerstone of our dynamic model is that 'knowing' is perceiving, moving, and remembering as they evolve over time, and the error can be understood simply and completely in terms of these coupled processes" (Thelen et al. 2001, p. 4). So the A-not-B error is not the product of a lacking mental representation but a collection of bodily processes that coordinated along with environmental constraints and opportunities generate certain behaviours, such as the A-not-B error. Evidence for this body-environment interplay can be found when the experimenter makes the child change her motor behaviour. If the experimenter changes the position of the child's body relative to the object (e.g., from sitting to laying) then the child typically succeeds in reaching the object under B as this

173

requires a change in the child's original motor plan. According to Thelen et al. this shows that different motor patterns emerge from different environmental situations. Their model aims to explain the A-not-B error as a product of unsuccessful adaptations from the body to novel environmental conditions and not as the lack of appropriate mental rules and representations.

In this model, cognition is a self-organizing process that emerges from the continuous interplay between the body and the environment. Beer (2012) indicated that a sound study of cognition must take into account notions like situatedness and embodiment and eliminate the classic idea of symbol manipulation. By situatedness, Beer means that agents inhabit concrete environments that constrain or facilitate opportunities for further action: "the environment does not serve merely as a source of isolated problems for the agent to solve, but rather a partner with which the agent is fully engaged in moment-to-moment improvisation" (Beer, 2012, p. 3). By embodiment Beer meant that the organism's body and its interactions play a fundamental role in the way the organism comes to make sense of the world around it.

An extrapolation of these ideas to the case of policy sense making in schools shows that school actors engaged with the material manifestations of the policy participate in the emergence of practices that instantiate new forms of policy sense making. In this account there is no need to posit the brain as the centre of the policy sense making process. Indeed, the operation of the IWB requires the body's adaptation to the material constraints presented by the device. The interplay between the school actor and the IWB constitutes emergent forms of sense making that otherwise would not be achieved. The device compels the user to perform certain actions to keep the flow of the activity. For example, in one type of IWB, the user is required to close the hand into a fist and use the external side of the hand in a swiping motion in order to erase on the screen.
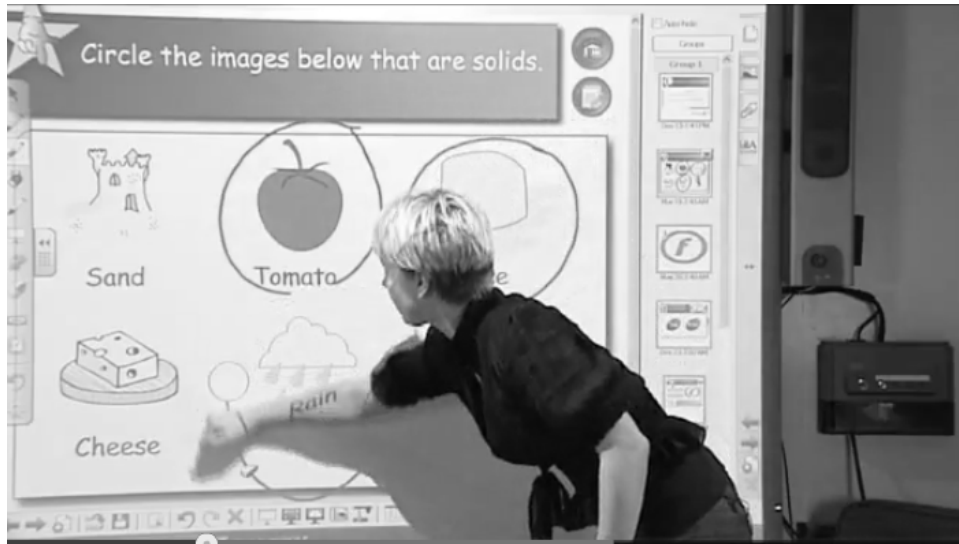
Figure 1-2. Erasing a drawing using the fist gesture. Screen capture from Smart Classrooms (2012b). The teacher in the video is erasing a drawing using the fist gesture.

Following Thelen et al.'s argument, the adaptation to new environmental conditions staged by the IWB demands the emergence of new motor patterns, like the fist swipe gesture required to erase the contents of the board. Erasing is a very important action afforded by the device. It gives the user the opportunity to edit the content on the screen and permits the continuation of the activity. Without the ability to erase, the performance would be interrupted and stopped. Actions like erasing are components of much more elaborated performances, such as demonstrations, explanations, and reasoning processes. Erasing is one of the many actions available to the user when operating the IWB. During a presentation, the teacher can correct or edit the content displayed on the board, sometimes, the situation itself calls for a correction, perhaps the drawing is not accurate or explanatory, the calculations are wrong, or the handwriting is unclear: the need to delete content arises from the situation itself. When the teacher deletes, she is responding to a situation with a motor pattern that is required from her by the situation created in conjunction with the IWB. She has to swipe the board with her fist, making this bodily movement a meaningful one in the context of her interaction with the device. As I argued above, the user makes sense of the IWB's operation through her bodily engagements with the device. Her engagements with

175

the IWB can be contextualized as pedagogical actions in the context of teaching the curriculum. For instance, let us revisit the case of the teacher who created an interactive graph that changed when the values were manipulated via gestures onto the IWB screen (Moss et al. 2007) in this case we can see a teacher who developed complex motor dispositions in response to a situation that required adaptation. The complicated combinations of gestures and motor dispositions developed by the teacher were incorporated in her teaching practices to the extent that her classroom practice became richer and more complex. This teacher integrated her skills into the instruction of content in an effort to foster learning. Let us note that "content" "instruction", and "curriculum" are concepts used in educational policies. For example, Alberta Learning (2004) stated in its *Learning and Technology Policy Framework*:

> This integrated approach to the instruction and application of ICT [Information and Communication Technology] has significant impact for learners and the learning system. ICT skills can and should be embedded into content instruction and integrated appropriately into content-area outcomes across the curriculum/program. Resource selection and development should reflect the infusion of ICT into course content. Assessment of learners' progress in meeting ICT outcomes must be integrated into and aligned with other assessment of student progress. Clarity and shared understandings about the role of ICT in learning must be articulated between senior high school and post-secondary programs to ensure continuity in learning. Well-defined learner outcomes, well-designed student projects, and effective assessment strategies are required. (Alberta Learning, 2004, p. 11)

An analysis of the teacher's practices in the classroom reveals that the teacher articulated a complex understanding of the policy through the interplay between her body and the environment, namely, the classroom, and more importantly, the IWB. For this teacher concepts like "integrated approach to instruction" or "appropriate integration of ICT skills into content-area outcomes" were translated

176

into contextualized practices and actions that took place in her classroom. The IWB offered this teacher further possibilities for action that could be conceptualized as policy bound in the sense that the IWB is a material manifestation of the policy. This analysis of this teacher's policy sense making does not require speculations about some sort of introspective process that takes place exclusively in the teacher's brain. The analysis that I just offered, presents sense making as a contextualized process of adaptation to a situation through bodily interactions (Thelen et al. 2001). The teacher made sense of the abstractions in the policy text, such as "integrated approach to instruction" or "appropriate integration of ICT skills into content-area outcomes" by engaging in processes of recontextualization of the policy in her practices. These recontextualization processes bring about dynamic patterns of action that include the body in interaction with the IWB. An example of those patterns could be seen in the gestures that were integrated into her teaching practices. Obviously, I am not claiming that the teacher's gesture of dragging an image on the IWB means, just by itself, that she made sense of the policy. I am claiming that the drag and drop gesture is a component of a dynamic process that includes many bodily interactions that take place when the teacher engages with the IWB in her context of practice.

The IWB functions as a regulator that compels, constrains and sustains diverse practices in the classroom. Once the device enters the classroom and is incorporated into the classroom practices, it becomes an unavoidable presence that informs how actors negotiate their experiences of the policy. An embodied account of policy sense making stresses the situatedness (Beer, 2012) of the school actors who engage in creative practices of recontextualization with the material instantiations of the policy and offers a context-sensitive account of policy processes that rejects traditional representationalist accounts of teachers' policy understanding (Spillane, Reiser & Gomez, 2006). Ball, Maguire and Braun (2012) argued that conventional cognitive accounts of policy sense making as an internal representation imply top-down models of implementation in line with authoritative-instrumentalism:

177

This kind of approach to the 'doing' of policy remains set within a linear top-down and undifferentiated conception of policy work in schools. It tells us something about how policies are understood and worked on and recast as they filter into classroom life but it views all policies and all schools and all teachers in the same way. It is an institutionally and socially 'thin' account of policy processes (Ball, Maguire & Braun, 2012, p. 4).

An account of policy sense making based on the notion of embodiment offers a situated perspective that includes contextual elements in the analysis of a policy. For instance, it allows us to examine the role of objects in policy processes. From this perspective some objects in the school, when inserted into practices, contribute to mobilize actors into contextualized performances that enact the policy. Policy sense making, from an embodied perspective, offers a more comprehensive account of policy processes that replaces decontextualized accounts of policy sense making as the internal representation of a finished product designed at the top of the bureaucratic structure. An embodied account of policy sense making situates policy in the practices and actions of actors who actively negotiate the meaning of the policy in a process of continuous recontextualization.

*Constitution.* Clark (2003) has pointed out that "human biological brains are, in a very fundamental sense, incomplete cognitive systems. They are naturally geared to dovetail themselves, again and again, to a shifting web of surrounding structures, in the body and increasingly in the world" (p. 189). He indicated that a large amount of research in cognitive neurology, and cognitive psychology starting from the early works of Piaget, Vygotsky, Gibson, and Bruner, among others, has showed that the environment is critical for brain development in the sense that an environment that is rich in possibilities for cognitive extension and coupling has a major role in the developing of certain cognitive abilities. Clark deemed humans as *natural-born cyborgs* because we

178

require an environment rich in cognitive coupling possibilities in order to develop our cognitive capacities.

To see the extended mind argumentation at work we can consider a very familiar scenario imagined by Clark and Chalmers (1998): Many Alzheimer patients often rely on environmental support to cope with daily tasks. For instance some use notebooks to write down any new information they learn in order to retrieve it later. Clark and Chalmers argued that there are no relevant differences between the Alzheimer's patient case and a person without the disease in terms of information retrieval procedures. Although the former does not seem to require the same environmental support as the latter, in the end, both persons are able to act based on the retrieved information. One of the conclusions that stems from the example is that cognitive systems do not need to be defined as internal to the organism. Indeed, according to Clark and Chalmers, the notebook functions as an information storage system that is permanently accessible and plays a key role in the patient's daily life, just as the biological memory of a non-Alzheimer person. Also, regarding the characterization of an Alzheimer patient as a cognitive agent, it can be said that the information in the notebook plays a pivotal role in defining his/her identity. This person can be "regarded as an extended system, a coupling of biological organism and external resources" (Clark & Chalmers, 1988, p. 18).

Adopting an embodied account of thought and action to understand sense making requires the reconsideration of the agent's boundaries. Adams and Pente (2012) offered a vivid image of the melding between human and non-human elements in schools:

> Chalk in hand, the teacher is newly arrived into the world, armed with an expanded teacherly authority and a differentiated capacity for thinking, being and doing. The evanescent extension of the body-self reconfigures her identity as cyborg-teacher/teacher-cyborg – an amorous/arduous alchemical meld of human being and tool – telescoping the teacher's perceptual, temporal, spatial and relational reach (p. 249).

The notion of embodiment presents us with an alternative to discourses that portray school actors as individuals detached from their social and historical contexts. Furthermore, the arguments from the extended mind theorists can be used to understand the interaction between school actors and IWBs. Evidently, IWBs present users with a wide array of opportunities to perform: the displaying and computing capacities of the device offer users novel ways to expand their practices. The studies on the use of IWBs in the classroom (Armstrong et al., 2005; Davidson & Pratt, 2003; Deaney, Chapman & Hennessy, 2009; Moss et al., 2007) seem to indicate that school actors exploit the affordances of these devices to instantiate practices that would not emerge if it were not for the participation of the IWB. For example, Deaney, Chapman and Hennessy (2009) reported that teachers use the IWB during class creating feedback loops that allowed them to revisit previous work while reflecting during instruction. In this case, the device functioned as an extension of some of the teacher's cognitive capacities, namely, the capacity to retrieve specific information from a source that functions as a memory storage. The case is analogous to the Alzheimer patient: the IWB plays a major role in the process of accessing the alternative memory storage, which is essential to the continuation of the teacher's performance. We can imagine another teacher, across the hallway that does not have an IWB in her classroom. She also has an excellent memory and does not need the IWB to retrieve information relevant to her instruction. Following the previous argumentation we can hypothesize that there are no relevant differences between the IWB and the non-IWB cases as long as both persons are able to act based on the retrieved information. Deane, Chapman and Hennessy (2009) reported that the teacher and the students in their study incorporated the IWB as a key component in their rehearsal activities. In this case the IWB was a constitutive element in the processes of planning and reasoning to the extent that the user-IWB coupling generated *functional gain* (Wilson, 2010), that is, planning emerged as a novel function that was the result of the integrative coupling.

Critics of the extended mind hypothesis, tend to understand these couplings as if the coupled element had an *asymmetric influence* (Menary, 2010,

p. 3) over the brain, that is, cognitive extensions as seen as mere causal connections that do not constitute a cognitive integration at all. In their view, cognitive processes are still occurring exclusively in the brain (Adams & Aizawa, 2009). According to Adams and Aizawa the external elements simply add more capacity to the organism but do not constitute part of the cognitive system. Menary's (2010) response as well as Clark's (2010) is that in the case of cognitive extensions, behavioural capacity would decrease if the extension were interrupted exactly in the same way in which behavioural capacity would decrease if the internal elements of the organisms were tampered with. Indeed, if the Alzheimer patient's access to his notebook were interrupted, his behavioural competence would decrease the same way as if the non-Alzheimer person's access to her memory were interrupted.

A similar argument can be construed in the case of IWB use in the classroom. Lewin, Somekh and Steadman (2008) reported that IWBs resonated with students with special needs as the device's kinaesthetic and visual affordances allowed students to engage actively and creatively with the content. Previous to the introduction of IWBs these students were struggling to learn, looking bored and disengaged. Once the students began to use the IWB and were able to incorporate movement and visual images to their learning experiences, their attitude changed and they were able to understand the contents better. Extrapolating Clark and Chalmers' (1998) arguments to this case, it can be said that the students' learning capacities improved once they incorporated the IWB to their learning experience, consequently, it can be argued that their learning capacity would decrease if the coupling student-IWB gets disassembled. Lewin, Somekh and Steadman (2008) offered a suitable scenario to argue that in some cases cognitive processes can be seen as extending their scope beyond the brain into the world. The IWB and the student stand in a coupled relation in which both have symmetrical influence over each other. The student and the IWB constitute a learning assemblage. The removal of any of its components would decrease or eliminate the assemblage's learning capacity.

181

Armstrong et al. (2005) found that the IWB contributed to the students' understanding of particular curricular contents by allowing students to manipulate text and graphics on the screen. For example, they reported one lesson in which the goal was to create a coherent narrative based on a set of random sentences displayed on the IWB screen. The student had to combine the sentences in order to construct a meaningful paragraph. To do so, the student had to move the sentences around using pick, drag and drop gestures. According to the previous arguments it can be argued that the student off loaded some of her cognitive burden onto the IWB. For instance, it can be argued that when the student manipulates the sentences on the IWB screen her short term memory demands are reduced and more attention can be given to reasoning and problem solving, which suggests fewer cognitive resources will be used to solve the puzzle as the sentences are now stored on the IWB's screen and can be physically manipulated via gestures. Functionally speaking there is no relevant difference between the student who manipulates the sentences on the IWB and the student who organizes the sentences introspectively. An argument against the idea of embodied sense making would need to demonstrate that the processes emerging in the interaction between the student and the IWB, are not cognitive processes on their own right.

The examples I have reviewed show how some teachers interacted with the IWB in ways that instantiated novel ways to make sense of their own situation. The teacher who enhanced her capacity to retrieve information through the archival and retrieval functions afforded by the IWB reveals the complex ways she made sense of the policy on instructional technology. For this teacher the policy is enacted in practices that involve extensions of her cognitive capacities. Moss et al. (2007) reported the case of a teacher who used the IWB in ways that evidenced the extension of cognitive functions and revealed a very sophisticated understanding of the policy on instructional technology. For a lesson on geometry, this teacher created an interactive diagram that displayed the area of a square as the square changed its size. The interactive diagram could be manipulated to see how the changes on the sides' length determined changes in the area. This teacher connected a tablet computer with the IWB via wireless link.

The tablet circulated around the classroom and students were able to manipulate the size of the sides on the tablet to see the changes displayed on the IWB. As the students used the tablet the teacher encouraged them to find out the formula behind the process. The IWB was running a very simple program that applied the formula to calculate the area of a square every time the size of the square changed. Following my previous discussion on the constitution theme it could be argued that the IWB was a constitutive component in the process of calculating the area of the square. The teacher used the IWB as an extension of her cognitive processes that allowed her to pay more attention to the students' responses to the problem, and less attention to the calculations behind the interactive diagram. This allowed her more time to answer the students' questions and probe for more answers. The way this teacher integrated the IWB to her teaching practices and the way the IWB constituted an extension of her cognitive processes shows a very sophisticated understanding of the policy on instructional technology. For instance her classroom practices revealed her sense making of policies expressed in a variety of policy texts. For example, Alberta Learning (2004) in its *Learning and Technology Policy Framework* indicated that "ICT skills can and should be embedded into content instruction and integrated appropriately into content-area outcomes across the curriculum/program" (Alberta Learning, 2004, p. 11). In light of this framework, it can be argued that the sense making of this teacher differed substantially from the sense making of the teacher who used the IWB as a conventional blackboard. Through her practices, the teacher who developed an interactive lesson using the IWB enacted the policy in ways that instantiated a rich environment for teaching and learning. The practices that incorporated the IWB as a blackboard brought about particular forms of student and IWB interaction, idiosyncratic applications of the IWB to teaching and learning, and specific forms of student participation (Moss et al. 2007) that differed from those in which the IWB was integrated into practices that generated complex ways to engage with the curriculum.

I must clarify that I am not prescribing ways to enact policy. I am not suggesting embodiment as a recipe to enact policy, nor I am suggesting a way to

evaluate which policy enactment is better or worse. Those are not the aims of this paper. I am using a gamut of examples to contrast different instances of policy enactment. I am arguing that a perspective of policy analysis that uses the notion of embodiment can explain the diverse ways school actors make sense of educational policy. In the next section I conclude this paper by summarizing the argument and arguing that an embodied account of educational policy sense making implies a redefinition of policy that portrays it as a contextualized process that takes place in the practices of school actors. This account differs from conventional understandings of policy that portray it as a finished product crafted by authoritative individuals at the higher levels of a bureaucratic structure.

**Conclusion**

In this paper I argued that the notion of embodiment is a useful theoretical construct that informs explanations of policy sense making. I started by offering a critique of authoritative instrumentalist discourses of policy analysis. These accounts portray policy as a finished product created by authoritative individuals at the top levels of governance. As a finished product, policy is portrayed as transferred to the lower levels of the bureaucratic structure where it is implemented. Applying this account to schools, I argued that authoritative-instrumentalists discourses of policy analysis fail to explain the ways in which policy actors recontextualize policies to their contexts of practice. In contrast, I argued that the notion of "policy enactment" (Ball, Maguire & Braun, 2012) provides policy analysts with appropriate theoretical constructs to analyze how school actors recontextualize policy. The notion of policy enactment implies a reconceptualization of policy, not as a finished product crafted by authoritative individuals but as a process that spans over multiple contexts of practice.

In order to explain how school actors recontextualize policies I offered the notion of policy sense making and argued that school actors recontextualize policies, that is, enact policies, when the engage in processes of policy sense making. I argued that policy sense making is an embodied process that takes place when school actors engage in bodily interactions with the objects that constitute

material manifestations of the policy. According to Ball, Maguire and Braun (2012), Barry (2001), Carolan (2011), Fenwick and Edwards (2010), Foucault (1986), and Nespor (2012), policy is materialized in multiple forms in contemporary societies. Some objects are material manifestations of policies that enrol people in actions and practices that range from blind compliance to conscious resistance. I analysed cases of IWB introduction to classrooms and argued that these devices are material manifestations of policies on instructional technology. I claimed that the bodily engagements between school actors and IWBs constitute instances of policy sense making that contribute to the enactment of educational policy. I used Shapiro's (2011) taxonomy of theories of embodiment to illustrate how the notion of embodiment can inform our understanding of policy sense making in the classroom. In relation to the conceptualization theme, I argued that teachers conceptualize policy through their embodied interactions, such as gestures, with the IWB. In relation to the replacement theme, I contended that embodied accounts of policy sense making replace traditional accounts of policy understanding as internal mental representation. In relation to the constitution theme, I argued that some instances of policy sense making take place in the interactions between the teacher and the IWB. These arguments suggest that policy sense making should not be analysed as a process that occurs inside the head of a decontextualized individual. Instead, the notion of embodied policy sense making shows that the dynamic and ever-changing nature of policy contexts requires a more comprehensive conceptualization of the *here and now* of the contexts in which educational policy is enacted.

Traditional discourses on policy implementation, constructed around the idea of authoritative individuals and bureaucratic structures, fail to capture the complexity of policy sense making because they are unable to examine the situated character of school actors and the practices that emerge as educational policy materializes in schools. This does not mean that other policy actors, such as trustees, government officials or politicians disappear in the characterization of policy enactments. Given the space and time limitations of this study, I decided to

185

pay special attention to the enactment of policies in the classroom highlighting how actors at the school level enact policies by engaging in embodied interactions with the material manifestations of the policy. However, this picture does not mean to circumscribe policy processes to the classroom or school context. Other policy actors play important roles in the way policy is brought to practice. For instance, my example of IWBs could be expanded to examine the role of trustees in the process of enactment of a provincial policy on instructional technology. The analysis could be enriched by examining how and why IWBs were positioned as primary targets for funding instead of tablet computers or laptops. The analysis would also aim to characterize the practices and roles that emerged as a consequence of privileging IWBs and how those roles and practices shaped new forms of interaction in the classroom that materialized in concrete assessment and instructional practices. Administrators and government officials could find this approach to policy processes useful to understand the ways policies are recontextualized in schools and how such recontextualization brings about idiosyncratic transformations in the way schools operate.

The notion of enactment stands as an alternative to authoritative-instrumentalist discourses of policy analysis. My argument shows that school actors recontextualize policies through creative processes of sense making which also suggests that school actors are not just passive executors of mandates. School actors translate policy into their contexts of practice adapting the policy to their own situation. Policy artefacts pose new and intriguing challenges for policy analysts. The extent of their interaction with school actors and the way they participate in the enactment of educational policy is yet to be explored.

**References**

Adams, F. & Aizawa, K. (2009). *Why the mind is still in the head*. In. P. Robbins, & M. Aydede, (Eds.). *The Cambridge handbook of situated cognition*. New York: Cambridge University Press.

Adams, C. A., & Pente, P. (2011). Teachers teaching in the new mediascape: Digital immigrants or "Natural Born Cyborgs"?. *E-learning and Digital Media, 8,* 3, 247-257.

Alberta Commission on Learning. (2003). *Every child learns, every child succeeds.* Edmonton: Alberta Commission on Learning.

Alberta Learning, (2004). *Learning and technology policy framework.* Edmonton: Alberta Learning.

Alberta Teachers' Association. (2011). *The impact of digital technologies on teachers working in flexible learning environments*. Edmonton: Alberta Teachers' Association.

Apple, M. W. (2004). Are we wasting money on computers in schools?. *Educational Policy, 18,* 3, 513-522.

Armstrong, V., Barnes, S., Sutherland, R., Curran, S., Mills, S., & Thompson, I. (2007). Collaborative research methodology for investigating teaching and learning: The use of interactive whiteboard technology. *Educational Administration Abstracts, 42,* 1.

Ball, S. J., Maguire, M., & Braun, A. (2012). *How schools do policy: Policy enactments in secondary schools*. London: Routledge.

Barsalou, L. W. (2008). Grounded cognition. *Annual Review of Psychology,59,* 617-45.

Barry, A. (2001). *Political machines: Governing a technological society*. London: Athlone Press.

Beer, R.D. (2012). Dynamical systems and embedded cognition. in K. Frankish and W. Ramsey (Eds.), *The Cambridge Handbook of Artificial Intelligence*. Cambridge University Press.

Bergen, B. & Feldman J. (2008) Embodied concept learning In P. Calvo (Ed.) *Handbook of cognitive science*. Kidlington: Elsevier.

Braun, A., Ball, S. J., Maguire, M., & Hoskins, K. (2011). Taking context seriously: Towards explaining policy enactments in the secondary school. *Discourse,32,* 4, 585-596.

Braun, A., Maguire, M., & Ball, S. J. (2010). Policy enactments in the UK secondary school: examining policy, practice and school positioning. *Journal of Education Policy, 25,* 4, 547-560.

British Educational Communications and Technology Agency. (2004). *Getting the most from your interactive whiteboard: A guide for primary schools*. Coventry: BECTA.

Carolan, M. S. (2011). *Embodied food politics*. Farnham: Ashgate Pub

Clark, A. (2003). *Natural-born cyborgs: Minds, technologies, and the future of human intelligence*. Oxford: Oxford University Press.

Clark, A. & Chalmers, D. (1998). The extended mind. *Analysis, 58*, 10 – 23.

Cohen, D. K. (1990). A Revolution in One Classroom: The Case of Mrs. Oublier. *Educational Evaluation and Policy Analysis, 12,* 3, 327-45

Cuban, L. (2003). *Oversold and underused: Computers in the classroom*. Cambridge, Mass: Harvard University Press.

Deaney, R., Chapman, A., & Hennessy, S. (2009). A case study of one teacher's use of interactive whiteboard system to support knowledge co-construction in the history classroom. *The Curriculum Journal, 20,* 4, 365 - 387.

Daniels, J., Friesen, S, Jacobsen, M. & Varnhagen, S. (2010). *Technology and high school success research: Final report*. Edmonton, AB: Alberta Education. Retrieved from: http://education.alberta.ca/admin/technology/research.aspx.

Davison, I., & Pratt, D. (2003). An investigation into the visual and kinaesthetic affordances of interactive whiteboards. In Becta (Ed.), *Research Bursary Reports*. Coventry: Becta.

Dewey, J. (1944). Democracy and education: An introduction to the philosophy of education. New York, NY: Free Press. (Original work published 1916).

Fenwick, T. J., & Edwards, R. (2010). *Actor-network theory in education*. Milton Park, Abingdon, Oxon: Routledge.

Feuer, M. J. (2006). *Moderating the debate: Rationality and the promise of American education*. Cambridge, Mass: Harvard Education Press

Fullan, M. (2007). *The new meaning of educational change*. New York: Teachers College Press.

Glenberg, A. M. (2008). Embodiment and education, In P. Calvo (Ed.) *Handbook of cognitive science*. Kidlington: Elsevier

Glenberg, A. M., & Kaschak, M. P. (2002). Grounding language in action.*Psychonomic Bulletin & Review, 9,* 3, 558-65.

Heidegger, M. (1962). *Being and time*. New York: Harper.

Heidegger, M. (1977). *The question concerning technology, and other essays*. New York: Harper & Row.

Henry, C. J., & Garcia, A. C. (2004). Exclusive beverage arrangements in US and Canadian schools: A review of practices and policy perspectives. *Foodservice Research International*, *15*(3‑4), 107-117.

Hogwood, B. W., & Gunn, L. A. (1984). *Policy analysis for the real world.* Oxford: Oxford University.

Lakoff, G., & Johnson, M. (1999). *Philosophy in the flesh: The embodied mind and its challenge to Western thought*. New York: Basic Books.

Lewin, C., Somekh, B., & Steadman, S. (2008). Embedding interactive whiteboards in teaching and learning: The process of change in pedagogic practice. *Education and Information Technologies, 13*(4), 291-303.

Matlock, T. 2004). Fictive motion as cognitive simulation. *Memory & Cognition, 32*(8), 1389-1400.

Menary, R. (2010). *The extended mind*. Cambridge, Mass: MIT Press.

Meyer, H. D., & Rowan, B. (2006). *The new institutionalism in education*. Albany: State University of New York Press.

Merleau-Ponty, M. (1962). *Phenomenology of perception*. International library of philosophy and scientific method. New York: Humanities Press.

Moss, G., Jewitt, C., Levacic, R., Armstrong, V., Cardini, A., & Castle, F. (2007). The interactive whiteboards, pedagogy and pupil performance evaluation (Research report 816). London: DfES.

Nespor, J. (2002). Networks and Contexts of Reform. *Journal of Educational Change, 3,* 365-382.

Nespor, J. (2012). Devices and educational change. In T. Fenwick & R. Edwards (Eds.). *Researching education through actor-network theory*. Oxford: Wiley-Blackwell

Niedenthal, P., Barsalou, L., Winkielman, P., Krauth-Gruber, S., & Ric, F. (2005). Embodiment in Attitudes, Social Perception, and Emotion. *Personality and Social Psychology Review, 9,* 3, 184-211.

Pal, L. (2006). *Beyond policy analysis: Public issue management in turbulent times*. Scarborough: Thomson/Nelson.

Piaget, J., & Inhelder, B. (1969). *The psychology of the child*. New York: Basic Books.

Riveros, A. (2009). Thomas Greenfield and the quest for meaning in organizations: A postponed dialogue with Ludwig Wittgenstein. *Educational Administration and Foundations, 20*(2), 51-68.

Riveros, A. (In press). Cognition and administrative practices in education. In D. Burgess & P. Newton (Eds.), *Theoretical Foundations of Educational Administration.* Henday Publishing.

Riveros, A. (Submitted a). Embodied policy sense making: Gestures and policy enactment in schools.

Riveros, A., Newton, P., & Burgess, D. (2012). A Situated Account of Teacher Agency and Learning: Critical Reflections on Professional Learning Communities. *Canadian Journal of Education, 35,* 1, 202-216.

Rowlands, M. (1999). *The Body in Mind: Understanding Cognitive Processes*. Cambridge: Cambridge University Press.

Rupert, R. (2004). Challenges to the hypothesis of extended cognition. *Journal of Philosophy 101*, 389–428.

Shapiro, L. A. (2011). Embodied cognition. New York: Routledge.

Smart Classrooms, (2012a, June 11). SMART Board 800 series interactive whiteboard –Touch gestures video [Video file]. Retrieved from http://youtu.be/-ujkBEyG5Mk

Smart Classrooms, (2012b, June 11). SMART Board 800 series interactive
        whiteboard –Touch gestures video [Video file]. Retrieved from
        http://youtu.be/0U05WeXPGlk

Spillane, J. P. (2004). *Standards deviation: How schools misunderstand education
        policy*. Cambridge, Mass: Harvard University Press.

Spillane, J., Reiser, B., & Gomez, L. (2006). Policy Implementation and
        Cognition: The Role of Human, Social, & Distributed Cognition in
        Framing Policy Implementation in M. Honig (ed.), *New Directions
        in Educational Policy Implementation: Confronting Complexity*.
        New York: SUNY Press.

Spillane, J., Reiser, B., & Reimer, T. (2002). Policy implementation and
        cognition: Reframing and refocusing implementation research.
        *Review of Educational Research, 72*(3) 387-431.

Thelen, E., Schöner, G., Scheier, C., & Smith, L. B. (2001). The dynamics of
        embodiment: A field theory of infant perseverative
        reaching. *Behavioral and Brain Sciences, 24,* 1, 1-34.

Varela, F. J., Thompson, E., & Rosch, E. (1991). *The embodied mind: Cognitive
        science and human experience*. Cambridge, Mass: MIT Press.

Wilson, R. &Foglia, L. (2011). Embodied cognition. In N. Zalta (Ed.), *The
        Stanford encyclopedia of philosophy*. Retrieved from:
        http://plato.stanford.edu/entries/embodied-cognition/

Yanow, D. (2000). *Conducting interpretive policy analysis*. Qualitative research
        methods, v. 47. Thousand Oaks: Sage Publications.

## Chapter 4

## Conclusion: How the Notion of Embodied Policy Sense Making Informs our Understanding of Policy Enactment

In the preceding papers I aimed to answer a set of questions that I asked at the introduction of this dissertation. The questions are:

- How does an account of educational policy sense making from the perspective of embodiment inform our understanding of educational policy enactment?
    a. What constitutes educational policy sense making?
    b. What constitutes educational policy enactment?
    c. What specific instances of educational policy sense making illustrate the enactment of an educational policy?

In this section I aim to take each of these questions in turn and indicate how I answered them in the previous papers. I will start by the sub questions and continue with the main question. After explaining how these questions were answered, I conclude with a few comments on what this thesis has achieved, some implications, limitations, and future directions.

## What Constitutes Educational Policy Sense Making?

In Paper 1 (Riveros, Submitted a) I described a phenomenon that has intrigued educational policy analysts: According to a growing body of research (Ball, Maguire & Braun, 2012; Coburn, 2001; Cuban, 1998; Hill, 2001, 2006; Honig, 2004; Spillane, 2002; 2004), a policy can be put into practice in multiple, diverse, and sometimes contradictory ways. Research in this area has pointed to the idiosyncratic ways in which school actors understand policy as an explanation for these differences. For instance, Spillane (2004) indicated that in many cases the recontextualization of the policy happens "not because the players are intentionally trying to change the story; it happens because that is the nature of human sense-making" (p. 8). I explored the notion of policy sense making and showed how the notion of sense making, from the perspective of embodiment,

contributes to our understanding of how educational policy is recontextualized by the school actors when they try to incorporate the policy to their practices.

I argued that the embodied engagements of school actors with the objects that are material manifestations of the policy constitute instances of sense making. I focused on one particular case of educational policy sense making, namely, the adoption of interactive whiteboards in schools in the context of a provincial initiative on educational technology. In my analysis I showed that schoolteachers make sense of the policy by engaging in embodied interactions, through gestures, when operating the interactive whiteboards. From the perspective of embodiment, gestures are not just random movements. Gestures are constitutive of thought. I related a series of experiments and studies (Alač & Hutchins, 2004; Goldin-Meadow et al., 2001) that have concluded that gesturing enriches the way people make sense of their experiences. Gesturing is constitutive of some cognitive processes such as conceptualization, memorization and retrieval. I argued that for the purposes of policy analysis, the interactive whiteboard (IWB) could be conceptualized as a material manifestation of the policy on instructional technology that enrols school actors in practices and actions that enact the policy in particular contexts of practice. Gesturing to interact with the IWB constitutes episodes of policy sense making as these interactions allow school actors to conceptualize the policy through the incorporation of the device into their contexts of practice.

In paper 2 (Riveros, Submitted b) I aimed to elaborate on the notion of embodiment and drew upon Shapiro's (2010) taxonomy of theories of embodiment to illustrate how the notion of embodiment offers useful insights to understand educational policy sense making. Shapiro proposed three themes to embodiment: conceptualization, replacement, and constitution. In relation to the conceptualization theme, I argued that teachers conceptualize policy through their embodied interactions, such as gestures, with the IWB. In relation to the replacement theme, I contended that an embodied account of policy sense making replaces traditional accounts of policy understanding as internal mental

representation, offering, in contrast, a picture of policy sense making as embodied practice. In relation to the constitution theme, I argued that some instances of policy sense making take place in the interactions between the teacher and the IWB. I concluded that policy sense making is an appropriate conceptual construct for policy analysis because it reflects the dynamic and ever-changing nature of the policy contexts. The notion of embodied policy sense making responds to the field's need for a more comprehensive conceptualization of the *here and now* of the contexts in which educational policy is enacted.

**What Constitutes Educational Policy Enactment?**

In paper 1 argued that some conceptualizations of policy pay insufficient attention to the contexts where the policy practices take place, downplaying the role of the actors, their actions, and practices. I used the term " authoritative instrumentalism" (Colebatch, Hoppe, & Noordegraaf, 2010; Shore & Wright, 2011) to refer to forms of policy analysis that 1) portray policy as instrumental to solving governance problems, and 2) portray policy as a finalized product crafted at one level in the bureaucratic hierarchy by authoritative individuals, and then implemented at another level within that hierarchy (Hogwood & Gunn, 1984; Pal 2009). Traditionally, these forms of policy analysis used the term "implementation" to refer to the process of bringing a policy initiative into effect (Pal, 2009, p. 21).  According to Ball, Maguire and Braun (2012), the notion of "implementation" suggests a picture of policy development as a top-down process within a hierarchical structure. I introduced several examples (Ball, Maguire & Braun, 2012; Coburn, 2001; Cuban, 1998; Hill, 2001, 2006; Honig, 2004; Spillane, 2002; 2004) that showed that the practice of policy development does not correspond to this image. Policies are adopted in schools through complex processes of sense making consisting in meaning negotiation, translation, and recontextualization. According to Ball, Maguire and Braun (2012) "implementation" does not capture the complexities of the practices by which policy is actualized in schools. As a concept that was appropriated and developed within the context of authoritative instrumentalism, "implementation" fails to capture the active and creative efforts of the people who aim to make sense of

194

policy in their particular contexts of practice. I indicated, following Ball, Maguire and Braun (2012), that the notion of enactment offers a robust conceptualization of how school actors recast policy texts into concrete practices as part of an embodied process of meaning negotiation.

I showed that policy sense making and policy enactment are intimately related and that an explanation of policy enactment requires an account of sense making. I argued that an embodied account of sense making is appropriate to explain how school actors understand policy in their contexts of practice and that an embodied account of policy sense making is key to understand the enactment of policy in the school settings. Furthermore, I argued that the narrative of authoritative instrumentalism subsumes a problematic conceptualization of the role of schools in a democratic society. Following Dewey (1916) I noted that schools are social institutions geared towards social change and that education is inherently a democratic endeavour. I argued that an image of school actors as mere implementers of predetermined policies with fixed meanings expresses an authoritarian conception of schools that is unacceptable from a perspective that acknowledges the democratic value of education and schooling.

In paper 2 I contended that policy is enacted in the practices and actions of the different actors that participate in the policy processes. In the school, actors enact educational policy when they engage in the practices and actions that recontextualize the policy. I concluded that policy enactment is constituted by the practices and actions of the actors who strive to make sense of the policy in their contexts of practice.

**What Specific Instances of Educational Policy Sense Making Illustrate the Enactment of a Policy?**

In paper 1 I argued that the embodied engagements of school actors with material manifestations of educational policy constitute instances of policy sense making. In particular, I argued that, in the case of policy on instructional technology, the embodied interactions that integrate technological devices into

195

practices, instantiate episodes of policy sense making. I offered a conceptualization of the IWB as a device that that enrols actors into practices that enact the policy. Traditionally, policy analysts have paid scant attention to the role of artefacts in policy processes (Nespor, 2009), portraying them as mere furniture that provide a background to the policy "implementation". I argued that, from a policy analysis perspective, some artefacts in schools are vehicles of the policy. They mobilize school actors in practices that contribute to the enactment of the policy (Apple, 2004; Ball, Maguire & Braun, 2012; Barry, 2001; Carolan, 2011; Cuban, 2003; Fenwick & Edwards, 2010; Foucault, 2008; Nespor, 2009). Studies conducted by Ball, Maguire and Braun (2012) and Nespor (2009) illustrated how certain artefacts, like posters, scantron sheets, and computerized assistive devices, are material expressions of educational policies that play a role in the configuration of the practices that recontextualize the policy to the school settings.

I argued that the gestures performed by the teacher in front of the IWB are examples of the bodily engagements with a policy artefact. From a policy analysis perspective, when a teacher gestures to operate the IWB she is articulating a practice that includes the body in interaction with a material manifestation of the policy. Through her embodied interactions with the IWB, the teacher enacts the policy as she strives to make sense of it through her actions. In aper2 I offered additional examples of instances of educational policy sense making that illustrate the enactment of a policy. I adopted Shapiro's (2010) taxonomy of theories of embodiment and explained how the three themes that he identified in the literature on embodiment: conceptualization, replacement and constitution, inform the notion of embodied policy sense making. I offered three lines of argumentation. First, I claimed that school actors conceptualize the policy through their embodied interactions with policy artefacts. Second, I argued that an embodied account of educational policy sense making replaces authoritative instrumentalist assumptions about policy processes, such as the idea that policy arrives in schools as a finished product and that the role of school actors is to accurately implement it. An embodied account of policy sense making subverts this "thin" (Ball, Maguire & Braun, 2012, p. 14) account of policy and proposes an account that

highlights the active role of school actors in the policy processes. Third, I contended that an embodied account of educational policy sense making illustrates how school actors incorporate policy artefacts into their actions and practices. In particular, I argued that an embodied account of policy sense making illustrates how the couplings between school actors and policy artefacts, like the IWB, configured idiosyncratic ways to make sense of the policy.

In relation to the conceptualization claim, I analyzed the case of two teachers (Moss, et, al. 2007) who enacted a policy on instructional technology in different ways. One teacher integrated the computational capabilities of the IWB into his teaching practices. As the teacher strived to make sense of the policy, he adapted and reconfigured his practices in ways that helped him to make sense of the policy. The emerging practices configured an idiosyncratic understanding of some of the abstract concepts in the policy texts, such as "curricular integration" or "demonstration and modelling". The emerging understandings were idiosyncratic because they were particular, situated, and contextually bounded. The practices that took place as this teacher attempted to make sense of the policy were different from the practices that appeared when the other teacher aimed to incorporate the IWB into his practices. The other teacher incorporated the IWB into his practices as a conventional blackboard. He did not make use of the computational affordances of the IWB and used the IWB as a conventional erasable surface to write down and display information for his students. Evidently, both teachers enacted the policy on instructional technology in different ways. Moss et al. (2007) noted: "the teacher recognized the potential of IWBs to behave like a traditional blackboard and adapted the technology in this light to his existing pedagogic practice" (p. 35). In this case the IWB was incorporated into concrete teaching practices that enacted the policy in a particular way. These practices revealed a particular way to make sense of the abstract concepts in the policy texts. For this teacher "curricular integration" and "demonstrating and modelling" made sense in the practices that incorporated the IWB as a conventional blackboard.

In relation to the replacement claim, I argued that an account of policy sense making based on the notion of embodiment offers a situated perspective that integrates contextual elements in policy analysis. Policy sense making, from an embodied perspective, offers a comprehensive account of policy processes that replaces decontextualized accounts of policy sense making that focus on the agent's internal representation of a finished product designed at the top of the bureaucratic structure. An embodied account of policy sense making situates policy in the practices and actions of actors who actively negotiate the meaning of the policy in a process of continuous recontextualization.

In relation to the constitution claim, I reviewed cases (Moss et al., 2007) that showed how some teachers interacted with the IWB in ways that instantiated idiosyncratic ways to make sense of the policy. The teacher who enhanced her capacity to retrieve information through the archival and retrieval functions afforded by the IWB reveals the complex ways she made sense of the policy on instructional technology. For this teacher the policy was enacted in practices that involve extensions of her cognitive capacities.

The cases that I analysed in the preceding papers included in this dissertation reveal how the body in interaction with the material manifestations of the policy configure instances of policy sense making. The practices and actions that emerge as school actors try to make sense of the policy illustrate how the policy is enacted in the school in creative and idiosyncratic ways.

## How Does an Account of Educational Policy Sense Making from the Perspective of Embodiment Inform our Understanding of Educational Policy Enactment?

In the preceding papers I have argued that the notion of embodied policy sense making provides a deeper understanding of policy enactment because it clarifies how school actors recontextualize policy through their practices and actions. I have argued that the notion of embodiment offers a situated account of policy processes that allows educational policy analysts to study how school

actors make sense of policy in their contexts of practice. An account of policy sense making from the perspective of embodiment situates sense making in the practices and actions of the actors involved in policy processes. This account challenges authoritative-instrumentalist discourses that portray policy as a finished product crafted by policy elites.

A conceptualization of policy sense making from the perspective of embodiment shows how school actors recontextualize the abstract ideas of the policy in idiosyncratic ways through their practices and actions. It shows how policy is enacted, namely, how policy is recontextualized in the practices of school actors. The notion of enactment offers a depiction of policy practices that emphasizes the processes of negotiation and conflict that take place when policy actors try to make sense of the policy (Ball, Maguire &Braun, 2012). It implies a redefinition of policy as a process that involves the participation of policy actors enrolled in different contexts of practice. The notion of policy enactment challenges the "narrative of authoritative instrumentalism" (Colebatch, Hoppe, & Noordegraaf, 2010; Shore & Wright, 2011), according to which, authoritative individuals at the top of a bureaucratic structure create policies that are instrumental in solving governance problems. From the perspective of enactment, the narrative of authoritative instrumentalism is insufficient to explain how educational policy is recontextualized and transformed in the contexts of practice because it assumes that policy is a finished product that does not admit transformations and adaptations at the lower levels of the bureaucracy. Research in this area (Ball, Maguire & Braun, 2012; Coburn, 2001; Cuban, 1998; Hill, 2001, 2006; Honig, 2004; Spillane, 2002; 2004) has found that policies are generally transformed and recontextualized in the contexts of practice. The notion of policy enactment offers a context-sensitive perspective that provides policy analysts with the conceptual tools to study such transformations.

In addition to the previous points, I argued that authoritative instrumentalism underscores a problematic understanding of educational policy analysis because it portrays policy processes as mechanistic and hierarchical,

reducing policy analysis to the evaluation of the effectiveness and efficiency of implementation. This approach to policy analysis coincides with recent management tendencies that introduce forms of technocratic rationality in the practices and actions of school actors (Apple, 2004; Ball, 1994) as they overemphasize accountability and control, limiting democratic participation, contestation and debate. The idea of enactment challenges the authoritarian connotations of authoritative instrumentalism because it recaptures the active role of school actors in the definition of policy.

The notion of policy enactment also reveals policy as an iterative process, that is, a process that is recurrent and unfolding. The enactment of a policy does not end once new practices have emerged. On the contrary, the emergence of new practices contribute to the constitution of new social and material contexts that allow for further recontextualization of the policy. I have indicated that school actors make sense of the policy as they engage in embodied interactions with the material manifestations of the policy. As a result of the new practices that appear in these interactions, the social and material contexts of the school are transformed, creating new opportunities for action and new possibilities to engage with the reconstituted material and social context in new embodied interactions. This on-going process of continuous specification and recontextualization is part of the nature of policy sense making and explains the multiplicity of policy enactments that were evidenced in the examples cited in chapters 1, 2 and 3.

**What this thesis has achieved**

In this thesis I have laid the foundations for a dialogue between fields that have been traditionally separated, such as, philosophy, cognitive sciences, and policy analysis. I have shown that they can inform research on policy enactments and policy sense making. For instance, I have shown that a philosophical reflection on the body can inform analyses of policy enactment in schools and I have shown that studies in contemporary cognitive science provide tools for studying the processes of embodied policy sense making.

I offered a reconceptualization of the notion of policy. I criticised the notion of policy as an object crafted by authoritative individuals and I argued, based on the notion of policy enactment (Ball, Maguire & Braun, 2012), that policy is a process that spans over contexts of practice. A reconceptualization of the notion of policy allowed me to challenge the notion of policy implementation, according to which, policies are transferred from the upper levels of bureaucracy to schools and classrooms. Instead, I argued that policies are recontextualized in the practices and actions of school actors, that is, policies are enacted, rather than implemented. The notion of policy enactment also challenges the narrative of "authoritative instrumentalism", that is, the idea that policies are crafted by authoritative individuals and that policies are instrumental to solve problems of governance. I offered examples (Ball, Maguire & Braun, 2012; Coburn, 2001; Cuban, 1998; Hill, 2001, 2006; Honig, 2004; Spillane, 2004; Spillane et al., 2002) that showed that policies are reconfigured in the school when the school actors try to make sense of them. The recontextualization of policies through embodied processes of sense making show that policies are constructed in complex processes of meaning negotiation in the contexts of practice and not necessarily at the higher levels of bureaucracy. My particular contribution to the concept of policy of enactment is to provide a more detailed description of the processes that take place when school actors recontextualize the policies in their contexts of practice. I argued that in the case of a policy on instructional technology, school actors make sense of the policy through their embodied engagements with objects that are material manifestations of the policy.

I chose the enactment of policies on instructional technology with emphasis on the IWB because the case studies on the adoption of these devices offer a dramatic picture of how school actors engage in embodied interactions with the objects that constitute material manifestations of the policy. However, I indicated in chapter 2 that an embodied account of policy sense making offers a situated account of policy processes that could be applied to other policy contexts. An analysis of policy enactments based on the notion of embodied sense making attends to the social and material relations that policy actors establish within their

201

context of practice, their engagements with the material manifestations of the policy and the ways in which the actors' engagements with the policy objects articulate new practices and actions in the school.

In this thesis, I argued that the role of the body has been considerably overlooked in policy analysis and I offered a new conceptual construct to remedy this flaw: the notion of "embodied policy sense making", which aims to enrich analysis of policy enactment. I argued that an embodied account of policy sense making offers a situated perspective on policy enactment, because it shows how contextual elements, in interaction with the body, configure actions and practices that allow school actors to make sense of the policy and to put the policy into practice. This dissertation offers a contextualized perspective to understand policy processes. Researchers, administrators and practitioners would benefit from adopting this perspective because it brings to the fore the relations and interactions that were not evident in authoritative instrumentalism. In particular, an embodied account of policy sense making positions policy actors, policy artefacts and their practices as the focus of the analysis. The lack of understanding of policy sense making in schools has costly implications for schools and for those in charge of facilitating the policy processes. Authoritative instrumentalist accounts of policy processes fail to characterize the active role of policy actors and cannot provide useful insights about the way policy is brought into practice. The lack of detailed and contextualized knowledge about the way policies are put in practice would lead administrators and other policy facilitators, such as school trustees, to adopt unsustainable policy-adoption strategies. That is, strategies that cannot be maintained over time and do not reflect the needs and expectations of other policy actors.

**Some Implications for Educational Administration and Leadership**

This thesis offers a situated perspective on policy enactment. I aimed to develop conceptual constructs that inform our analysis of policy in practice. The notion of embodied policy sense making gives policy analysts the opportunity to study the enactments of policy in the school settings from a perspective that

highlights the creative and transformative role of school actors in their contexts of practice. In addition to the implications for policy analysis, this thesis has some implications for educational administration and leadership. An embodied account of the way policy is transformed in practice requires a related account of leadership and power in schools. Indeed, the notion of embodied policy sense making suggests that school actors recontextualize policy, transforming it when they incorporate the policy into their contexts of practice. The creative and active involvement of school actors in policy enactment presents school leaders with a critical question about their actual role in the process of putting educational policy in practice: what style of leadership is required for the enactment of policy as opposed to the implementation of policy? In this work, I have portrayed implementation as a top-down process that responds to the narrative of authoritative instrumentalism. I contrasted the narrative of authoritative instrumentalism with the notion of policy enactment and argued that policy is transformed in schools through embodied processes of sense making that recontextualize policies into practices. The notion of implementation does not capture the situated processes of sense making that take place when school actors incorporate the policy into their contexts of practice.

What does it mean that leaders must lead for enactment and not for implementation? Perhaps the work of Christopher Hodgkinson (1978, 1983, 1991, 1996) can suggest some promising directions. Hodgkinson (1983) distinguished between management and administration indicating that the former involves policy implementation whereas the latter involves policymaking (Hodgkinson, 1983). In his view, the educational administrator sees purpose and meaning in the action of other school actors (Hodgkinson, 1991). The form of leadership proposed by Hodkingson is transformational and moral because it seeks to engage others in the search for moral purpose and agency (Hodgkinson, 1996). A transformational leader is less concerned with the bureaucratic control and the mechanical execution of mandates. Instead, a transformational leader adopts a participative and democratic model that is reflected in the way policy is put in practice and decided as a collaborative enterprise.

In addition to the previous points on the implications for our understanding of educational leadership, the notion of policy enactment also implies a reconsideration of the role of the "policy maker". Authoritative instrumentalism portrays policy makers as those who hold the authority and power to create and define policy. From this perspective, administrators and government officials are perceived as being in control of the policy processes. However, the cases and examples that I have reviewed in this dissertation show that this image of policy processes does not reflect the complex processes of recontextualization that take place when policy actors engage in embodied processes of policy sense making. A reconsideration of the role of policy actors in policy enactment implies that policies are not finished objects crafted by authoritative individuals but complex processes of meaning negotiation that involve many actors and contexts of practice. A policy enactment perspective portrays powerful actors in policy processes, such as administrators or government officials, as contributors to the policy processes. The perspective that I have defended in this dissertation shows that other policy actors, such as the teachers, students and other classroom-level actors, have an important role in the enactment of the policy because they recontextualize the policy as they try to make sense of it through their practices and actions in the school settings.

My thesis also has implications for our understanding of schools as organizations. As noted in the previous chapters, the notion of embodied policy sense making suggests that policy is enacted in complex processes of recontextualization that do not correspond to the traditional models of bureaucratic and hierarchical organization. The notion of enactment highlights the creative and transformative capacity of school actors, and thus, subverts the notion of organizational power as unidirectional and concentrated in the hands of authoritative individuals. Early conceptualizations of organizations as information-processing systems (Simon, 1957) failed to capture the flexibility and adaptability of schools to the demands of education reform. The notion of enactment shows that schools are not static structures that scan the environment, process information, and generate outputs (Simon, 1957), but flexible and

dynamic assemblages where school actors transform and create their own contexts of practice.

Finally, the notion of embodied policy sense making offers an alternative to Evers and Lakomski's (1996, 2000) ideas about professional learning and decision making in schools. Let us recall that Evers and Lakomski proposed a connectionist model to explain how school administrators learn about their practice and make decisions. They argued that the notion of neural networks could offer an account that "naturalizes" the knowledge of educational administration. As I noted in chapter one, this model holds strong individualist assumptions that do not take into account the body's capacity to constrain, distribute and regulate cognitive activity (Wilson & Foglia, 2011). In contrast, an embodied account of policy sense making offers a situated account of how school actors recontextualize policy through their embodied action and practices. Policy sense making is portrayed as a situated process that emerges as school actors incorporate policies into their practices. One important implication of the notion of embodiment for professional learning in schools is that it suggests that teachers and administrators learn about their profession as they engage in contextualized practices. Professional learning is not an isolated event that takes place during a meeting after school. Professional learning can be portrayed as a process that requires the emergence of practices and actions that give meaning to the schools actor's experiences (Riveros, 2012; Riveros & Viczko, 2012).

**Limitations**

This thesis aimed to expand our understanding of policy enactment. I offered an account of policy enactment that explains what makes it possible for policies to be transformed in schools. I argued that policies get transformed and adapted to the school context when the school actors recontextualize the policy in their practices and actions. This account of policy processes does not intend to distinguish "good" enactments from "bad" enactments of policy. My intention was to offer an account of the processes that take place when school actors

attempt to make sense of the policy and to show that in the process of policy sense making, school actors engage in practices and actions that enact the policy.

A different question is: what legitimates a policy? In the current stage of this research I have little to say about this question except that the body is also a site for contestation and resistance. Judith Butler (1989) indicated that "the body is a site where regimes of discourse and power inscribe themselves, a nodal point or nexus for relations of juridical and productive power" (p. 601). The question of policy legitimacy is a question about what makes a given practice or set of practices a legitimate instance of the policy. In order to answer this question we require an examination of the way power is institutionalized in the school and how practices in schools legitimate different modes of power and agency. Evidently, the question about legitimacy cannot be answered by reference to a simplistic model of correspondence between practices and some platonic ideal of the policy. I have shown that policies are configured in complex processes of recontextualization that include the bodily engagements of school actors with artefacts and other actors in practices and actions. An answer to the question about legitimation requires an acknowledgement of the embodied processes of sense making that take place in the school context, because it is through these processes that policy is configured in the school. An answer to the question about legitimation also requires a recognition of the political processes that take place in schools, as well as a study of how these processes enable, and also restrict, forms of agency that legitimize or delegitimize the practices that enact policies (Riveros, submitted c).

The question of legitimacy is important because it would allow an exploration of the normative conditions and political processes under which a practice or set of practices is accepted within the social and political sphere. Lave and Wenger (2003) have argued that practices are legitimated through the actors' participation in social scenarios where meaning negotiation takes place. They call this process "legitimate peripheral participation" (p. 29). The legitimacy of practices is determined relative to the cultural norms that provide a background

for action. Foucault (2006) argued that social relations take place in society as a product of relations of power. In his view, "to live in society is to live in such a way that action upon other action is possible – and in fact on-going. A society without power relations can only be an abstraction" (pp. 222-223). Thus, a study of the legitimacy of the practices that enact educational policy requires an examination of the mechanisms through which power is exercised and manifested in educational settings (Ball, 2012). As I have indicated before, an answer to these questions would require a separate study that explores the dynamics of power and the way they shape schools as political scenarios. I have advanced some of these ideas in my critique of authoritative instrumentalism by noting that a perspective of policy analysis that assumes the passivity of school actors in relation to policy processes implies an authoritarian model of society that does not reflect the contested nature of democratic institutions. The politics of the body (Foucault, 1977) remain to be explored and their significance for an embodied account of policy sense making are yet to be studied. In Riveros (submitted c) I gave the first steps towards an exploration of these issues and I argued that the Foucauldian notion of disciplined body (1990) can be expanded to capture the creative processes of embodied policy sense making that recontextualize policy into practices.

**Future Directions**

In the future, I plan to use the conceptual construct of "embodied policy sense making" in an empirical research on policy enactment in schools. In particular, I want to investigate how policy on instructional technology is manifested in schools. I plan to use a "policy ethnography" approach (Shore & Wright, 2012) to explore how the uses of technological devices in educational contexts constitute enactments of policy. This research has the potential to illuminate the role of technology in school reform and to show how the incorporation of technological devices in the practices and actions of school actors configure new roles, forms of agency, and power in schools.

**References**

Ball, S. J., Maguire, M., & Braun, A. (2012). *How schools do policy: Policy enactments in secondary schools*. London: Routledge.

Ball, S. J. (2012). *Foucault, Power, and Education*. Hoboken: Taylor and Francis.

Butler, J. (1989). Foucault and the paradox of bodily inscriptions. *The Journal of Philosophy, 86*(11), 601-607.

Butler, J. (1999). *Subjects of desire*. New York: Columbia University Press.

Coburn, C. E. (2001). Collective sensemaking about reading: How teachers mediate reading policy in their professional communities. *Educational Evaluation and Policy Analysis.* 23 (2), 145-170.

Cuban, L. (1998). How schools change reforms: Redefining reform success and failure. *Teachers College Record.* 99 (3), 453-477.

Foucault, M. (1977). *Discipline and punish: The birth of the prison*. New York: Pantheon Books.

Foucault, M. (1988). The ethic of care for the self as a practice of freedom, in J. Bernauer & D. Rasmussen (eds.), *The Final Foucault.* Cambridge, MA: MIT Press

Foucault, M. (1990). *The history of sexuality: Vol. 1*. New York: Vintage.

Foucault, M. (2006). Afterword: The subject and power. In H. Dreyfus & P. Rabinow (Eds.), *Michel Foucault: Beyond structuralism and hermeneutics*. Chicago: Univ. of Chicago Press.

Hill, H. (2001). Policy is not enough: Language and the interpretation of state standards. *American Educational Research Journal.* 38 (2), 289-318.

Hill, H. (2006). Language matters: How characteristics of language complicate policy implementation. In M. Honig (Ed.), *New directions in education*

*policy implementation: Confronting complexity* (pp. 65-82). Albany, NY: SUNY Press.

Hodgkinson, C (1978). Towards a philosophy of administration. Oxford. Basil Blackwell.

Hodgkinson, C. (1983). The philosophy of leadership. Oxford: Basil Blackwell.

Hodgkinson, C. (1991). Educational leadership: The moral art. New York: Suny Press.

Hodgkinson, C. (1996). Administrative philosophy: Values and motivations in administrative life. Oxford: Pergamon.

Honing, M. (2004). Where's the "Up" in bottom-up reform? *Educational Policy. 18,* 527-561

Lave, J., & Wenger, E. (2003). *Situated learning: Legitimate peripheral participation*. Cambridge: Cambridge University Press.

Riveros, A. (Submitted a). Embodied policy sense making: Gestures and policy enactment in schools.

Riveros, A. (Submitted b). Reencountering the policy sense maker: Interactive whiteboards and policy enactment in schools.

Riveros, A. (Submitted c). La corporeidad en la escuela y la construcción del sentido de las políticas educativas.

Riveros, A. (2012). Beyond collaboration: Embodied teacher learning and the discourse of collaboration in school reform. *Studies in Philosophy and Education, 31*(6), 603-612

Riveros, A. & Viczko, M. (2012). Professional knowledge "from the field": Enacting professional learning in the contexts of practice. *McGill Journal of Education, 47*(1), 37-52

Shore, C., & Wright, S. (2011). Conceptualising Policy: Technologies of governance and the politics of visibility. In C. Shore, S. Wright & D. Pero (Eds.), *Policy worlds: Anthropology and the analysis of contemporary power* (pp. 1 - 26). New York: Berghahn.

Spillane, J. P. (2004). *Standards deviation: How schools misunderstand education policy / James P. Spillane*. Cambridge, Mass: Harvard University Press.

Spillane, J. P., Diamond, J. B., Burch, P., Hallett, T., Jita, L., & Zoltners, J. (2002). Managing in the Middle: School Leaders and the Enactment of Accountability Policy. *Educational Policy, 16,* 5, 731-763.