

Research On Content In Physical Education: Theoretical Perspectives And Current Debates

Shivani

Assistant Professor

Abstract

This special edition of Physical Education and Sport Pedagogy is about research on content in physical education (PE). The content focus has been minimal over the years and could be considered as the "missing paradigm" (Shulman, 1986) despite some seminal contributions and debates introduced in the late 80s (Rink et al., 1992; Siedentop, 1989/2000). However, more recently researchers have begun to focus on the complexity of how the content of lessons is brought into play during the interactive teaching/learning process with special attention to the social and cultural contexts that contribute to content development.

Their argued position is that the domain-specific content knowledge is a key element in the teaching/learning process, which allows a more integrated approach to thinking about knowledge production in PE (Amade-Escot, 2000, 2006, Griffin & Placek, 2001, Kirk & Macdonald, 1998; Rovegno, 1998; Tinning, 2002). The questions addressed by the current research on content are: How do the teacher and students contribute to the development of content during and across lessons? How does student learning of content evolve through classroom interactions? What educational experiences favour the acquisition of content? How do the contextualized settings of teaching and learning support content knowledge development together with value-laden, educational ends and personal and social development? How can PE take into account students' diversity and specific needs while at the same time create a shared cultural knowledge base of physical activities and sport which does not alienate any of the students? How does the context of PE help students to construct meaningful experiences that promote transferability to other contexts? These questions are important questions for research and for the practice of teaching.

Contemporary research approaches to the development of content in PE settings is based on the assumption that the content taught and learned is a result of shared and co-constructed processes between teacher, students and a specific learning environment including its social and cultural features. In the following sections, we cast light on the central characteristics of this research. First, we discuss the theoretical backgrounds that inform the research. Then we draw attention to the need for different lenses to understand the co-constructed process that is at the origin of content development. We introduce the five articles in this monograph/issue that tackle content development from ecological, didactic, and semiotic perspectives. Finally, we explore the ongoing theoretical debates that still exist between these approaches in the study of content knowledge and knowing in physical education.

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I. Introduction

Theoretical Backgrounds that Inform Research on Content. Nowadays research in the educational field promotes new ways of examining teaching, learning and the content knowledge as part of a complex system, which should be studied as a "unit of analysis" (Allal, 2001, Brown, Collins, & Duguid, 1989; Brousseau, 1997; Lave, 1988; Lave & Wenger, 1991). Such units of analysis define individual and social activities concomitantly within triadic relationships that encompass knowledge or knowing (embedded in the learning environment), the learner and the teacher's co-activity and interactions. Moreover, in these contexts, knowledge is considered the fruit of human activities or the artefacts and tools produced historically by human beings and then crystallized in social and cultural activities that form the backdrop in which any learning is developed (Vygotski, 1934/1997). These approaches are rooted in contemporary theories of teaching and learning, which consider first, that schoolwork is "work with knowledge"

(Bereiter, 1997, p. 298) and second, that human knowledge in general is the result of a constructivist process (Piaget, 1967, Vygotski, 1934/1997).

Of course, there are multiple constructivist theories. Piaget (1967) himself first used the expression "constructivists epistemologies" with a plural form. These epistemologies, which should be considered as high range theories and pervade almost all fields of social and behavioural sciences (such as psychology, sociology,

anthropology, philosophy, and linguistics). Constructivist theories are at the core of educational thinking and research primarily because their assumptions concern the construction of knowledge. That is why research on content in school disciplines is fundamentally concerned/connected with these theories. However, in the field of education, the differences between constructivist approaches open up space for important debates, which should be explored in relation to two continua.

The first continuum concerns the view on how knowledge is constructed. Is it a social situated process or an individual process? A huge debate between cognitive and situative theorists in the mid 90s finally led to recognition that both research perspectives are of interest and should be pursued vigorously even though the paradigmatic struggle is ongoing (Anderson, Reder, & Simon, 1996, 1997; Anderson, Greeno, Reder, & Simon, 2000; Brown, Collins, & Duguid, 1989, Cobb, 1994; Cobb & Bowers, 1999, Donmoyer, 1997; Greeno, 1997; Kirshner, & Whitson, 1998). This discussion has also been salient in PE (Griffin & Placek, 2001; Durand, 1998; Rovegno, Nevett, & Babiarez, 2001). For a review of the influences of these theories in PE see Rovegno (2006) and Rovegno and Dolly (2006).

The second continuum is more critical. It is connected to the nature of knowledge itself within a realist/anti-realist philosophical debate. Some constructivists view all knowledge as "constructed" under the assumption that it does not necessarily reflect any external reality. Knowledge is thus an auto-organized potentiality of the human being, a construct that makes it impossible to know the extent to which it reflects an ontological reality. In this approach, knowledge is contingent on convention, human perception, and social experience. In education, radical constructivists like von Glazerfeld (1995) defend this relativist viewpoint. This philosophy of knowledge may have some similarities with the one developed in PE by critical theorists with postmodernist, poststructuralist and postcolonial perspectives (For a review see Wright, 2006). It is also at the core of some situative perspectives which reject the view that knowledge acquisition can be an outcome of education (Kirshner & Whitson, 1998; Smith, 1995). Allal (2001) explains that "it is not clear whether instruction as a deliberate enterprise of promoting learning is a major concern for these authors" (p. 410). However, other constructivist theories conceive knowledge as socially and historically constructed and crystallized in activities that belong to a given culture and that are at the core of the schooling project of any society. Vygotski's cultural-historical psychology supports this philosophy of knowledge notably in the research he conducted on concept formation (1934/1997). This view acknowledges a twofold assumption: (1) knowledge construction at school is a result of in situ social interactions as well as the knowledge (values, beliefs, ways of knowing) learners and teachers bring to bear on any classroom activity, and (2) at the same time classroom activity works with referenced knowledge which is knowledge recognized by any institution: society, community of practice, etc... as adequate knowledge to fully participate and that predates the students' current educational experiences (Amade-Escot, 2000; Bereiter, 1997; Bronckart, 2001; Kirk & Macdonald, 1998; Kirk & Kinchin, 2003; Lave & Wenger, 1991; Sensevy, Mercier, & Schubauer-Leoni, 2000). Here it is alleged that relativism is a problematic position for educators. If the process of schooling has to struggle against the inequities of the students' social origin by empowering them, then the quality of referenced knowledge has a role to play in this process. Research on content in different school disciplines is based on these assumptions and tries to identify the conditions in which teaching and learning a particular content may contribute to students' empowerment.

The theoretical backgrounds that undergird the research give a central focus to content as a key variable in understanding the situated co-constructed process of teaching and learning, for the scholars who engage in classroom-based research and instructional design in collaboration with teachers.

These debates between the constructivists' multiple perspectives about learning theories were widely developed in educational psychology but a question remains to what extent they can inform teaching and learning practices and our understanding of schooling.

Greeno (1997) asserts that empirical evidence is never sufficient to resolve paradigmatic differences and considers that educational researchers must take into account the idea that any theory should offer not only prospects for theoretical advances but also implications for educational practices. For him "the important question is how to make school learning more beneficial beyond the classroom, providing students with general resources for reasoning both in and with the concepts of subject-matter domains" (p. 14, italic added). The purpose of this issue is not to pursue the theoretical debate in PE (see Macdonald, Kirk, & Metzler, 2002) but to highlight how current contemporary content related research increases our knowledge of the complexity of teaching and learning the content of physical education and to what extent it can influence practice.

Contemporary Research on Content in Physical Education: Ecological, Didactic, and Semiotic Approaches.

The following articles are built on works developed in English-speaking and French-speaking educational research communities, which have different research traditions.

Nevertheless, some current research in both communities shows increasing attention to content development as a critical aspect of quality PE. This special issue of the PESP journal aims to highlight the

commonalties and the specificities of three new strands of research: the ecological, didactic, and semiotic approaches to the study of the teaching and learning process in PE classrooms with a specific focus on the content taught and learned. We do not suggest that these three approaches cover all the work by constructivist researchers in PE. This editorial aspires to give a glimpse into the ongoing contributions of research on content in the field of sport pedagogy, and discuss some of the theoretical facets related to studying content development during PE lessons. Five articles compose this special edition. The first article (Rovegno & Gregg) is rooted in an ecological approach of teaching cultural content. The second and third articles (Walhead & O'Sullivan; Verscheure & Amade-Escot) are developed within the didactic perspective, look at the dynamic evolution of content through problematic and implicit negotiations in the situated contexts of instructional environments, and discuss their effect on students' learning.

The last two articles (Wright & Forrest; Wallian & Chang) are based on semiotics and examine the content actually taught, based on a linguistic analysis of verbal and non-verbal interactions. Viewed collectively the five articles study the evolution of content in PE settings, using qualitative research methods and explore the teaching and learning process in detail. However, the focus of the analysis differs and the choice in each particular case depends on the purpose at hand. From the first paper which examines how interdisciplinary content knowledge and curriculum decisions may (or may not) respectfully teach aspects of Native American culture, to the research that focuses on linguistic interactions in teaching games for understanding, through to the didactical analysis of negotiating content in peer teaching tasks or a design experiment which promotes gender equity, these five contributions clearly show that studying how content knowledge is co-constructed in PE settings benefits from the application of different theoretical lenses. The five articles show how these lenses contribute to a better understanding of the teaching and learning process. We argue that the situated context and the dynamics of shared practices, which are at the root of content development, should also be studied from different temporal scales. A longer scale encompasses the analysis of the enacted curriculum of different communities of practices while a smaller scale analysis examines specific content during particular situations and scrutinizes how language structures content knowledge through interactions. The range of units of analysis in these articles confirms the complexity of the process studied.

The Rovegno and Gregg article describes a school-based project focused on developing and teaching folk dance curriculum integrated within an interdisciplinary unit called "People and the Land: Native Americans and their Environments" at a predominantly African-American elementary school. Based on situated theory that considers learning as a process in participation in "communities of practices", it analyses an attempt to develop and teach culturally-situated content which is respectful of both the children's culture and the cultures from which the folk dances are drawn. The curriculum attempts to be transformative enabling children to view content (in this case, dance and geography) from multiple perspectives while also honouring the situated meanings children make about dance and culture at their developmental level. The curriculum also attempts to apply a culturally situated framework for developing school curriculum that approaches cultures holistically, portrays cultures as dynamic, rejects theories that support hierarchical rankings, and, counteracts stereotypes of indigenous cultures (in this case that Native American Nations are "fossils" or vanishing communities). The finding points out even though the children learned the content knowledge taught, that the teacher's subject matter ignorance or weakness can limit the effectiveness of teaching. The discussion, although it might appear too self-critical underscores the sensitive problem of the theory of content knowledge that the teacher carries when designing and teaching an unit. The authors' excellent questions relating to the teacher's pedagogical content knowledge when working outside her/his own cultural histories can be extended to all cultural insiders' subject matters.

The second and third articles are from the didactic perspective. Walhead and O'Sullivan show the critical role of the teacher as "facilitator" in the provision of effective content learning within peer teaching tasks. The study examines the evolution of content knowledge and knowing of a team of six students participating in peer-assisted learning tasks of a Tag Rugby Sport Education unit. Using a didactic research methodology to study the evolution of the participants' content knowledge, the authors consider the need of a "sharper lens" to understand the dynamic evolution of content during the unit. Within the theoretical idea of "breaches of the didactic contract", data analysis consisted of the identification of problematic episodes in the teaching-learning process (called critical didactic incidents) during the peer assisted learning tasks and a search for configurations in the data across episodes. If participants demonstrated a high level of engagement and compliance with the intended content of the peer assisted learning tasks, the findings show that they failed to learn higher order content of game strategy. The analysis points out that it was primarily due to deficiencies in the student coach's ability to elaborate content through appropriate demonstration, error diagnosis and task modification. On a whole, the "products" of the peer assisted learning community, in terms of content learned, seem dependent on the quality of "coach" preparation provided by the teacher. Pursuing their inquiry, the authors, like in the former article, discuss the question of teacher's pedagogical content knowledge in providing adequate situated interventions during the peer teaching tasks that help in reducing problematic breaches in the didactic contract.

Conducted within the same theoretical framework of the didactic co didactic contract, the third article by Verscheure and Amade-Escot focuses on how teacher and students (girls and boys) jointly construct the content knowledge and know-how related to "how to perform an efficient attack in volley-ball" during pedagogical interactions. The study focuses on student learning with special attention to the gendered content that emerges through the differentiated pedagogical interactions. Using a design experiment that challenges both the masculine and feminine stereotypes of the volleyball attack, the authors scrutinize the evolution of the content actually taught and learned during two units of volleyball. Findings show that the didactic contract evolved in differential ways for girls and boys over the course of the units and was influenced by the (1) teacher's views on teaching the game of volleyball, (2) slight modifications of the instructional environment in which the content is embedded within the design experiment, and (3) gendered attitudes and values individuals bring into and invoke during the situated teacher-student interactions.

Students do not develop the same degree of understanding and performing the attack in volleyball due to the ways in which the "differentiated didactic contract" evolves. The gendered content learned by girls and boys resulted from subtle breakdowns that occurred within a loosely-coupled framework of negotiated meanings and a co-production of knowledge. This process is quite implicit because students and the teacher in accordance with how they activate a gender position in connection with the particular content at stake defined the situation as it unfolded which meant that their "agreements" about how and when to attack in volleyball did not necessarily coincide.

These two articles using a didactic approach to content development in PE sustain a research agenda to the domain specific content actually taught and learned during classroom interactions. It supports the theoretical idea that curriculum is enacted through micro social interactions. Conducting a micro analysis of linguistic interactions in PE settings, the last two articles underscore that the acquisition of knowledge is a process constrained by semiotic resources, which include the study of how meaning is constructed and understood through languages.

Analysing examples of linguistic interactions provided as a model for teachers in the form of resource materials and textbooks on game centred approaches (GCA), the article by Wright and Forrest explores the possibilities of a linguistically motivated approach to understanding how meaning might be constructed in physical education lessons. The authors describe the resources offered by a social semiotic analysis, which examines language as a social practice constituted by, and constituting particular forms of knowledge (discourse), subjectivities and social relations, to identify the "kind of learning being fostered". They assert that such analysis goes beyond "content knowledge" to investigate the wider social and cultural implications of meaning gained through questioning sequences between the teacher and students. One purpose of the article was to tackle to what extent this type of interaction, when used by teachers, might ignore social meanings associated with masculinities and femininities. A second purpose argued that the questioning sequences of "Initiation-Response-Evaluation" might more appropriately align with the closed pattern of a "Question-Answers-Evaluation" format of traditional classroom teaching. It is argued that a very fine grained study of the situated verbal interactions in teaching a particular content (here tactical understanding in games) makes salient how meanings are constructed through an interdependent and co-constructed semiotic process. The authors claim that such studies allow the possibility to make visible some critical effect of the type of content and knowledge developed. This article, written from a critical social theorist viewpoint, raises the delicate question of the status of knowledge in the pedagogical interactions. It highlights the important differences in how social constructivist theorists look at the role of knowledge is used to bring about new learning in the classroom.

Finally, the special issue ends where it began with a theoretical discussion related to which learning theories can support research on content that informs educational practice more productively. Wallian and Chang in their article claim that educators and researchers should value a "semio-constructivist approach". They attempt to keep paradigms up for review and point out the need for constant reflection on them. Studying the co-construction of knowledge-in-action through "debates of ideas" between students from a linguistic theoretical framework, they consider how plurimodal interactions make it possible to formalize relevant action strategies. Examples of debates are provided in which the students of a 5th grade class exchange their ideas after a game play with the aim of better perform as a team. The purpose of the article was to highlight the potentialities of verbal and non-verbal interactions between students as semiotic tools for content development in PE classroom. Rooted in a constructivist framework combining the ecological and semiotic models, this approach attempts to focus on the evolution of the learner's viewpoint during action. Students construct, deconstruct and reconstruct constantly their expectation through language and action. The authors claimed that the debate of ideas helps students in constructing pertinent content knowledge. Within a proactive orientation for teaching, this article is a nice companion to the preceding article as it elaborates on and challenges some of its basic tenets.

Having given an overview of the research approaches that studied the dynamic process of co-construction of physical education content, it is time now to decipher the ongoing and perhaps tacit debates that underline theses approaches.

Ongoing Debates in the Study of Content in Contemporary Research.

The purpose of this section is to address some important questions, which emerge from the originality and diversity of the three research approaches. The complexity of the teaching and learning of PE content supports research strategies that shed light on current disputes among learning theorists in educational psychology. In this schema, it is useful to remember that at the beginning of the 20th century, Dewey (1902/1990) and Vygotski (1937/1997) argued for studying teaching and learning in the context of real school activities. Looking back at the five articles, three themes appear prominent given the purpose of research was to grasp the dynamic process of co-constructing content in PE settings: How to define the context? What is the status of the knowledge? How language formats the construction of meanings? With the aim of suggesting a future research agenda for research on content, it seems fruitful to review those three themes. It is also worth noting that these themes are characteristic of contemporary debates. Indeed, theorists refer to three major sources for the origin of the situated epistemology of human activities (Allal, 2001; Beguin & Clot, 2004; Brown, Collins, & Duguid, 1989): (1) the anthropological perspective, which studies human beings in their lived context; (2) the socio-cultural perspective which interrogates the status of knowledge; and, (3) the semiotic perspective which considers how language formats context-dependant meanings during interaction. Following these ideas, we first discuss, through the theme of the "unit of analysis", what should encompass the context for research on content.

Then we argue that "referenced knowledge" is a crucial element for understanding the process of content development in its relations with the teacher's pedagogical content knowledge. We next examine the relationship between the construction of meaning in PE and the role of language during pedagogical interactions. Finally we conclude this editorial by considering the need for research on the teaching and the learning of particular subject matter that encompass a twofold agenda at the cross road of epistemological and interactionist views.

The Context and the Unit of Analysis

The three strands of research in this special edition consider the co-determination between human activity and context approached itself as inextricably material, social and cultural. This first idea put forward was that studying the interrelated process of teaching and learning in school settings envisages a complex unit of analysis within a situated and constructivist perspective (Amade-Escot, 2000, 2006; Kirk & MacDonald, 1998; O'Sullivan, 2005; Rovegno, Nevett, & Babiarz, 2001). Such a position (epistemologically as well as methodologically) lies in a view of teaching and learning as constrained actions that must be better understood given the aim of informing educational practices. That is why classrooms are the primary site for such research. But does "classroom" mark out the context sufficiently? The intent in this frame is to understand how teacher and students as individuals participate in a culturally situated environment, interact and develop shared practices with the aim of achieving educational purposes. Consequently two questions arise: (1) what should the unit of analysis encompass? And, (2) what should be the borders of the studied context?

In all five articles, it is worth noting that the context studied is not reduced to the task at hand, but includes broader elements like the culture of a community of practice (Rovegno & Gregg), the social environment in which the peer teaching evolves (Walhead & O'Sullivan); the gendered attitude and values teachers and students bring when participating in the volley-ball design experiment (Verscheure & Amade-Escot), and the logic of the games when discourses are studied (Wallian & Chang; Wright & Forrest). In terms of situated learning all articles studied the co-constructed process of content development in the context of social and cultural practice. They acknowledge individual activity always includes a social component through the evocation of social practices (most often historically crystallised in human work) and through cultural artefacts used while carrying out the task at hand. Lave and Wenger (1991) argue that participation in social practices implies individual development that is inherent in the particular setting. In this sense, as Brown, Collins, & Duguid (1989) said, "situation might be said to co produce knowledge and activity" (p.32) that is why the unit of analysis in research on content should encompass content in a broader sense.

A specificity of the didactic approach is to take into consideration, through the "a priori analysis" (Amade-Escot, 2005) what content knowledge is intended to be taught and learned, not only to call attention to the importance of the structure of tasks, but to anticipate the possible trajectories of student learning (see in this issue, Verscheure & Amade-Escot; Walhead & O'Sullivan). Such analysis, which is conducted independently of the contingency, creates a background (guided by a theory of the domain specific content) that allows classroom based analyses (guided by an interpretative work) to be compared with the original instructional intent of the teacher. This is very near to what Cobb and Bowers (1999) in a different but closed perspective claim for rethinking research within a relationship between theory and practice. Tracking the content really taught and learned in school settings implies looking at the various ways in which the students interpret and understand what is at stake in the tasks (or the learning environment or the didactic milieu, to remain in the diverse terms used by each approach) as aspects of their participation in classroom practice and the creation of a classroom micro-culture. As an illustration the work of Verscheure and Amade-Escot (with the concept of a differentiated didactic contract) make clear the fact that students as well as teachers, depending on their gender position as activated in

situ, participated in distinct classroom micro-cultures. This may be also illustrated by the discussion raised by Wallian and Chang about team micro-cultures created through the "debate of ideas". In the five articles, the tasks, in contrast with the process-product and the cognitive paradigms of teaching, are not reduced to a stimulus environment, but as opportunities for participation in a system of practices that are themselves evolving. The idea of "attunements to constraints and to affordances" (borrowed from Gibson, 1988) as developed in the ecological perspective (see in this edition, Rovegno & Gregg) highlights the potentiality in which individuals participate in a situation. Within an interesting critical social theory framework, Wright and Forrest pointed out how questioning students created a context in which unintended aspects of culture (for example the masculine culture of games) might be activated without somebody knowing.

Beyond these epistemological commonalities, contrasts exist between the three research approaches. It concerns the call up (or not) in the unit of analysis of the observer's viewpoint as an important feature for interpretation. This issue refers to "the emic" and "the etic" perspectives for interpretative research (Vidich & Lyman, 2000, p. 41). Adopting the actor's perspective (the emic or intrinsic viewpoint) to delimit the unit of analysis is the only way if researchers want to understand the meaning and significance that teachers' and students' have for the activities. This allows viewing content knowledge as embodied, located in activities including acting, reasoning and talking (Wallian & Chang). But a school setting also has specific demands related to the intended content knowledge as will be discussed in the next section, and thus the actors' viewpoint may not be enough to track the ways the content is brought into play. The student's and the teacher's subjectivities are usefully enlightened when they are studied together with the observer, which is "guided by the domain specific instructional design theory" (Cobb & Bowers, 1999, p.8). That is why, the observer's perspective is essential to guide the interpretation of the evolving and co-constructed content (Amade-Escot, 2005; Sensevy, Mercier, & Schubauer-Leoni, 2000; Walhead and O'Sullivan in this issue). This position may not be shared by all researchers; some of them favour a more radical constructivism (see the discussion on Dewey's and Vygotsky's forms of constructivism by Wright and Forrest in this issue).

To conclude on the question of context as a unit of analysis in research on content, it must be stressed that, whatever the approach, the purpose is to understand the shared practices involving the teacher and students (it is useful to underline that "shared practice" does not mean "same meaning" of that practice) that allows: (1) a better understanding of classroom activities that foster student's development of increasingly sophisticated PE content and, (2) refers this to a theory of domain specific content knowledge. For example Wright and Forrest develop a social criticism of the questioning sequences by putting forward how the knowledge finally taught and learned dismisses the cultural knowledge of netball as historically constructed at Smith College in 1892.

Referenced knowledge and the status of culture. Many ideas underlying current research on content in different subject-matter areas have been present in the educational debates since the earliest years of research on teaching.

Dewey (1902/1999) argued for example that learning should not be considered a self activity because "all activity takes place in a medium, a situation and with reference to its conditions" (pp. 208-209). Dewey (1938/1963) as well as Bruner (1996) consider meaning is an act embedded in a culture. A core feature of a human child is to become in a world already changed by human's work and activities. In a wider sense of the term, the culture encompasses the traditions, tools and artefacts, knowledge and know-how, values and attitudes, languages, meanings and theories, which are, although continually in evolution, traces of human development. Educational practice cannot be disconnected from these historical and cultural perspectives of knowledge. Its aims, under instructional settings, are for students to develop a deep, holistic, meaningful well-connected understanding of knowledge and be able to generalize it to new settings and situations. Learning at school is thus a process in which the opportunity to practice in situ allows the development of contextualized competencies and knowledge incorporating the tools and the values of a given culture.

Beyond the realist/anti-realist philosophical debate evoked in the first section of this editorial, the question raised by research on content it to take knowledge itself seriously. It supposes a broad definition of content including the knowledge, understanding, skill, know how, and dispositions that are to be learned by students, which includes individuals and societal concerns and values. Several authors (Kirshner & Whitson, 1998, Wright and Forrest, in this issue) attribute a deterministic social bias to Vygotskian sociocultural theory as focused on the appropriation of culture across generational boundaries. These remarks tend to overlook the notion of culture in his theory. That is a definition in which "the culture is a continual process of creating meaning in social contexts and by using past experiences and available cultural resources to respond to subjective positions in the present" (Deglau & O'Sullivan, 2006, p.381). In that frame, the available cultural resources refer to the whole set of human endeavours in their universal and anthropological dimensions which constitutes the bequest of previous generations and which are of the basis of the transmission of knowledge and values in a given society (Meyerson, 1948/1995). Students, as active agents in their own learning, can and will resist to varying degrees these kinds of knowledge, understandings and practices.

By contrast, Lave and Wenger (1991) recognized the central role of Vygotski's ideas of culture and knowledge when they theorized the notion of "legitimate peripheral participation" as a tool to understand situated learning within apprenticeship (p.49). Their contribution gave a fruitful framework to researchers interested in content development in school settings because school settings are forms of communities of practice (see in this issue, Rovegno & Gregg). But there is still a question that should be discussed. Whatever the complexity and technical nature of knowledge shared and learned through apprenticeship in society's communities of practice, there is still a difference with that shared and learned within school experiences even though the observed classroom environments are connected to authentic practices outside the school. This marks out a specificity that Rovegno and Gregg in their article put forward when interrogating the lack of authenticity of the pedagogical content knowledge of the teacher regarding Native American culture. Teachers' prior knowledge of content has a profound affect on how they interpret and understand what and how they teach the content (O'Sullivan, 1994, 2005, Rovegno, 2003; Tsangaridou, 2002). In this issue all articles point out the impact of a teacher's pedagogical knowledge on the evolving process of content development. They suggest that holistic approaches of content in PE lessons are very demanding in terms of a highly detailed level of pedagogical content knowledge. School settings are thus specific communities of practices which work with knowledge (Bereiter, 1997) and where knowledge and knowing are always reorganized (recontextualized) in forms that may (or not) encounter the potentiality of apprenticeship (Mercer, 1992). In the didactic tradition this is theorized through the concept of "didactic transposition" (Chevallard, 1991,

Walhead and O'Sullivan, in this issue). Thus if the classroom is really a place where cultural and contextualized practices are developed as well as in a community of practice, it must be understood that knowledge and cultural experiences have a specific status because in school settings knowledge and knowing are socially desired, wilfully provoked, and institutionally organized in terms of curriculum. In the situated learning theory, as well as in the didactic one, the question of authenticity for school activities is salient. It is argued in both approaches that it is not the surface similarity of classroom activities to real-life activities that are critical, but rather the fact that classroom activities develop authentic strategies and practices. This begs the question of what kind of content knowledge, when embedded in a rich and meaningful environment, has the potential to foster these authentic practices? Here too, a deepened understanding of knowledge becomes useful. For example Wright and Forrest, and Verscheure and Amade-Escot in their articles show that the gendered nature of knowledge at stake either in the questioning sequences, or in the forms of the attack valued by the teacher might interfere with (and sometimes might hinder) the initial intended content knowledge.

Authenticity thus has more to do with: (1) how the content is crystallized in a learning environment. This implies the need for a domain-specific instructional theory, which encompasses sociological, historical and epistemological views on the content and, (2) how content is brought into play during teacher and student interaction and within student's collaboration. This implies an interactionist analysis framework. This last comment brings us to the third topic of discussion.

Classroom interaction and the role of language

In trying to understand how content knowledge is constructed by students, current research looks at contextualized interactions in PE setting where the teacher is studied as a facilitator mediating students' learning by a creating positive learning environment. When researchers use such a fined grained lens to track the content taught and learned through micro analysis of classroom interactions, the question of language is immediately convoked. Social activity, as developed in classroom, presupposes human beings inhabiting shared forms of life, and in the case of knowledge construction, utilizing semiotic resources (meaning making and meaning signifying) with reference to social structures and institutions. The semiotic approach to research on content is thus an unavoidable tool for studying the content development through signs and symbols both individually and grouped into verbal and non-verbal sign systems. It includes the study of how meaning is constructed and understood and it encompasses the social interactions and cultural issues during content specific teaching.

Following Vygotskian ideas, adult mediations in pedagogical interactions are content knowledge dependent most of the time because they are developed within the structural constraints of the school, which works with knowledge (Bereiter, 1997). In school particular knowledge has to be covered and explained in specific ways by the teacher, and the students would need to understand how school demands the knowing of this knowledge in a specific way. This fact has an effect on the type of interactions in use in classrooms.

In society, all interactions are developed within a background that formats the evolving construction of meanings between speakers through utterances, turns, and conversations. Linguists consider that the context and the individual's background shape an implicit "communication contract" which is at the heart of the construction of shared meanings during language interactions (Kerbrat-Orecchioni, 2005). Ethnomethodological research using conversation analysis as well as social research on discourse recognize that meanings are context-dependent and that contexts are constructed and modified by speakers in the give and take of conversation. The notion of indexicality elaborates on this feature of any interactionist process.

In the classroom, the format of verbal and non verbal interactions has been typified as Initiation-Response-Evaluation (IRE) in which the teacher mostly takes the first speaking turn (Mehan, 1979). Participation structures in classroom talks are more than just arrangements between speakers, they demonstrate the interdependence between activities and discourse in connection with the instructional purposes of the lessons. Carlsen (1991) in his review indicates that classroom talk is topically oriented on subject matter issues and that the content of the questioning sequences is related to the teacher's depth of understanding of the content knowledge.

Given the important role of verbal discourse in meaning-making by students, classroom discourse and interaction has often been perceived to have restrictive effects on students' understanding because of the small autonomy given to them through the closed re-framed way the teacher usually conducts the questioning sequences (see Wright and Forrest in this issue). Thus one alternative is to give more room to students' interaction with the aim of giving them opportunities to construct their knowledge. The semio-constructivist approach of teaching through the "debate of ideas", as discussed by Wallian and Chang in this issue, informs our understanding on how tactical content knowledge may be co-constructed during the negotiated interactions between students.

But here, in parallel with other contemporary approaches to research on content development, an additional interpretation under the Vygotskian theme of "zone of proximal development" may also consider that in both cases, when the teacher conducts a closed questioning sequence as well as when students exchange about their team play, or either during peer teaching tasks (Walhead & O'Sullivan, in this issue) the dialogue scaffolds students' extension of knowledge. Knowledge is thus constructed in the social context of the classroom through languages and other semiotic means. The relevant question thus becomes:

How can teacher student interactions actually produce opportunities for the construction of knowledge and knowing?

The two articles based on semiotic theoretical frameworks thus offer a glimpse of the heuristic provided by such detailed micro-analyses. They both make the case as to how these lenses might be of interest for studying content in PE settings and how these different approaches to the analysis of lessons may inform educational practices. But they also open up some discussion.

Forms of "telling", like in IRE sequences, have been too often downplayed as a transmission model of teaching because of a surface level of understanding of constructivism (Lobato, Clarke, & Burns Ellis, 2005). The telling/non-telling dilemma may thus be re-interrogated as teachers can become paralysed in the way they interact with students. Actually, the practice of structuring classrooms around student-student interactions, while potentially valuable, does not guarantee the interactions will be purposeful and effective in themselves. Class discussions in which students share their solution will not necessarily generate learning. In a way, the problem arose for Wallhead and O'Sullivan in their study of peers teaching tag rugby to each other. Students cannot be expected to reinvent entire bodies of knowledge and knowing even though each piece of content is embedded in well-designed learning environments. This returns accountability to teacher in the way she/he interacts with students, as well as how she/he structures the student-student interactions. That is why pedagogical interactions (either between the teacher and students or between students) should be micro-analysed in term of function rather than form. The semiotic perspective has the potential to focus in depth on such detailed work with the aim of understanding how and what is really learned in PE.

What is salient also through the semiotic approaches is that pedagogical interactions, as well as social interactions are analysed for misunderstandings or mismatches which more often than not are implicit and thus unavoidable. In both articles the micro-analysis elicits some mismatch between teacher and students, or between students, that marks out the difficulty of construing relevant content knowledge to the situation. As underscored by Wright and Forrest, a social semiotic analysis of IRE questioning sequences might unveil unexpected or unintended content knowledge as it emerges through the structure of interaction itself which limits the negotiation of knowledge because students are guided to only one canonical solution. This interpretation joins up with the didactic perspective in highlighting the constraints that weigh on the content intended to be taught during interactions in terms of didactic contract effects (see Walhead & O'Sullivan, in this issue). For example: **for the teacher**, to "obtain quickly the right answer" as pointed out by Wright and Forrest and, **for the students**, to give back only what they think the teacher wants to hear. This points out some commonalities between the linguistic concept of "communication contract" and the "didactic contract".

During pedagogical interactions breaches of the didactic contract emerge through symbolic and social interaction which involve constant re negotiations of meanings.

Finally semiotic and didactic approaches point out the fact that content development might not be deciphered if its dynamic and chaotic evolution is not taken into account.

Deepening the complexity of learning meaningful knowledge and know how in games, Wallian and Chang indicate how it is difficult for a student when engaged in a debate of ideas to be a relevant "even interpretant". This itself is a construction in context, which supposes the necessity of sharing a common frame of

reference inside the student group. Here too it is acknowledged that classroom interaction is not a one-way process to the intended knowledge.

A semio-constructivism approach to teaching PE through students' dialogue supposes shared interpretations of action. During the debates, the divergent viewpoints between students may initially provoke some frustration between what they understand at the time of the debate of idea and what they are trying to learn or how they can complete the task. This highlights the fact that effective learning is also a temporal scale issue, which pleads for research using different time scales analysis.

To conclude this section, it must be stressed that implicit transactions of meaning elicited from both semiotic and didactic perspectives support the idea that the co-construction of content is a complex process involving cultural backgrounds, personal experiences, meaning construction through reflective practice, and includes possible implicit and unavoidable mismatches during verbal and non verbal classroom interaction. As Lave and Wenger (1991) noted: "Didactic instruction creates unintended practices. The conflict stems from the fact that there is a difference between talking about practice from outside and talking within it. Thus the didactic use of language, not itself the discourse of practice create a new linguistic practice, which has an existence of its own. Legitimate peripheral participation in such linguistic practice is a form of learning, but does not imply that newcomers learn the actual practice the language is supposed to be about" (p.108). Lave and Wenger points out that school settings are specific communities of practice which may not easily afford conditions for apprenticeship as the one created in other communities of practice. This has to do with the schools' role in "transmitting" certain ways of behaving and certain values to students that are not quite as ridged in non-school settings. Our interpretation of Lave and Wenger is to consider this fact as a specific school constraint that should be taken into consideration most notably in terms of targeted content knowledge and the forms of didactic language used.

II. Conclusion

Future research on the co-constructed process of PE content. This special edition of Physical Education and Sport Pedagogy makes the case for a deeper understanding of what is taught and learned in PE with the assumption that a complex and evolving process underlies and pervades the enacted curriculum. Such position implies the adoption of a triadic view with the aim of examining curriculum and content, learning and teaching in an integrated way and as a complex system of interpersonal and contextual interactions. Rooted in a situated and constructivist epistemology the contemporary approaches to content development highlight the fact that teaching and learning physical education is extremely contextualized, deals with referenced knowledge and know how, and evolves within a more implicit set of meaning negotiations. We hope the views shared by the authors in this issue will be a catalyst for more discussion and encourage future research.

This research on content should be conducted in different contexts, with different time scales, and complementary theoretical frameworks allow scrutiny of the practices of individuals jointly involved through social interactions in a cultural context and in learning environments. The challenge for future research will be to better understand the teaching principles which create student apprenticeship, and this, at a level of specificity that can give clear guidelines to teachers and, at a an analysis level that does not over simplify the act of teaching as well as the domain-specific knowledge. This research has to be not only content-specific but also specific to grade levels, specific to the diversity of the school settings, and specific to girls and boys, to children with special needs, and to disadvantaged youth. We claim that to avoid the risk of any reductionism (cultural, sociological, and psychological reductionisms) this research should be developed at the crossroad of two analyses: (1) an epistemological logic, which does not take for granted the content in use but works to define a more holistic and sophisticated content in connection with the domain-specific instructional theory encompassing sociological and historical views, (2) an interactionist logic, which is concerned by understanding how the content it is brought into play through semiotics resources during teacher and students interaction and with student's collaboration. The growth of such research may on the one hand, better informs educational practitioners, and on the other, overcome the current debates between behaviorist, cognitivist, and situative learning theories and subsume them in a more anthropological understanding of the teaching and the learning of physical education.

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