ISSA Proceedings 2006 – Theory And Practice: A Metatheoretical Contribution

1. *Introduction*

It is well known that all professions have what is generally termed a theory-practice problem. The problem view often takes one of two shapes. The first is the theoreticians' complaint that practitioners do not use available scientific, research-based knowledge in their work, but rather rely on common sense and old bags of tricks. The second is the practitioners' complaint that research-based knowledge is too abstract and general to be of any use in practical contexts; not infrequently with the added complaint that research-based theory is not relevant, it simply does not address the issues that practitioners are interested in. Sometimes it is claimed that practice is self-sufficient, it does not need theory.

Even a discipline such as argumentation has a theory-practice problem. As a prelude, let us take a brief look at argumentation theorists say about their theory-practice problem, before we delve into selected aspects in greater detail. Robert Pinto, in reflective hindsight, takes a somewhat skeptical position (Pinto 2001). Once he saw himself as engaged in theory-building, but makes the judgment that while his ideas were both valid and important, they did not "add up to the elaboration of a theory" (p.128); rather they were fragmented and incomplete. More recently his view of the whole enterprise has changed: " … I now hold that our judgments about arguments and inference are guided by a *tradition of critical practice* rather than by an over-arching theory" (p.129). And here is where Pinto's skepticism comes in; he doubts whether it is at all possible to construct a theory that might ground critical practice, but he grants that a theory might illuminate it. So what could the argumentation enterprise be? Pinto applies his views to his own work. He denies that it will yield "a set of propositions about argument inference whose truth is proved and which constitutes a theory of inference or argument"; rather what he settles for is "an altered way of looking at the phenomena this paper discusses – an alteration induced by observations and reminders set forth in them" (p.129).

Ralph Johnson (2005) takes issue with Pinto's views, especially his skepticism concerning the possibility of a theory for the practice. In fact, Pinto problematizes whether various proposed theories are theories at all. In turn, Johnson problematizes Pinto's assumptions that a theory would have to be complete and systematic, and that the job of any theory worth the name is to provide a foundation for practice. In *Manifest Rationality* (2000) Johnson diagnoses the overall problem as a gap between theory and practice, and suggests that "gap can only be bridged by significant alterations to the theory" (p.358). In his 2005 OSSA paper, he suggests that the relationship better be viewed as reciprocal, in a Deweyan fashion.

There are many things here that are worthy of analysis, and regrettably I cannot treat them. I shall organize my discussion along three major lines. First, there is the question about the concept of a theory; of what sort of entities "theory" refers to. This section will introduce a metatheory and a conception of (scientific) theories. Second, what does it mean to say that there is a "gap" between theory and practice, and what may a "bridge" possibly look like? Finally, my third theme is the relation between theory and practice and how to conceive of it.

2. *What is a theory?*

Despite the fact that *theory* is the most frequently used form of representation in science (but not the only one), the concept is used rather loosely about a number of conceptual structures. Sylvain Bromberger (1963) identifies two main ways of using the concept of theory. First, we have concrete, empirical theories like the electromagnetic theory of light or Skinner's theory of learning; theories which can be "accepted, rejected, believed, remembered, stated, granted, confirmed, refuted, have authors" (p.83). Second, we have theories which "include contributions from many sources; they have founders and perhaps foundations; they are academic subjects" (p.83). Examples are "psychological theory", "social scientific theory" or "argumentation theory".

This is an important distinction to make. Bromberger's second sense of theory refers to a kind of supra-theoretical entity that is sometimes also called realm, field or domain. Such domains are large, often not well circumscribed, and they contain a number of concrete theories of Bromberger's first sense. For example, the educational domain contains curriculum theory, evaluation theory and motivation theory. These in turn may actually be seen as smaller domains, containing e.g. Atkinson's motivation theory. It is important to note that the metatheory I shall use applies only to theories of Bromberger's first kind; that is,

concrete, specific, delimited theories that can be accepted, believed and refuted. In fact, all metatheories (conceptions of theory) deal with concrete theories which in turn deal with some delimited aspect of the world.

A problem that confronts us here is so to speak the location of the theory-practice relationship. Is it at the level of the domain or is it at the level of specific theories? At the outset, I would like to venture the hypothesis that it might be at both levels, but that the relationship may look different according to which level one discusses. If this is true, we shall have to exercise both care and precision in our theory-practice discussions. It may seem, for example, that views about possible over-arching theories may be a confusion of levels; more precisely that the domain could be treated as a theory of Bromberger's first kind. On the other hand, the *grounding* of a practice may most adequately be viewed as a problem for the domain, not for any specific theory.

Let us move from domain to specific level. I shall henceforth reserve the term *theory* for concrete theories of Bromberger's first kind. There are a few competing metatheories; that is, views about what theories are, what they consist of and how they are related to the world. Of these, two are better known, and of the two, one is widely agreed to be inadequate, albeit the source of the inadequacy is not agreed upon.

So what is a theory? I begin my description of theory structure by citing Pinto, who in private correspondence with Johnson (Johnson 2005, footnote 7, p.227) says the following about what a theory is:

A theory of X consists of a set of propositions which purport to offer an account of X which (a) is a systematic account (i.e. it addresses the outstanding features of X and shows how those features are connected with each other) and (b) is an account that has been defended by argument and the appeal to evidence.

What particularly interests me about Pinto's view, is its reminiscence of what has come to be called the Received View of theories; the logical positivists' conception of theory. On this view, theories are partially interpreted axiomatic systems consisting of two main parts. The first part is a logical calculus, typically consisting of sentences, propositions (statements of laws) and the logical connections between them (deductions). The second part of a theory is a set of correspondence rules C which has two jobs: it partially assigns empirical content to the logical calculus (this is usually cashed out as defining theoretical terms) and it specifies the admissible procedures for applying a theory to phenomena

(e.g. Carnap 1956, Hempel 1965, 1966).

For various reasons, this conception of theories has been found inadequate. I will not go into them in any detail; readers are referred to Frederick Suppe (1989) for a thorough critique of the Received View. I turn now to the semantic conception of theories, which was largely developed as a criticism of and an alternative to the Received View. The short version of the semantic view is as follows: Theories do not describe the phenomenon within their scope in all its complexity. Instead, they attempt to characterize phenomena in terms of a few selected parameters which are abstracted from the phenomenon (Suppe 1989). Ronald Giere (1979) invokes the analogy of a map as a heuristic device to illustrate that many features, factors, causes and details are left out in the process of representing a landscape on paper. The parameters together make up what might be called a model or a replica of the phenomenon; it follows that in its nature the model is a simplification of the phenomenon. This may sound discouraging, but it gives good intuitive sense and is quickly evidenced when looking at examples of theories. The kinetic theory of gas characterizes the behavior of (ideal) gases in terms of the parameters pressure, temperature and volume. Classical behaviorism characterizes human behavior (learning) in terms of two parameters, stimulus and response. Skinnerian behaviorism characterizes human behavior (learning) in terms of three parameters, stimulus, operant and reinforcement. Unlike in the Received view, this is a dynamic portrait. As values of parameters change, the state of the model changes over time. The theory may have what is technically called a theoretical law to describe how this change happens, what states the model assumes over time.

This account of theories has the seemingly paradoxical implication that the relation between a theory and the phenomenon within its scope is indirect. The theory deals directly with the model, and hence only indirectly with the real phenomenon. In Suppe's framework, this amounts to treating the phenomenon *as if* it only involved the selected parameters. In effect, he says, "one assumes the fiction that no other … parameters exert an influence on (these n bodies') behaviors" (1989, p.95). Concerning actual phenomena, however, situations in which no other parameters exert any influence are extremely rare, if existing at all. Typically, the fiction is not realized. In actual student populations learning behavior is not just a function of stimulus and response parameters. Evidently a number of factors fall outside the scope of the theory of classical behaviorism; e.g. motivation, interests, classroom climate – factors which will have an impact

on the relation between stimulus and response in a concrete situation. The indirect relationship of a theory to the phenomenon within its scope clearly has thoroughgoing implications for the use of theory and the theory-practice relationship. I shall return to this issue in a subsequent section.

3. *Gaps and bridges*

As suggested above, Johnson (2000) diagnoses a gap between theory and practice. He is by no means the only one. Stephen Toulmin (1958) claimed that a "radical re-ordering of logical theory is needed in order to bring it more nearly into line with critical practice ..." (p.253), to which Johnson remarks that a possible remedy might also be to bring practice in line with theory. However, his own proposed remedy is very similar to Toulmin's: "... the gap can only be bridged by significant alterations to the theory" (2000, p.358).

My business here is not to discuss what sort of alterations should be done. Rather, I wish to ask what it means to claim that there exists a *gap* between theory and practice. What does this tell us about the conceptions of theory and practice that are at play? At the outset, metaphors such as *gap* and *bridge* make theory and practice seem like two completely separated entities. Do they indicate that theory is theoretical and that practice is theory-free? And what might a *bridge* be? A third kind of entity, unlike theory and practice, that is needed to build connections between them? I shall argue that the picture suggested by gaps and bridges is both unfortunate and unwarranted.

The unfortunate connotation of the *gap/bridge* metaphor can be illuminated by another important distinction concerning the use of *theory*; a distinction which, despite not being perfect, has a significant bearing on the theory-practice problems. This is the distinction between strong and weak notions of the theoretical. To a certain extent it overlaps with the domain-specific distinction outlined above, but has an even wider area of application. A strong use of theory or theoretical would be to insist that it is a well articulated theory dealing with a carefully delimited aspect of the world. A weaker sense of theory or theoretical is what we find in claims, views and beliefs that clearly go beyond the observational, both concerning terms and assumptions of connections, but fall short of explicit articulation. Most claims about everyday events and happenings are of this kind. Theory in the weak sense is of vital importance in the theory-practice debate. In the philosophy of science this view has found its most famous expression in Norwood Hanson's thesis that all observation is theory-laden (Hanson 1958).

There is no such thing as theory-free observation; all observation is shaped by the purposes and the prior knowledge of the observer. Philosopher of education Wilfred Carr, in his discussion of practice as theory-laden, relies on exactly the same weak sense of theory (Carr 1995). Educational practice, he says, is full of more or less implicit assumptions and beliefs concerning unobservable entities and connections of various kinds. Hanson's thesis enjoys wide agreement. On this understanding of theory, there is no gap between theory and practice because practice is never theory-free. So why diagnose a gap? Several explanations are possible. Those who diagnose a gap may rather want to argue that the theory with which practice is laden is inadequate. If that is the case, then there is a gap in the sense that the theories which inform practice are not the theories that we want to inform practice. The bridging of such a gap amounts to replacing old theories with better ones; thereby also changing practice. Alternatively, the same argument can be made, but without normative overtones: the theories we advocate are out of sync with practice as it is; that is, our theories are misleading as descriptions of existing practice. Johnson claims that the gap between theory and practice can only be bridged by significant alterations to the theory, and he makes it clear what alterations he believes are needed in great detail. It is not entirely clear to me whether he thinks that theory alterations are bridge-building because the revised theory will be more descriptively correct, or because old theory should be replaced. Quite possibly he thinks both – these are by no means incompatible. One more point needs to be made here. Practice is (probably) laden with theory both in the strong sense and in the weak sense. Some parts of practice will be informed by carefully argued and delimited theories of argument(ation). But there will always also be theory in the weak sense: preconceptions, prior knowledge, misunderstandings, prejudices and unarticulated assumptions that shape what we see, perceive, think and do. Johnson's theory, or the theories of any informal logician for that matter, will be a well articulated theory in the strong sense. My hypothesis is that theory in the strong sense cannot hope to replace all theory in the weak sense in a theory-laden practice. There will always be a "residue".

Let me close this section by putting a slightly more curious twist to the problem of what a bridge might be. I find the nature of a bridge (or bridging) rather elusive. If we diagnose a gap between theory and practice, are we then left with three different entities in the proposed remedy? Theory, practice + bridge? The twist comes from the observation that theory, practice and bridge may have some

affinity to Johnson's discussion of argument structure (Johnson 2002). He maintains that the nature of an argument is not well represented by the Premises + Inference model, because it may confuse inference with argument. To evaluate an argument structure, it is sufficient to ask whether reasons given provide rational support for the conclusion in question. There is no need to mention the inference from reasons to thesis. So is it necessary to invoke a bridge between theory and practice?

4. *Theory and practice: the relation*
It might be instructive to begin our foray into the relationship problem by looking at Wilfred Carr's overview of various conceptions of the theory-practice relationship in education (Carr 1995). The most common way of understanding the relationship is, he says, as a dichotomy. On such a view, practice is everything that theory is not. While theory deals in abstract ideas and universal, context-free generalizations, practice deals in particular instances and concrete realities. Carr concludes his discussion as follows:

In short, by making the twin assumptions that all practice is non-theoretical and all theory is non-practical, this approach always underestimates the extent to which those who engage in educational practices have to reflect upon, and hence theorize about, what, in general, they are trying to do (1995, p.62).

The gap metaphor may be guilty of this kind of opposition. The oppositional view clearly hinges upon a certain view of what theory is, but so does Carr's judgment of it. But first, let us have a look at the reactions to the dichotomy. Predictably, Carr says, these are views which focus on the dependence of practice on theory. Practice is seen as theory-laden; it is not opposed to theory, but rather governed by theoretical frameworks which range from explicit to implicit and tacit. But practice cannot be reduced to theory, Carr maintains, because it is never guided by theory alone but also by norms and specific knowledge of particular students; non-generalized knowledge is necessary, he argues. But neither can theorizing be reduced to a form of practice, as Gilbert Ryle once suggested (Ryle 1980), because Ryle equates practice with knowing how, and that yields a concept of practice that is too narrow and restricted to be adequate in educational contexts. The same, we might argue, holds for critical practice in the argumentation field.
Carr's approach to the theory-practice relationship is by no means the only one. Peter Reid distinguishes between three different types of relationship (Reid 1991). First, it can be conceived of as dialectical. This view is generally favored by

those who emphasize the exchange between theory and practice, in the sense that both are continually revised in the light of each other. Second, the relationship can be conceived of as operational. Strictly speaking, this is no relationship since practice is seen as self-sufficient. Practice is understood as performance of certain activities, and theory is neither necessary nor sufficient for this performance. Theory is not sufficient because the essential skills are learned in practice; it is not necessary because one can learn to perform these actions without recourse to theory at all. Third, the relationship can be conceived of as logistic. This view maintains that practice can be completely guided by theory; theory is both necessary and sufficient for practice.

At this point we need to look at the concept of practice. Educationalists who discuss theory-practice relations tend to take both for granted; furthermore there is a tendency to assume that educational practice is tantamount to the teacher's actions. The theory-laden character of practice is then taken to refer to the teacher's beliefs, knowledge, values, perceptions and judgments. On my part, I have come to think that the concept of practice is even more difficult than the concept of theory. Johnson, on his part, relies on Alasdair MacIntyre's concept of practice:

By a 'practice' I am going to mean any coherent and complex form of socially established cooperative human activity through which goods internal to that form of activity are realized in the course of trying to achieve those standards of excellence which are appropriate to, and partially definitive of, that form of activity, with the result that human powers to achieve excellence, and human conceptions of the ends and goods involved, are systematically extended (MacIntyre 1996, p.187).

Incidentally, this concept of practice in turn relies on an Aristotelian concept of praxis, where there are no external goals and the activity is done for its own sake. That may not be exactly what Johnson wants from a concept of practice, but I shall not pursue that line of investigation. Let us, for the sake of the argument, accept this as an adequate view of practice and go on to explore some of the consequences for the present discussion.

What we have here, is a wide, complex concept with a focus on human activity with internal goods accessible through participation. This conception is much broader than ordinary conceptions found in the domain of education, with their focus on individual actors. It is also much more comprehensive than Ryle's rather

narrow concept of practice.

Let me return briefly to Peter Reid's typology. He does not say what he takes theory to be, nor what he takes practice to be. It does seem, though, that theory is endowed with different meanings. Can practice in a MacIntyrean sense stand in a dialectical relationship to practice? Sure it can. But this is a very noncommittal view unless one can specify to some degree what aspects in practice in revised in the light of what aspects of theory, and vice versa. Theory in the weak sense will contain many beliefs that might be changed pretty easily, whereas revision of an articulated and well evidenced (scientific) theory is much more demanding. Can the relationship be operational? Not if we by theory mean theory in the weak sense, but practice without well articulated, delimited theories is certainly conceivable. Can the relationship be logistic? Hardly – there will always be elements in practice that are not covered by theory, especially if theory is given a strong interpretation.

Some general problems emerge from this discussion. First, there is the question whether there is one theory-practice relationship or many. There is a tendency to speak of the relationship (sic) in singular, as if there is something called *the* theory-practice relationship. This is unfortunate. As we have seen, both concepts are comprehensive, rather vague and complex and the relation between them may take different forms and be of many kinds. Attempts at generalized descriptions, exemplified by the ones above, often mean a reduction. Even one and the same theory (in the strong sense) may exhibit several forms of relationship to practice. This is simply because users of a theory may have different purposes. Theories are constructed to e.g. describe, predict, explain, modify, influence, understand, ground, justify, be tested, revised and falsified by some phenomenon, and there is no reason why a theory should only perform one of these functions. Second, there is a question of how the influence flows: is it unidirectional or bidirectional? My description above betrays my inclination to think of it as a two-way relationship. However, if we think it is the job of the theory to ground practice or guide practice, we may have unidirectional relations in mind – the influence goes from theory to practice. Johnson (2005) understands Pinto to at least lean in the direction of such a view, whereas he himself holds a more Deweyan view that insists on a continual exchange between theory and practice, much like Reid's dialectical type. But which level of theory is meant here? And which parts of practice? I think it is reasonable to hypothesize that some elements in practice

may change fairly easily and quickly (such as use of technology), whereas other elements (such as standards and goods) are much less amenable to change. Or more precisely, they may change but slowly and over time; their change is not up to one or two individuals since practice is a socially established human activity. Third, there is the question of plurality of theories. Is there one theory that is related to practice, or are there many? Is it possible to have one systematic, over-arching theory that stands in some kind of specified relationship to practice? My answer to this is no. Practice, on MacIntyre's definition, is by far too complex for any one theory to cover it all. But then, there is no reason why several theories cannot be used at the same time, complicated though as it may be.

It is time to return to the semantic conception of theories and have a look at its implications for the theory-practice debate. But first, let us briefly revisit the Received View of theories. On this view, there is a direct, one-step relation between a theory and the phenomenon it treats. The correspondence rules, a finite set C which is an integral part of the theory, comprise admissible procedures for applying a theory to observable phenomena. They determine, so to speak, how the laws of the theory (the logical calculus) manifest themselves in the phenomenon. Perhaps one might say that the correspondence rules provide a direct bridge between theory and phenomenon? However that may be, the theory itself determines its own use. By contrast, the semantic conception makes a sharp distinction between a theory and the method of its use. This is because the theory is one step removed from the phenomenon, there is so to speak a two-step relation between them due to the intermediary model. As Suppe puts it:
[A scientific theory] does not deal with phenomena in all of their complexity; rather it is concerned with certain kinds of phenomena only insofar as their behavior is determined by, or characteristic of, a small number of parameters abstracted from those phenomena (1989, p.65).

The theory, in effect, with its postulates and theoretical laws, describes and explains the behavior of the model thus constructed and only indirectly the phenomenon. No theory can therefore be applied directly to observable phenomena, practice, or what one may wish to apply them to. While this may seem odd and perhaps counter-intuitive, it opens for great flexibility in theory use: the same theory can be used in different ways in different circumstances, and different people may use it differently.

So what happens to the bridge? What happens when a highly abstract, simplified

theory that is far removed from the phenomenon, is used? Theory use, advocates of the semantic conception insist, necessitates the use of a body of auxiliary hypotheses. Imagine Skinner's theory of operant behavior to be applied to understand students' behavior in classrooms. The theory characterizes behavior in terms of three parameters; stimulus, operant (behavior) and reinforcement (consequence). But the behavior of actual students, as we know, is not limited to being a function of these parameters only. So when the theory is used, auxiliary hypotheses are used in conjunction with it, to adjust or accommodate the theory to the present context. Such auxiliary hypotheses would, among other things, consist of working knowledge of the students in question; their preferences, motivation, relationship with friends etc. – what the theory user judges to be relevant and important. And since contexts vary, auxiliary hypotheses will vary (to what degree is a contentious question). This means that uses of theory in practice is never a straightforward procedure; it requires knowledge not only of the theory but also of the context in which the theory is used. On the other hand, this divorce of a theory and the method of its use makes possible a large degree of flexibility in theory use; and hence, I would argue, increases the value and usability of the theory. Thus, theories in the strong sense for their use also rely on theory in the weak sense.

Two observations need to be made here. First, the semantic conception of theories has been developed with scientific, empirical theories in mind. But I would venture the hypothesis that this is an adequate view of theories within any fields. This includes argumentation, where a good many theories are normative in character. I think that one will find the same elements in normative theories as in other theories (I have myself employed it to analyze normative educational theories); you look for parameters and you find them. But of course, the generality of the semantic conception is in principle open to dispute. Second, is it reasonable to conceive of auxiliary hypotheses as a bridge between theory and practice? At any rate, on this view they are necessary when a theory is used, simply because theories have the nature that they do have.

5. *Conclusion*
I have in this paper addressed the theory-practice problem in argumentation. The point of departure was Ralph Johnson's (and earlier Stephen Toulmin's) diagnosis of a gap between theory and practice. Johnson laments the lack of a clear concept of theory, and my business in this paper has been to provide precisely that and

investigate what it may lead to.

To the best of my knowledge, all metatheories (conceptions of theory) provide definitions of concrete, delimited (scientific) theories that deal with a specific phenomenon or aspect of the world. For example, the electromagnetic theory of light and neo-behaviorist learning theory, or for that matter, Johnson's theory of argument. This focus then forces one to make a distinction between various uses of the concept of theory; I have followed Bromberger in distinguishing between larger domains and concrete theories. I believe that the theory-practice problem may apply on both levels, but that it takes on different shapes. My own discussion of the implications of the semantic conception of theory, seems to focus more on theory application. Theory use is but one part of what the theory-practice relationship can be, so my metatheory of choice does not solve all problems (that may not be a reasonable expectation anyway).

The *gap* diagnosis itself is a matter of some contention, and so is the remedy described metaphorically as a *bridge*. As they stand, the give the impression that practice is theory-free. But much criticism and many good arguments have been raised against this idea, both within the field of education and in the philosophy of science. Again, a lot hinges on what one takes a theory to be. A distinction between strong and weak senses of *theory* and *theoretical* is then made; it is indirectly connected to a metatheory since metatheories deal with theories in the strong sense of articulated, delimited theories. If such theories do not inform practice, practice is still not theory-free but rather infused with theory in the weak sense of prior knowledge and preconceptions. This in turn problematizes the notion of a *gap*. So what adherents to the gap diagnosis may want, I speculate, is to replace the theory that does inform practice with other and better theories.

My treatment of the concept of practice has been admittedly stepmotherly; this is a concept that surely is worthy of much more attention. I have followed Johnson in using MacIntyre's concept, and its very complexity shows that the theory-practice problem is manifold, and that no one theory speaks to or informs the whole of practice. And as new theories may contribute to changes is practice, so new theory may grow out of practice.

REFERENCES

Bromberger, Sylvain (1963): A theory about the theory of theory and about the theory of theories. In B. Baumrin (Ed), *Philosophy of science: the Delaware seminar*, Vol. II (79-106). New York: Interscience.

Carnap, Rudolf (1956): The methodological character of theoretical concepts. In H. Feigl & M. Scriven (Eds), *Minnesota Studies in the Philosophy of Science*, Vol. I (33-76). Minneapolis: University of Minnesota Press.

Carr, Wilfred (1995)*: For education. Towards critical educational enquiry.* Buckingham: Open University Press.

Giere, Ronald N. (1979)*: Understanding scientific reasoning.* New York: Holt, Rinehart and Winston.

Hanson, Norwood R. (1958): *Patterns of discovery*. Cambridge: Cambridge University Press.

Hempel, Carl G. (1965): *Aspects of scientific explanation and other essays in the philosophy of science*. New York: Free Press.

Hempel, Carl G. (1966): *Philosophy of natural science*. Englewood Cliffs: Prentice-Hall Johnson.

Ralph (2000): *Manifest rationality. A pragmatic theory of argument*. Mahwah, NJ: Lawrence Erlbaum Associates.

Johnson, Ralph (2005): Theory and practice again: Challenges from Pinto and Toulmin. In D. Hitchcock (Ed), *The uses of argument: Proceedings of a conference at McMaster University* (222-231). Hamilton: Ontario Society for the Study of Argumentation.

MacIntyre, Alasdair C. (1996): *After Virtue. A study in moral theory.* London: Duckworth Pinto.

Robert C. (2001): *Argument, inference and dialectic.* Dordrecht: Kluwer Academic Publishers.

Reid, Peter (1991): The idea of the practical. In B. Gundem, B. Engelsen & B. Karseth (Eds), *Curriculum work and curriculum content. Theory and practice. Contemporary and historical perspectives* (12-23). Report No. 5, Institute of Educational Research, University of Oslo.

Ryle, Gilbert (1980): *The concept of mind.* Harmondsworth: Penguin Books

Suppe, Frederick (1989): *The semantic conception of theories and scientific realism.* Urbana. University of Illinois Press.

Toulmin, Stephen E. (1958): *The uses of argument*. Cambridge: Cambridge University Press.