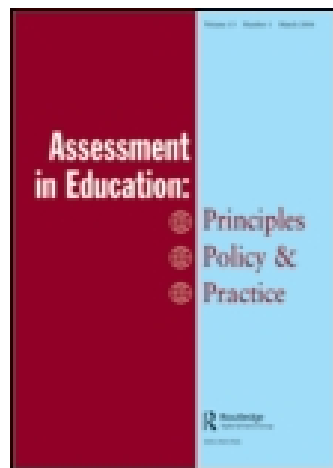


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From Formative Evaluation to a Controlled Regulation of Learning Processes. Towards a wider conceptual field

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Black & Wiliam's review (1998) seems very complete. In its organisation it appears to reflect fully English language sources. One could venture the wish that such reviews of the literature, which are already considerable endeavours, cover, in future, several linguistic areas and where possible establish contact between them.

A review of French language sources would no doubt produce a contrasting image of research on formative evaluation. It would be inappropriate for the present author to assume the role of spokesperson for a scientific community with a pluralist approach. However, it does seem justifiable to state that for the last 10 to 20 years, French language contributions associate more and more closely formative evaluation, the didactic content of disciplines and differentiation in teaching around an integrated concept: the individualised regulation of learning. I will try and enunciate and justify this widening of the conceptual field, without laying claim to a synthesis.

Black & Wiliam identify formative evaluation with the application of feedback which will reinforce learning. The French language tradition puts greater emphasis on the regulatory effects of intervention. This has led the present author to plead for a more obviously pragmatic approach: all those evaluations are formative which contribute to the regulation of an ongoing learning process (Perrenoud, 1991b,c). Pragmatic in this sense does not mean 'purely intuitive' or 'without theoretical foundation', but describes formative evaluation by its formative effects. This assumes, in the immense majority of cases, a formative intent, even if one cannot exclude that a given evaluation without a specific aim produces regulatory effects. Understood in this sense, formative evaluation is not incompatible with the notion of feedback, but the mere presence of feedback is not sufficient.

Clearly this poses an empirical problem. It is simpler to observe the practice of evaluation than to discern its effects. The Black & Wiliam review has chosen the 'lowest common denominator', in other words the practice of feedback. This certainly makes it possible to bring together very diversified research. However, there is a high price to pay for this advantage in that the following must be disregarded:

- the nature of the feedback and the cognitive and socio-affective mechanisms activated in the pupils;

- its inclusion in a contract and didactic organisation, and globally in classroom management and a teaching relationship;
- its links with a concept of learning and teaching;
- the degree of individualisation and its relevance;
- and especially, the means and effects involved in the regulation of the learning processes.

If one had today to set out a review of French-language literature on formative evaluation one would attempt to construct a conceptual field more complex than that of Black & Wiliam. To begin with, there would be less emphasis on the comparison of the achievement of pupils having experienced feedback and those who had not. Clearly there is some merit in verifying whether regular feedback encourages more substantial, better integrated or more stable learning amongst a greater number of pupils, and therefore raises the level of understanding. This no longer seems to me, however, to be central to the issue. It would seem more important to concentrate on the theoretical models of learning and its regulation and their implementation. These constitute the real systems of thought and action, in which feedback is only one element.

From this standpoint, the 'Anglo-Saxon' studies appear to appeal either to the common sense inspired by behaviourism, which suggests that all feedback assists learning, or to the classic teaching of control, with the trilogy of: objectives, criteria-referenced tests and remediation. Between Piaget and Vygotsky, constructivist approaches to learning have encouraged French language researchers to develop more sophisticated and systemic teaching and learning models. These approaches have led them, for nearly twenty years, to place at the centre of the conceptual field the notion of the regulation of the learning process (Cardinet, 1986a,b; Allal, 1988b). Formative evaluation becomes a source of regulation; neither random, nor marginal, but one source amongst others, also inscribed in the scheme of work and interaction.

Regulation and Auto-regulation of Learning

Feedback is a simple message. How can it assist the learning process? Because pupils take it into account, because it affects their cognition. Communication theory teaches us that the effectiveness of a message is measured at the level of the recipient: an intervention or a piece of information only helps a pupil learn better if their thought processes are modified. This is an abstract way of stating that no learning takes place without the learner. One can only stimulate, reinforce, reorient, readjust or accelerate the pupil's mental processes, in the hope of modifying the learning processes.

This intention can only be effective if a window is found into the cognitive system of the learner. There is no point in sending him or her messages if they are treated as noise or redundancy, and not as intelligible or pertinent information likely to help him or her understand, remember, assimilate knowledge or develop skills. Thus we

must concede that some of the messages which the teacher conceives as feedback do not in fact play this role for the pupil, because their form, their tone, their content (verbal or non-verbal), the moment chosen, the point reached in the work and the interactive situation in which they occur do not allow the pupils to understand them or 'do something with them'.

To enable feedback to take place on a regular basis requires a clear understanding of the way the pupils function and the manner in which they incorporate contributions external to their own thought processes. This understanding should be both general and (in the context of a discipline and a programme of study intended for pupils of a given age and average ability) particular (in so far as the pupils do not all function in the same way). We are confronted with a three-fold difficulty:

- even the most advanced theoretical models, generated by research, are not yet adequate to account, in a precise manner, for the mental processes of a pupil in a classroom situation and the exact use he or she makes of feedback.
- teachers act, most of the time, on the basis of intuitive models even more rudimentary than those of researchers, based on common sense rather than well honed concepts or cognitive functions; thus the finer points and strategies advanced by Astolfi (1997) concerning the errors of pupils are far from being recognised by teachers.
- even a teacher possessing all the theoretical tools would have considerable difficulty using them in an optimal way in a given situation, because of other priorities and uncertainties which cannot be dealt with in a given time (Perrenoud, 1996c).

In other words part of the feedback given to pupils in class is like so many bottles thrown out to sea. No one can be sure that the message they contain will one day find a receiver.

Along with the difficulty of formulating and transmitting effective and relevant feedback deliberately and at the right time, can be added a fairly frequent confusion amongst teachers of the levels of regulation. Amongst the regulations 'orchestrated by the teacher' (Allal, 1993a), it is important to distinguish the regulation of ongoing activities from the regulation of learning processes.

The regulation of the activities of pupils is easier to validate, since the teacher can immediately observe the results of his or her contribution. The teacher's job is, to a great extent, to organise, control and direct the activities of the pupils. The question is to see whether this regulation of activity guarantees the regulation of the learning process itself. Teaching in a structured, but not rigid manner, encourages learning, in the same way a good working atmosphere does or instilling mutual respect and co-operation amongst the pupils. Activating pupils, encouraging them to formulate a clearer image of the task and its outcome, guiding them in the choice of tools and procedures, upholding a more methodical approach, a better use of resources and of available time, minimising the dispersal of attention and energy: these are the very important aspects of the work of the teacher who wishes to achieve the centring and regulation of the activities of the pupils with a view to improving learning. But is this regulation of the learning process itself?

The question is first and foremost a conceptual one: ought we to consider any influence on the learning process as regulation, or should the concept be confined to modulation or an adjustment of these processes? The question is not as trivial as it might seem; it opposes two conceptions concerning human action: one emphasises premeditated action and perceives regulation as a minor variation in the scheme of things, involving fine tuning; the other insists on the role of improvisation in complex professions, which accords a much greater role to regulation as one of piloting or visual navigation.

To avoid identifying all actions of the teacher with permanent regulation, it would seem that we need, to address the issue of the regulation of the activities of pupils in the strictest sense namely to:

- refer to activities specifically conceived with the intention of stimulating particular learning processes amongst pupils.
- confine regulation to the visual navigation through these activities, or in other words to the initiatives taken to thoroughly engage pupils to help them to understand the purpose of the activity and find their own place in relation to it in order to prevent them from abandoning it at an early stage.

In this restricted sense, regulation does not include setting up the activities suggested to, or imposed on, the pupils, but their adjustment once they have been initiated. This is not a negligible part of the work of teachers. However it is very variable depending on the teaching strategy they practice: traditional school exercises are not regulated in the same way as more open-ended activities such as research or projects.

Even if, ideally, regulation concerning activities is supposed, at the end of the day, to encourage learning, one should not, for this reason, confuse it with a regulation of the learning process, for two distinct reasons:

- Firstly: in reality the regulation of activities does not always have as its main objective the regulation of the learning process! In the classroom, what is important is that the pupils become involved in the tasks set, finish in the required time and succeed. The teacher consequently has a strong normative influence on the work of the pupils, for reasons which are, one could venture to say, foreign to the idea of learning. One could even argue that the control of activities can hinder the regulation of learning, especially when the teacher, mindful of the quality and the quantity of learning required, steers his or her course without leaving the pupils the right to hesitate, make mistakes, reflect, enter into dialogue and thus learn. In active and constructivist teaching, the teacher is less obsessed by the product, more centred on the process; but other considerations deflect him or her from learning, for example the wish to support the dynamics of a project or to foster a climate of co-operation.
- Secondly: even where the aim is to regulate learning, the regulation of activities can only have an indirect effect on mental processes, in a haphazard and barely observable manner; it is difficult to ascertain at which point in time and under which conditions the regulation of the activity induces effects

on the learning process. In between what the pupil does and what passes through his or her mind, the mediations are complex. And what happens in the mind does not necessarily affect learning. Thus teachers will say of some pupils: they are active, they seem interested, they ask questions, they enter into dialogue, they seem to be learning, but the next day, there is nothing left.

The Regulation of Cognitive Processes

Regulation of learning occurs by way of the regulation of cognitive processes, itself only indirectly subject to control and prediction. In acting on situations and activities the teacher hopes, at the very best, to regulate cognitive processes and, finally, through them, the learning process. This doubly indirect influence only has a chance of achieving results if we possess ever more finely honed models of the mediations thus activated.

These models differ according to the form of learning desired. The most evident mechanism concerns procedural information and knowledge. When, in the course of an activity, the contribution of the teacher increases the knowledge base of the pupils, in explaining how to find information, in explaining the meaning of a word, in showing them how to use an index or how to hold their set square and ruler to draw one line parallel to another, he or she encourages learning on condition that: a) pupils retain the information or procedure in their long term memory; b) that the necessary connections are made that will enable the pupil to use the information in another situation, given the right prompting. These two conditions are far from being constantly satisfied. Teachers are always saying 'I've already told you, explained to you, shown you several times ... Are you listening to me?' We know, however, that things are more complex, that even the most factual information is only memorised through a process of construction and integration which escapes some pupils. As for the application of information and knowledge, this raises the whole issue of transfer and the analogies which underpin skills (Meirieu *et al.* 1996; Rey, 1996; Perrenoud, 1997a,b).

Talking, explaining, showing: these necessary interventions do not guarantee regulation of the learning process, even when they are allied to an activity which attempts to optimise regulation. One of the debates which is produced as a result concerns the possibility of reinforcing memorisation and integration, increasing the likelihood of reinvestment and transfer, and entering the 'metacognitive' domain, in other words in stating an intention of intervening at the level of learning processes and explicitly targeting integration and transfer. It no longer suffices to talk, to explain or to show; one needs to take into account the representations acquired and the cognitive functioning of the subject. One needs to accompany him or her in a 'metacognitive' journey, in the form of a dialogue which, being anchored in an activity, separates itself to concentrate on knowledge and the learning process.

It is immediately apparent that such regulations demand both considerable acumen in the identification of difficulties, considerable skills in the contributions

the teacher makes, considerable detachment from the activities—which are only contrivances to assist learning—and an immense availability in terms of entering the logic of the pupil, giving the latter all necessary time.

The endeavour is even more difficult when we consider the regulation of learning at a much higher classificatory level which assumes, for example, concept formation or the understanding of theories. The regulation of the activity does not in this case have much chance of regulating the construction of concepts and knowledge, because this is not about mastering an activity but acquiring its fundamental concepts. Explaining a hundred times how to carry over in a subtraction, to an eight- or nine-year-old child who has not mastered the concept of number, or who has not understood the system of numeration to the base of ten is a waste of time. He or she may be able, as a result of being drilled, to reproduce through imitation what he or she is shown, but without understanding, and so be incapable of the slightest transfer of new information. In the same way a student who has not understood the notion of the intensity of electric current can assemble components wired in series or in parallel, but will remain incapable of building or modifying a circuit with any real understanding, because without mastering basic theories he or she will literally not know what they are doing.

The Role of Formative Evaluation

In such a context what is the role of formative evaluation? Does it have a monopoly over regulation? I do not think so; not all regulation of learning processes uses evaluation as the only set of bearings in teaching, pupil activities or learning processes.

One element of regulation can be delegated to the didactic apparatus itself, to interaction between pupils, to technologies, to various forms of metacognition (Perrenoud, 1991b,c, 1993, 1997d). In a class which practices formative evaluation and methodically analyses the anticipated results and methods (Nunziati, 1990) or in a class which is working on metacognitive skills (Allal & Saada-Robert, 1992; Grangeat, 1997), the pupil becomes an important source of auto-regulation, controlling and even dispensing with external feedback. This is why the regulation potential in a learning situation is never an analysable abstraction consisting of the skills and availability of the actors present, who come from a culture forged, both in the classroom and in the school, first 'upstream' and subsequently in relation to each situation, and progressively reinvest themselves in each area.

The nature of regulation and the role of formative evaluation depends on the definition, broad or narrow, we choose to employ; this in turn presupposes a particular understanding of teaching-learning. Teachers who wish to be associated with formative evaluation employ a wide variety of concepts and practices. Some limit themselves to information based on feedback, whilst others opt for a total integration of teaching and formative evaluation, both insisting on interactive regulation. It is thus a very delicate matter to compare classes in which the status of

regulation and formative evaluation are so different. The differences reveal our basic conception of education:

- in what we may term 'traditional' classes, teaching is taking a class or giving a lesson; evaluation is a specific event (oral questioning or written test);
- in classes which favour active methods or advanced research in education, teaching is determining the learning situation; formative evaluation becomes one aspect of managing learning.

We can also state that a traditional lesson also determines the learning process. This is true. But it is linked to teaching in the form of a lecture which, even if it is at times interactive, does not allow for regulation. 'Three-hundred kilometres an hour' says Astolfi (1991), that is the speed of the French TGV, but it is also the number of exchanges that flow between teacher and pupils during a lesson in secondary education. Half of these exchanges emanate from the teacher. At such a pace it is hardly surprising that each pupil has only limited access to regulation. Traditional teaching inevitably reduces regulation to its simplest expression and confines formative evaluation—if it exists at all—to tests which are quite distinct from lessons even if one follows the other. The ensuing retroactive regulation is often limited to reworking notions which 'have not been fully understood by a significant proportion of pupils'. Formative evaluation is confined to a temporary microsummative evaluation, followed by remediation.

The regulatory influence of formative evaluation is weak if it is limited to a subsequent criterion referenced evaluation which, at the end of a phase in teaching, highlights gaps in knowledge, errors and an insufficient grasp of the subject, leading to remediation. We are thus obliged to follow Bloom's original model of control teaching which does in effect make it possible to distinguish between teaching phases and phases of formative evaluation. We find ourselves dealing with retroactive regulation which Allal (1988b) distinguishes from proactive regulation and interactive regulation, which operates during the activity through an exchange with the pupil (face to face or in a group). There is no reason to treat with disdain criterion referenced evaluation as the basis of retroactive remediation. This is better than a total absence of feedback. However, it only takes place at the end of a phase of learning and relates to levels of understanding which leave learning processes in the shadows and impedes the identification of the cognitive obstacles encountered by pupils.

If one has a more demanding conception of formative evaluation which targets, beyond the temporary acquisition of knowledge, the interactive regulation of learning processes, there is not much to observe in classes which practice 'frontal' teaching. It would thus be useful to develop categories of classes and teaching methods within which one could legitimately compare the operation of formative evaluation and its effects. In the sociology of the family may be distinguished various types of family organisation, identified as paradigms, organisational models of communal life and daily interaction. It would appear vital to carry out equivalent research in the classroom, even in the school itself, from the standpoint of ongoing regulation. Without such research, educational practices which have nothing in

common will be compared, despite the fact that they are taking place within quite radically heterogeneous working situations.

In the absence of such a typology, Black & Wiliam's review, examines research on formative evaluation practices which are weak in points of comparison. The task is not a simple one. There is a risk, if one is too hasty, of finding the classic differences between traditional teaching methods: active teaching and control teaching. It would be more rewarding, but more difficult, to distinguish classes according to their potential in the interactive regulation of learning, as incorporated in the normal organisation of work. There is of course good reason to suggest that classes that claim to espouse active methods and differentiation in teaching have greater potential than traditional classes. This can be demonstrated empirically. To explain this, we still lack a systemic conception of the potential regulation of learning contained within a given scheme of work and each typical situation it regularly produces.

Two Levels of Differentiation and Regulation

I would like to suggest several ways forward, based on distinguishing two levels of the management of situations which favour the interactive regulation of learning processes:

- the first relates to the setting up of such situations through much larger mechanisms and classroom management.
- the second relates to interactive regulation which takes place within didactic situations.

I have identified these two levels because it would be quite possible to conceive of—and observe—classes within which the conditions for the interactive regulation of learning processes, although they exist, are not used, in the absence of steps taken to mobilise the required teaching skills and resources. It is thus not enough to engineer situations, they must be managed in such a way as to allow their potential advantages to be effectively put into practice. So, for example, some teachers have a particular genius for interactive regulation, but this produces little effect, because their organisation of work produces few favourable situations.

In both cases, we are dealing with differentiated learning. In effect, so that 'each teacher is, as a general rule, confronted with teaching situations which have the greatest potential for him' (Perrenoud, 1996, 1997c) differentiation must operate:

- 'upstream' of situations, where a pupil is placed in a context, a group, a situation;
- within situations, where the pupil's participation and learning are optimised.

This concept of differentiation, which contains an element of common sense, has the advantage of favouring no particular type of classroom organisation, refers to no standard model, for example mastery learning or active pedagogy.

In any class, pupils are confronted with situations intended to make them learn; some do, some don't or some do very little. The classic approaches to difficulties in learning and failure in school are still trying to find a solution in the make-up of the pupil: the level of development, cultural and linguistic capital, knowledge previously

acquired, motivation, ambition, attitude towards knowledge, quality of life and family background, etc. In short: schools provide fairly standard learning situations, which are fruitful only for those pupils who have a specific profile which includes all the prerequisites for learning. Thus, typically, the teaching of reading, at the beginning of the school career is designed for children with a normal intellectual, perceptive and motor development who wish to learn to read and whose family background encourages the written word and has even begun the reading process. It is not therefore surprising that a year later these children know how to read well enough to make 'normal' progress through the primary programme. The others repeat a year, or they proceed with weaknesses which will have an effect on all their learning, in as much as the programmes assume pupils know how to read from the second year of compulsory education onwards. Difficulties in schooling can be explained in the differences between pupils, often described as failings or shortcomings in pupils who do not reach the norm: socio-cultural handicap, linguistic poverty, poor family background and lack of motivation and support; so many expressions which stigmatise pupils in difficulty.

From 1960 onwards, Bloom and Bourdieu have, separately, demonstrated the extent to which this explanation of difficulty and failure, hence inequality at school, has defeated the education system, as a modifiable variable (Bloom, 1980). Bourdieu (1966) demonstrated that pupils being what they are, that is to say different, these difficulties do not explain inequality. Rather it is because the school ignored them in accordance with an indifference to difference which is embedded in the structure of teaching programmes as well as in the culture and practice of teachers. Bloom (1976, 1988), on the other side of the Atlantic, in more psychopedagogical language, and with a more pragmatic approach, stressed that 80% of pupils could handle the programme if they were placed in learning situations which were optimal for them.

This is a completely different perspective. Without denying the reality of the differences between pupils forced to follow the same programme, we no longer believe they sufficiently explain the origin of the inequalities in learning and achievement. On the contrary we bring to the fore the mechanisms by which the school can in effect impose some control: the acknowledgement of differences to avoid their transformation into inequalities, a model which in its simplest form has been termed, not too happily, 'positive discrimination'.

The question becomes: given the diversity of, for example, six-year-old children in terms of levels of development, relation to the written word, or development of language, how do we lead them to an adequate reading level a year later? Differentiated teaching is, in an ideal world, a reply to this question. It is achieved through a diversified approach, that is day-by-day in the learning situations with which the children are confronted, not just by noting differences, and enclosing each pupil at his or her level of ability or attitude towards knowledge. All 'positive discrimination' aims, on the contrary, to allow each pupil to appropriate the same knowledge and basic skills: diversity in approach at the service of equality in the face of knowledge!

Avoiding making all pupils do the same thing at the same time is not an aim in itself; it is only the consequence of differentiated teaching which attempts to place

each pupil in a situation which is optimal for him. To the extent that pupils do not have the same abilities, nor the same needs or the same way of working, an optimal situation for one pupil will not be optimal for another. The diversification in approaches is due to their fitness for each particular case, in the same way as in a hospital, one does not attempt differentiated treatment for its own sake; one only attempts to give each person what suits them best and the inevitable result is a differentiation in therapy. One can write a simple equation: diversity in people + appropriate treatment for each = diversity in approach.

Differentiation is an effect of the adjustment of didactic treatment to suit the individual. It presupposes the installing of two complementary mechanisms:

- one which, from day to day, puts pupils in learning situations which are potentially optimal for them;
- the other which optimises the activity and the learning process of each pupil within a given situation.

At the first level, we take it as read that there is no point in putting the pupil in a situation where one knows in advance that he or she will not learn very much, because he or she does not possess even the most elementary prerequisites. We can envisage the proactive regulation of a 'micro-orientation' towards adequate teaching situations. As Grangeat (1997) reminds us, the first movement in differentiation which developed in France insisted strongly on this level of regulation, to some extent comparing differentiation to an orientation towards groups with appropriate levels and needs.

Allal's research (1988b) has given more weight to the interactive regulation which develops within situations. Meirieu also distances himself from a differentiation 'which could be conceived as a big computer into which one would feed, in a manner of speaking, all the information we have been able to gather, in accordance with objectives defined in advance, all we want the children to do, the time we ought to take, the kind of exercises they ought to be doing, the methods we should use, etc.,' (Meirieu, 1995a, p. 15). He contrasts the prior diagnostic model with the encounter model, arguing that one cannot know the pupil without having set him or her a task. Differentiation thus does not operate 'upstream' of learning situations, but according to their shifts, their individualisation within the situation.

At both levels, we can see emerging very complex methods of operation, which assume considerable class management abilities and various didactic mechanisms.

Encouraging Situations Fostering Regulation

Edith Wegmüller (1993) has suggested basing differentiated teaching on didactic situations which both 'foster meaning' and 'foster regulation'. The question of meaning is crucial and if it is not resolved, one wonders how learning could operate; but we will leave this to one side for the present.

What is a situation 'fostering regulation'? This formula remains rather abstract. Let us try to formulate in as intuitive a manner as possible: some food is poor in protein and some is rich; in like manner, there are learning situations which may be

poor or rich in regulation. The difference is that biochemists know how to measure the protein content of food, thus that of a menu, whilst we are only just beginning to conceptualise the value of a learning situation in terms of regulation.

The concept of a learning situation is not a simple one. A situation has an 'objective' aspect, which allows the description of the forms, content and objectives of the interaction. At the same time, each participant perceives the situation from their own standpoint, and acts in accordance with their own definition of its reality, resulting in a mental construction which escapes the observer. To this extent it is difficult to objectivise the sources of regulation existing in the situation, without being able to observe the cognitive processes of the pupil. It follows that the effects of regulation can be deduced neither from the intentions of the actors, nor from observable interaction.

We thus find ourselves confronted with the classic impasse in the social sciences: the process which interests us is not directly accessible, since it takes place in the 'black box'. We know that it is partially determined by the skills and aptitude which determine the mental processes of the subject, but which also depend on the situation. The whole question is to understand what, in a given situation, can influence the regulation of the learning process. Without a theoretical model of the mediations through which an interactive situation influences cognition, and in particular the learning process, we can observe thousands of situations without being able to draw any conclusions.

However, these theoretical models are not models of evaluation, but models of situated learning or more specifically learning in the classroom situation. These are still emerging and competing models are being debated in the scientific community. Can we base ourselves on them, with a view, not to prescribing ideal situations, but to describing and comparing ordinary situations to which pupils are exposed in the classroom? I would say the answer is yes, but with many reservations. This presupposes a body of research which subscribes to the same learning situation and regulation.

We will take a simple example, borrowed from French-language research in teaching, concerning the notions of 'obstacle objective' and 'problem situation'. Astolfi (1993) states that a problem situation is organised around the clearing of an obstacle by the pupils, an obstacle which has already been identified by the teacher. The situation is presented as an enigma. If devolution takes place, the problem, although initially suggested by the teacher, becomes that of the pupils. They do not, to begin with, have the means of getting over the obstacle. To do so, they develop or acquire the necessary intellectual skills. The situation should contain sufficient difficulty, encouraging the pupils to invest their understanding; the effort required to solve the problem will take them beyond.

In adopting this definition, we could analyse the extent to which everyday classroom situations resemble the problem-situation. Doubtless there is no dichotomy: between a standard problem-situation and a situation not presenting any such characteristics, there are a thousand intermediate gradations.

Before engaging in such an enterprise, it would be appropriate to make explicit the learning model and regulation in question. 'Resistance', a central notion, only

fosters learning and regulation if, to overcome it, the pupil must learn. In the best of worlds a well-conceived problem-situation encourages learning by the straightforward effect of the 'socio-cognitive' work which begins when the action encounters an obstacle. In the real world encountering an obstacle is not fatal!

Let us take an example: in order equitably to share a collection of nine tasks (laying the table, walking the dog, buying bread, cleaning the table, etc.), a group of three pupils must determine broadly 'equivalent' subsets in their minds, and thus confront the logico-mathematical problems of comparing what is incomparable, as well as the psycho-sociological difficulties of negotiating an agreement in a way that is just. On first sight it would seem simpler to attribute three tasks to each pupil, but nothing guarantees that the pupils will be able to form three broadly similar subsets. A cognitive problem now appears: there will be a conflict between a form of elementary equity—three tasks each—and a superior form, according to which five simple tasks can have the same value as two complex tasks. Some pupils will have difficulty in proceeding beyond the simple division, whilst others will assign each task with an intuitive coefficient of difficulty, complexity, unpleasantness or risk and will compare, not the number of tasks, but the global value of each subset. One could even imagine that each task be given a monetary value, money becoming the unit of measurement. We can see with this type of problem that the teacher would have difficulty in suggesting a readily available algorithm; the work of pupils is thus not to 'rediscover' existing knowledge, but to find a new procedure, judged to be provisionally and locally satisfactory, which is not an end in itself, but the supposed virtue of which is to oblige the construction of a notion of equivalence in a set of unequal attributes.

Let us assume that the obstacle which has been selected is the passage from a comparison of the cardinal attributes of the tasks—the number of tasks—to a comparison of their values in terms of work and inconvenience. Nothing allows us to be sure that the pupils will really founder against this obstacle, since they have a number of ways of avoiding it. At a first level of regulation, the role of the teacher consists in developing the constraints and influencing the situation, so that the pupils do not avoid the obstacle. We are not yet talking about the regulation of the learning process, the teacher is only acting on the representation of the problem. His or her role is thus analogous to that of a Piagetian psychologist who, during a clinical session proceeds, by counter-suggestion, to put to the test the hesitations of the child. In the present example, the problem for the teacher is to avoid a simple and obvious division of the nine tasks, by introducing, if necessary, an element of doubt as to the equity of the first solutions suggested by the pupils: 'cleaning the table takes two minutes, whereas buying bread takes ten. On the other hand buying bread is more fun and you meet people. Does one cancel out the other?'

When children are confronted with an obstacle, nothing guarantees that they will learn quickly enough to renounce the temptation to say 'its impossible, we'll never be able to do it, we give up'. This is where the notion of obstacle-objective appears, introduced by Martinand (1986) and further developed by Meirieu (1989, 1990) and Astolfi (1992, 1993, 1997): the obstacle is only interesting if it becomes an objective in a learning process, a cognitive problem which must be overcome to

move towards the practical solution of a problem. In the present example it means accepting that the equivalence between subsets should not solely be a function of the number of elements. If the teacher intervenes to regulate the activity this should not be seen as the formative evaluation of a skill, giving rise to feedback, but rather an incursion into the representations and thought processes of the pupil, to accelerate a breakthrough in understanding, a new point of view or the shaping of a notion which can immediately become operative.

The skills involved in regulation depend as much on the capacities of observation and dialogue of the teacher as the way he or she understands the cognitive obstacle in the mind of the pupil and analyses what prevents the pupil from overcoming it. In this task, empathy and perspicacity are useful qualities, requiring a measure of decentring: the ability to put oneself in the place of the person who does not know, does not understand and sees no solution. These skills involve formative regulation in the widest sense of the term. They can only be enriched by a didactic culture based on experience as well as research, which allows the teacher to mould not only the understanding to be developed but also the way it will develop in the pupil's mind. Bain & Schneuwly (1993) have stressed the didactic of the French language: there can be no efficient regulation without a precise representation of the linguistic processes involved and their origin, which they term 'models of reference'. Hence Bain's insistence (1988a,b) on the necessary connection between formative evaluation and a didactic approach. One could express this more simply and say that in this marriage of convenience, formative evaluation furnishes rather the intention—even the obsession—of regulating the learning process, whereas the didactic approach furnishes the terms of reference appropriate to the discipline and the knowledge in question.

The concepts of problem-situation and obstacle-objective were not developed for the purposes of analytic procedures and ordinary situations. They contribute, rather, to the development of an alternative teaching strategy. If I mention them here, it is to show that such models incorporate formative evaluation to the point of dissolving it into a more systemic instrument, the regulation of the learning process benefiting from the situation, whether this relates to the constraints, the resources, the tasks or the interventions of one or the other.

Conceiving a Favourable Organisation of Work

We will return to our metaphor: a menu as a collection of foodstuffs can be poor or rich in proteins. Similarly, in terms of a structured body of learning situations, the organisation of work in the classroom is poor or rich in evaluation. In any school, any class, there exists a scheme of work which has consequences for the probability of an interactive regulation of learning processes. This scheme foresees an alternation between various categories of teaching situation with an unequal distribution of regulation. The scheme of work cannot guarantee regulation since it only takes place in the course of an interaction which is never wholly determined by the system of classroom management and by the teaching situation in which one finds oneself. Nevertheless, we can be sure that some forms of organisation of work make the

likelihood of an interactive regulation of the learning process very improbable.

To enable teachers and students to interact in a task, in conditions favourable to regulation, the organisation of work must effectively ensure that the scheme of work does not leave such encounters to chance. Paradoxically, to renounce streaming and sets in favour of more flexible arrangements demands a more complex organisation of the classroom, in the search for a balance between the more uncertain distribution of children between tasks and their permanent attribution towards a category or form of organisation!

In a form of enquiry which would limit differentiated teaching to the simple individualisation of classroom organisation, the question would already be a complex one: how does one organise the parallel tuition of twenty or thirty scholars within the constraints of the school timetable and buildings? Already difficult at primary level, the enterprise would become more or less impossible at secondary level, as long, at least, as each teacher works independently within the two to six hours accorded weekly by the time-table to his or her subject area.

Other sources inform us of the didactic limitations of such a model, which condemns pupils to paper and pencil activities or to solitary work in front of a screen. As the Centre de recherche sur l'enseignement spécialisé et l'adaptation scolaire (CRESAS, 1987,1991) has stressed, 'we do not learn on our own'. The optimisation of the learning situation for each pupil should not be confused with the isolation of each pupil in individual tasks. Differentiated teaching does not consist of a succession of individual lessons, but rather of a permanent arrangement of individualised learning, each pupil being occupied with his or her activities. The problem thus becomes extremely complex, since one must reconcile:

- on the one hand the individualisation of the learning trajectory, a condition of the optimisation of the learning situations for each pupil;
- on the other hand the collective and interactive character of a significant number of the tasks likely to produce interesting learning situations.

This is why no one can at present provide a model of differentiated teaching which effectively articulates all these constraints. We approach this situation in some alternative schools, but this is often at the price of a radical pruning of teaching programmes and considerable continuity of instruction over a number of years, without formal evaluation. These are all difficult conditions to achieve in state education.

The formation of such models involves, almost of necessity, the breaking up of levels and classes and the creation of broader areas of instruction in time and space, entrusted to teaching teams who will collectively take in hand, for a period of at least two years, a group of pupils equivalent in number to two whole classes. 'Classroom management' is replaced by a complex organisation of work, in which monitoring individual progress and didactic input poses very difficult problems. I have tried elsewhere (Perrenoud, 1997c) to analyse the resulting paradoxes: increasing the complexity and size of the input is vital to achieve a critical mass large enough to differentiate usefully; at the same time this development causes a crisis in professional skills, routines, organisation, the familiar groupings of the class, which, I

have argued, can mean less learning and greater inequality, if we do not control its possible negative effects.

All this makes it necessary to forge new tools for 'collective development', tight control of the mechanisms and teaching programmes, which presupposes a different way of running schools and new forms of professional co-operation (Gather Thurler, 1994, 1996).

Conclusion

The fusion or dissolution of formative evaluation into a larger conception of the mechanisms of regulation suggests new approaches for analysing even the most commonplace aspects of the classroom. Rather than being solely concerned with the formative evaluation practices of teachers, why not conceptualise and observe more widely the process of regulation at work in classroom situations and the classroom organisation that underlies them? Using this method, the work on problem-situations, situated learning or the organisation of differentiation could provide the instruments for comparative analysis.

The task is thus not just to describe and compare situations, and the organisation practised by various teachers, but to observe more closely the mechanisms for regulating the learning process within each case. There are any number of methodological problems and they are best dealt with when theoretical work has moved forward. Common sense and various classroom approaches can immediately suggest regulation indicators. Nevertheless, in order to grasp their importance and relevance, we need a theoretical model of situated learning and the operation of teaching situations as well as the schemes of work of teachers and pupils.

Confronted with the complexity and the lack of completion of a theory of regulation, one can understand the temptation to fall back on formative evaluation, which is easier to conceptualise and observe than the potential for regulation of situations in which a precise scheme of work places children. Black & Wiliam, in their review, already demonstrate the difficulty of clearly identifying the work which involves the practice of formative evaluation, even though the concept is relatively well known and straightforward.

If formative evaluation becomes an element in teaching practice, we cannot limit its analysis to the intentional acts of the teacher; we must address ourselves to the effective regulation of the processes, to the underlying situations and organisation. This makes an exhaustive review of the relevant literature very difficult. Work on metacognition as a source of regulation seems to be emerging as an area of study, but it does not fully involve the regulation of learning processes. Many studies in the organisation of subjects or cognitive psychology applied to learning situations in the classroom study the phenomenon of regulation, without necessarily describing it as such or according this approach a central role in a title or an abstract. The concept of regulation is at the same time very ordinary, in its common sense approach, and very difficult to conceptualise in a stable and shared way. An analysis of the content of the studies which employ this notion would no doubt reveal the diversity of the uses of the expression, the theoretical standpoint of the author (subject areas,

cognitive psychology, evaluation, etc.) and 'metatheoretical' sympathies (systemic paradigms and active cybernetic models).

Thus it would be quite unjust to take Black & Wiliam to task for centring their review of the literature on the use of formative evaluation and more particularly on feedback given to pupils. If I suggest here a reconstruction of the conceptual field, it is perhaps to stress that reviews of the literature have, inevitably, a conservative dimension, since they are only possible within a relatively stable conceptual field. Perhaps we have, today, accumulated sufficient work on formative evaluation to venture a new departure.

'From formative evaluation to a controlled regulation of learning processes': the formula which gives rise to the title of the present article remains ambiguous. We can understand it as a substitution or an enlargement. The first hypothesis is not absurd: the more the evaluation is integrated into situations, becomes interactive and lasts, the further it distances itself from normative or summative evaluation, the province of tests and exams, and their consequences. We could thus be tempted to abandon the very concept of formative evaluation, to build a different object of analysis, more closely centred on the effects of regulation, less prisoner of the images and stakes which conjure up the idea of evaluation. This temptation seems a vain one.

Paradoxically, the French-speaking literature needs the concept of formative evaluation to distance itself more clearly from its original conception, in terms of criterion referenced tests followed by remediation. One cannot overturn a conceptual field by decree, it has considerable inertia. Also the role of the teacher as initiator and conductor of regulation remains central, even if and especially if he does not intervene in person, but puts in place a 'metacognitive culture', mutual forms of teaching and the organisation of regulation of learning processes run by technologies or incorporated into classroom organisation and management.

I would thus plead for a straightforward widening of the conceptual field; the idea of regulation does not exclude the use of information and the interpretative work generally associated with the idea of formative evaluation (quite the contrary). Perhaps it would be more appropriate to talk about formative intention and observation as elements of regulatory intervention, as resources for the orchestration of regulation.

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