

PEDAGOGICAL FRAMEWORK

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We shall not cease from exploration
and the end of all our exploring
will be to arrive where we started
and know the place for the first time

T.S. Eliot. Four Quartets

AN INTRODUCTION TO TELECOLLA- BORATIVE CURRICULUM PROJECTS

The MOTFaL Project centres on what we have called Telecollaborative Curriculum Projects. In this project we understand that the basic concepts, and therefore the essential issues, are found in the following: the idea of educational projects, teaching for understanding and telecollaboration.

For MOTFaL, technology is an instrumental choice which is subordinate to the proposed curriculum, the development of student understanding and collaboration between learning communities which are physically

separated. TCPs try to respond to and offer a pedagogically relevant structure for these two problems (Watson 2001).

WHAT IS A TELECOLLABORATIVE CURRICULUM PROJECT (TCP)?

We would like to start by offering a definition of what we understand by a TCP, to explain each concept that it includes step by step.

A TCP is a Curriculum Project that promotes practice communities through teaching for understanding in a telecollaborative environment

It is a Curriculum Project

A TCP is fundamentally a curriculum project (Stenhose 1975, 1983), which is supported by the following principles:

a) A TCP is implemented as an experimental project with which to try out pedagogical ideas in educational practice (Stenhose 19). It is not intended to be a closed teaching plan in which each step and action to be undertaken is specified; neither is it organised around final behavioural objectives. The type of curriculum project that a TCP presupposes is a project that opens up the experimental work of teachers, offering and suggesting a framework for practical action for the creation and development of learning experiences.

b) As a curriculum project, a TCP puts forward a teaching method based on a specific pedagogy for experimentation (teaching for understand-

ding) and a different way of focusing and organising the scientific/cultural content of the learning which is to take place (creating learning environments through student performance in the field).

To promote practice communities

The development of the knowledge and learning of individuals cannot be separated from the communities that believe, use or transform that knowledge and learning (Allee 2000). Knowledge and learning, as research into social cognition and the theory of situated learning (Brown, Collins & Duguid 1989; Lave 1988; Lave & Wenger 1990; Kirsher & Whiston 1997) has repeatedly shown, are of a social nature; interaction, daily conversations back up the interactive construction of implicit and explicit knowledge, the creation and empirical assessment of ideas, strategies, concepts and practical activities. Because of this, going further than routine learning and established procedures, practice communities become the medium for, and the source of, new knowledge.

“In all types of knowledge work, even where technology is very helpful, people require conversation, experimentation and shared experiences with other people who do what they do. Especially as people move beyond routine processes into more complex challenges, they rely heavily on their practice community as their primary knowledge resource” (Allee 2000).

As a source of knowledge, the clearest aim of practice communities is found in the establishment of learning communities between the subjects or individuals that participate in them; that is to say, individuals

that share the same learning aim (in pursuit of sharing learning enterprise) (Buysse, Sparkman & Wesley 2003). Learning communities are therefore an expression of the development of common practice and, as such, constitute a vital support in non-routine, unstructured situations and moments of high uncertainty, generating a shared group memory.

“Practice communities’ effect on performance is important in part because of their potential to overcome the inherent problems of a slow-moving traditional hierarchy in a fast-moving virtual economy. Communities also appear to be an effective way for organizations to handle unstructured problems and to share knowledge outside of the traditional structural boundaries... the community concept is acknowledged to be a means of developing and maintaining long –term organizational memory” (Lesser & Storck 2001).

The dimensions of a practice community, according to Wenger (1998) and Allee (2000), are the following:

Domain: People are organized around a domain of knowledge that gives members a sense of joint enterprise and brings them together.

Community: People function as a community through relationships of mutual engagement that bind members together into a social entity. They interact regularly and engage in joint activities that build relationships and trust.

Practice: it builds capability in its practice by developing a shared repertoire and resources such as tools, documents, routines, vocabulary, symbols, artefacts, etc. This shared repertoire serves as a foundation for future learning.

Transferring these ideas to our context we can state:

- a. The domain in our case is defined by the cultural knowledge of the curriculum project.
- b. The community: by the schools, the groups of students and teachers responsible for the development and implementation of the curriculum project.
- c. Practice implies the involvement of students in learning experiences via the use of mobile technology and other learning resources.

PRACTICE COMMUNITIES AND OTHER KINDS OF GROUPS AND ORGANIZATIONS
A practice community is different from a business or functional unit in that it defines itself in the doing, as members develop among themselves their own understanding of what their practice is about.
A practice community is different from a team in that the shared learning and interest of its members are what keep it together.
A practice community is different from a network in the sense that it is 'about' something; it is not just a set of relationships. A practice community exists because it produces shared practice as members engage in a collective process of learning.

Teaching for understanding

When we speak about 'teaching for understanding', the first question is usually about what is meant by the idea of understanding. Going be-

yond an intuitive sense of the concept, understanding is not the application of routines (in itself a routine process) in a situation or the expression – through rote learning – of lists of terms more or less in order . Understanding is connected with thought, and because of that could be considered as the ‘the ability to think flexibly with what one knows’. It has nothing to do with the use of rigid mental structures for ‘thinking’ and deciding, but with the ability to tune in to and debate problems using the knowledge and practical experience that we already possess (Schön 1983, 1987).

“An understanding of a topic is a ‘flexible performance capability’ with emphasis on the flexible” (ALPS-TfU)

Understanding implies the application of prior knowledge to new situations in a flexible way, so that we are able to understand the new situation with its various forms and implications, grasping the basic elements and connecting them coherently with prior knowledge, looking for a viable solution to the problem – if this is what is needed -, constructing an argument or creating a product.

Howard Gardner highlighted that in schools teachers have traditionally maximised the acquisition of memorised, ritualistic or conventional results.

“Such results are produced when the students respond simply, in the desired system of symbols, vomiting once again the facts, concepts or the sets of specific problems that they have been taught... the correct answers in these circumstances do not prevent genuine understanding:

they only serve to guarantee that genuine understanding has been produced ... I set these memorised results against the results of genuine understanding... such results are produced when students are capable of acquiring information and abilities ... and apply them flexibly and appropriately to a new situation or, at least, an unforeseen one" (Gardner 19: 24).

Teaching for understanding is, therefore, the process via which students develop their understanding learning new knowledge. But, but if we analyse carefully the idea of understanding expounded up to now, we discover that contrary to what happens with memorised or routine learning, there is no direct connection between 'teacher behaviour' and understanding, with direct methodologies - action-reaction, for example. However, we can call on the criterion of action to find out if the student has developed his or her understanding or not; according to this criterion we do not only ask the student what they know, but we ask them to think with what they know. That is to say, we can recognise understanding if the student can think and act flexibly with what they already know.

Teaching for understanding, therefore, demands a different focus, much more indirect and practical: the creation the conditions and the environments that allow the creation of student understanding.

"I believe that the key is in creating learning environments in which the students, in a natural way, use and develop their original knowledge, and in configuring these environments in a way that students can integrate this knowledge with the knowledge formats that are necessary

and are conveniently present in school” (Gardner 1991: 184).

Everything that we have developed in the field of teaching for understanding is closely bound up with the theory of the social construction of knowledge, situated learning and constructivism .

“As educators, we want students not just to retain information but to develop deep understandings and reflect thoughtfully about what they are learning. We want them to become scientific inquirers, critical thinkers, systematic problem solvers, and value-based decision makers. If these lofty goals are to be accomplished, we need to teach with emphasis on higher-order thinking about the implications of what is learned”. (Good and Brophy, 1997: 399).

Effectively this means that the student develops high-level cognitive processes like those of a scientific apprentice, researcher or thinker. This in turn means, and in parallel to what we will later call “performance of understanding”, that the development of thought, of understanding and knowledge (precisely of the high-level cognitive processes) occurs in practice.

“Apprenticeship forms of learning are likely to be based on assumptions that knowing, thinking, and understanding are generated in practice, in situations whose specific characteristics are part of practice as it unfolds” (Lave 1997)

“Cognitive apprenticeship supports learning in a domain by enabling students to acquire, develop and use cognitive tools in authentic domain

activity. Learning, both outside and inside school, advances through collaborative social interaction and the social construction of knowledge” (Brown, Collins & Duguid 1989: 35)

School conditions for understanding

The development of understanding in schools, as outlined by Darling-Hammond (1997), requires a series of basic conditions to foster meaningful learning and understanding (Darling-Hammond 1997: 107); in what follows we centre on the most important and most directly related to the concept of understanding that we have developed up to now .

Active in-depth learning.

In-depth learning implies that schools ‘that teach for understanding, engage students in doing the work of writers, scientists, mathematicians, musicians, sculptors, and critics in contexts as realistic as possible. Authentic education – as it is called by Darling-Hammond - therefore centres on active learning in real world contexts “that calls for higher-order thinking, consideration of alternatives, use of core ideas and modes of inquiry in disciplined, extended writing and an audience, beyond the school, for student work” (1997: 108).

Emphasis on Authentic Performance

Authentic performance implies that the contexts of meaningful performance in the real world are converted into the ‘material’ of the curriculum and into the focus of assessment. The curriculum, so to speak, is

drawn up using real learning experiences in which, and with which, the student is involved and performs; they are not merely textual situations such as those in textbooks or merely verbal, like those to be found in rote learning. They put the student at the theoretical and practical centre of the knowledge, like a biology, history, physics, or chemistry etc apprentice.

Attention to development

When students perform significant tasks, teaching comes to life as a decisive support to their cognitive and personal development.

“Developmentally attentive schools start from the presumption that the school should be user-friendly. School work should build upon children’s normal developmental dispositions so that student and teacher energy can be turned to the pursuit of important learning rather than wasted on an adversarial process of unnatural behaviour management. In user-friendly schools and classrooms teachers select intrinsically motivating activities that enable students to master their environment” (Darling-Hammond 1997: 118).

Teachers and schools, therefore, have to demonstrative their sensitivity towards the aspects of personal and cognitive development of students, maximising and stimulating their thought processes, going beyond what they already know, towards what is as yet still unknown; which according to soviet psychology constitutes the next area of development of the student (Newman, Griffin, Cole 1989; Daniels 2001).

Attention to development is also particularly relevant, as Darling-Hammond (1997) stresses, to Secondary level students, with their needs for 'possession' and autonomy in thought and action which means, at the very least, that in the curriculum, the experiences and teaching foster the social interaction of students and their intellectual initiatives.

Appreciation of Diversity

The appreciation of diversity is connected with the acceptance of the complexity of human intelligence and the diversity of 'intelligences' of the human being (Gardner, 1983). The acceptance that a single uniform intelligence does not exist (for example, verbal or logical-mathematical intelligence), should imply the design of learning spaces and performances which are sufficiently diverse and enriching that they stimulate and connect with the basic heterogeneity of students.

Opportunities for collaborative learning

Collaboration between students and between students and teachers is a central axis in supporting teaching for understanding. Schools, where collective action, inter-relation and work in various types of group (including different ages or levels) is encouraged with the participation of teachers, allow the verbalisation and socially interactive construction of knowledge.

Support for democratic learning

Access to knowledge, promotion of creative thinking and social dialo-

gue that facilitates democratic communication and participation have to be key elements in the whole process of teaching for understanding. This means that education for democracy, as Darling-Hammond (1997: 141 and following.) reiterates, requires something more than equal access to knowledge and the use of technologies; democratic education implies, and at the same time demands, access to 'knowledge and social understanding via participation in democratic communities of dialogue and debate, inside and outside of school' (142).

The ways in which students are grouped and communication with other groups of students from other schools or countries become key criteria and elements in democratic learning. As John Dewey (1916) highlighted even in his day, communication and community are concepts that are strongly linked by much more than etymology or semantics:

"There is more than a verbal tie between the words common, community and communication. (People) live in a community in virtue of the things which they have in common: and communication is the way in which they come to possess things in common... Not only is social life identical to communication, but all communication... is educative" (4-6)

To finish this section dedicated to understanding, we present below a table which could serve as a succinct summary of what we have outlined above.

The table compares, highlights and emphasises the contrasts between two ways of understanding teaching. One opts for teaching and learning based on the transmission of information or, as it has also been

called, recitation; unfortunately a widespread choice. The other is an option that understands that knowledge is a social construction and because of that, the student has to develop their intellectual autonomy, their ability to judge, investigating, making decisions, participating in discussions, questioning their knowledge and sharing their doubts and discoveries with their classmates, all of them links to teaching for understanding.

TEACHING AND LEARNING AS A TRANSMISSION OF INFORMATION VERSUS AS SOCIAL CONSTRUCTION OF KNOWLEDGE

Transmission View	Social Construction View
Knowledge as fixed body of information transmitted from teacher or text to students.	Knowledge as developing interpretations co-constructed through discussion.
Texts, teacher as authoritative sources of expert knowledge to which students defer.	Authority for constructed knowledge lies in the arguments and evidence cited in its support by students as well as by texts or teacher; everyone has expertise to contribute.
Teacher is responsible for managing students' learning by providing information and leading students through activities and assignments.	Teacher and students share responsibility for initiating and guiding learning efforts.

<p>Teacher explains, checks for understanding, and judges correctness of students' responses.</p>	<p>Teacher acts as a discussion leader who poses questions, seeks clarifications, promotes dialogue, helps group recognize areas of consensus and of continuing disagreement.</p>
<p>Students memorize or replicate what has been explained or modelled.</p>	<p>Students strive to make sense of new input by relating it to their prior knowledge and by collaborating in dialogue with others to co-construct shared understandings.</p>
<p>Discourse emphasizes drill and recitation in response to convergent questions; focus is on eliciting correct answers.</p>	<p>Discourse emphasizes reflective discussion of networks of connected knowledge; questions are more divergent but designed to develop understanding of the powerful ideas that anchor these networks; focus is on eliciting students thinking.</p>
<p>Activities emphasize replication of models or applications that require following of step-by-step algorithms.</p>	<p>Activities emphasize applications to authentic issues and problems that require higher-order thinking.</p>

<p>Students work mostly alone, practising what has been transmitted to them in order to prepare themselves to compete for rewards by reproducing it on demand.</p>	<p>Students collaborate by acting as a learning community that constructs shared understandings through sustained dialogue.</p>
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(Taken from Good and Brophy, 1997: 403)

Telecollaborative environment

The Internet offers education a window of opportunity to augment the traditional methods, materials and strategies of learning and teaching.
(Lin & Hsieh 2001)

If we accept that the main objective of teachers is found in the creation of learning contexts that promote and stimulate the development of understanding, it now becomes necessary to go one step further in the direction of what we have called Telecollaborative environments. The idea of telecollaboration is associated with and was born out of the Technologies of Information and Communication and so-called e-Learning

Judi Harris (2001) , distinguishes, whilst recognising that they are clearly related, between telecollaborative learning and telereasearch:

“Telecollaborative learning activities are those in which students com-

municate electronically with others. Teleresearch learning activities are those in which students locate and use online information. Online collaboration and research are frequently combined in large-scale educational projects" (Harris 2001:7).

Harris (2001:16-17), goes on outline that both, telecollaboration activities as well as teleresearch, offer many advantages, of which we highlight the following:

- .- Exposes the student to multiple viewpoints, perspectives, beliefs, interpretations, and/or experiences,
- .- Allows the comparison, contrast or combination of information gathered from different contexts,
- .- Facilitates communication with real audiences via written language,
- .- Broadens students' global awareness
- .- Allows access to information not available locally
- .- Allows students to see and work with information in a variety of formats (text, graphics, video, etc.)
- .- Takes into account information that has just been made available or that is very recent

With these ideas in mind, the idea of telecollaborative environments, therefore, implies the creation, via TCPs, of contexts in which students, using a variety of digital information and communication technology, will be able to make use of and combine various sources of knowledge and will be able to share with other remote groups their own understanding, doubts and results.

Telecollaborative environments are in essence the educational means through which, via digital technology, student understanding is developed.

THE STRUCTURE OF TCPS

After outlining the concepts and key ideas that underlie TCPs, we would like to move on to developing their structure in more detail in a way that could serve as a working framework for their use and application in the educational centres associated with the MoTFAL Project.

Key elements in TCP curriculum structure

These elements are closely related, as we have seen above, to the design and development of learning contexts that promote learning for understanding. Therefore, and following on from ALPS-TfU experiences, it is necessary to answer four fundamental questions:

- i.- What shall we teach
- ii.- What is worth understanding?
- iii.- How shall we teach for understanding?
- iv.- How can students and teachers know what students understand and how can students develop deeper understanding?

i.- **What shall we teach**, is related both to the value of the knowledge selected for the development of student understanding , as well as how representative this is with respect to the underlying subjects.

Teaching for understanding cannot be fostered with just any body of knowledge; a list of terms can develop memory skills but not understanding, just as a specific topic can lead to circumstantial and transitory knowledge, and in neither case is student understanding involved. To avoid these problems, teaching for understanding is based on the selection of 'generative topics'.

Generative topics are 'issues, themes, concepts, and ideas that provide enough depth, significance, connections, and variety of perspectives to support students development of powerful understandings' and possess the following characteristics:

- a.- GTs are central to one or more domains or disciplines. Therefore, they represent or imply questions, knowledge, dilemmas and basic procedures in the scientific subjects they are related to.
- b.- GTs are interesting to students. In the selection of GTs, variables such as age, social/cultural context and intellectual experience of the students must be taken into account; in this way we can, to some extent, awake the intellectual curiosity of students.
- c.- GTs are interesting to the teacher, which implies that they should also awake the intellectual curiosity of teachers.
- d.- GTs are accessible, in the way that they use sufficient resources and those that are adapted to the age of students. A GT could be a disaster if the available media and

resources were extremely inaccessible.

e.- GTs offer opportunities for multiple connections, giving the student new opportunities to link new knowledge with previous experience gained both inside and outside school.

ii.- What is worth understanding?

Once the generative topic has been chosen, we may find that it is just that, too generic, and that it needs to be more specific so that, without the need to resort to the formulation of operative and behavioural objectives, it is possible to indicate and work on the design of the possible 'learning experiences' that we are going to prepare for students.

Understanding Goals help us to firm up the GTs, indicating and making explicit those concepts, processes, and skills that we want our students to understand.

"Understanding goals identify the concepts, processes, and skills that we most want our students to understand"

Although UGs can be expressed as statements (of the type "the student will understand...") or as questions (What are the similarities or differences between...?), we believe it is much more useful if they are expressed as questions, as the search for answers to questions suggests the existence of problems, situations that need student investigation and understanding.

iii.- How shall we teach for understanding?

As we have indicated above, one of the key elements in the development of understanding is found in 'learning experiences'. However, for these learning experiences to be considered as experiences that maximise student understanding, it is necessary that they presuppose the application of knowledge in specific and varied situations, so that students have to go beyond what they know and beyond the information they possess. This situation is called performance of understanding.

"Performance of understanding ... requires students to go beyond the information given to create something new by reshaping, expanding, extrapolating from, applying, and building on what they already know. The best performances of understanding help student both develop and demonstrate their understanding" (ASPSL-TfU).

According to ASPSL-TfU, Performances of Understanding possess the following key characteristics:

- Require students to use what they know in new ways or situations to build their understanding of unit topics.
- Help students build and demonstrate their understanding.
- Require students to show their understanding in an observable way. They make student thought visible.

iv.- How can students and teachers know what students understand and how can students develop deeper understanding?

In normal school situations the procedure that teachers use to be sure to some extent what students have acquired is the exam or objective test; on some occasions, teachers also take into account perceptions of student work and behaviour, but it is the 'final exam' or the process of assessment that determines in a 'public' way what students have learnt.

Processes of understanding are by their own definition, processes that cannot be 'examined' in the same way as routine or memorised learning. The answers to an exam or test of knowledge – typical assessment methods – only show that the student knows or can respond to what has been asked in the test, but this does not imply that he or she has 'understood' the knowledge, ideas, questions that underlie the items in the test.

As a result, the assessment of a process of teaching for understanding has to change direction. It has to be part of the same process of teaching and learning.

"Assessment that fosters understanding... has to be more than an end-of-the-unit test. It needs to inform students and teachers about both what students currently understand and how to proceed with subsequent teaching and learning". (ALPS-TfU)

This way of focusing student assessment is called 'Ongoing Assessment'.

'(the) integration of performance and feedback is exactly what stu-

dents need as they work to develop their understanding of a particular topic or concept... Ongoing assessment is the process of providing students with clear responses to their performances of understanding in a way that will help to improve their next performances' (ALPS-TfU)

Ongoing-Assessment requires continuous feedback on the part of the teacher, so that students do not only feel an interest in their work, but also that this feedback in itself becomes a source of learning. In addition, in the interaction with students concerning assessment, teachers must include not only information about what students have done but about how they can improve their work and performance. On the other hand, feedback is not only an interactive process exclusively between student and teacher; it must foster student reflection on their own work and activity and debate and discussion with other groups and classmates about work completed.

Criteria for Student Assessment in the Performance of Understanding
CLEAR: articulated explicitly in the definition of each performance of understanding - although they may well be involved over the course of the performance especially if it is new to the teacher as well as to the students
RELEVANT: closely related to the understanding goals for the unit.
PUBLIC: everyone in the classroom knows and understands them

Kinds of performance

Performances of understanding can be, in principle, as varied as the breadth of the imagination of teachers and the determination of students. The following table offers an initial approximation of three types of performance that could be given in a curriculum in action.

Kinds of Performance
<p>Introductory Performances. These are the performances of understanding that usually come first in a unit. They give your students a chance to explore the generative topic a bit. They also give you an opportunity to gauge students' current understanding of the topic. The possibilities for connections between students' personal interests and the topic emerge from these explorations.</p>
<p>Guided Inquiry Performances. In these kinds of performances of understanding, students focus on developing their understanding of particular problems or aspects of the generative topic you feel are especially important. Guided inquiry performances typically occur in the middle of units.</p>
<p>Culminating Performances. These more complex, concluding performances of understanding give students a chance to synthesize and demonstrate the understanding they developed through the other performances of understanding.</p>

However, and taking into account the idea of teaching for understanding that we have been constructing throughout the previous pages, we would like to raise two basic questions that have to be taken into account in TCPs. Firstly, we would like to present some basic recommendations to help in the selection of performances, emphasising below one of their most outstanding qualities and perhaps one which makes performances for understanding complex spaces for the work of teachers.

Recommendations for the design and selection of PoU

In order to guide the design and selection of performances in TCPs, the following characteristics should be taken into account:

- They must be flexible and adaptable in terms of their structure.
- They must be related to each other in such a way that the whole group of performances can constitute a learning space.
- They must be more focused on the richness of the processes to be maximised than on the results to be obtained.
- They must be focused on the work (theoretical and/or investigative) of students.
- They must imply group work and, therefore, a grouped organisation of students with respect to the work to be undertaken.
- They must imply collaboration between pupils in the groups, and collaboration between groups.
- They must imply a search, selection and organisation of information using and combining various sources: from textual sources, to digital sources (such as the Net).

- An appreciable number of performances must be directly related to student field work.
- An appreciable number of performances must use technologies to register, search for and/or organise information.
- An appreciable number of performances must imply communication between the schools involved in the project.
- An appreciable number of performances must imply the use of mobile technologies, as well as other digital technologies that may be available.

Performance of Understanding: risk and ambiguity

Studies of classroom interaction and the processes of teaching and learning carried out by Walter Doyle (1983) offer us an interesting and illustrative table of the various 'tasks' that can be given. Doyle distinguishes and classifies the tasks according to risk and ambiguity. Whilst risk "indicates the strictness of the assessment criteria that a teacher uses and the probability that these criteria will be fulfilled (by the student) in a given situation"; ambiguity refers to the level of possibility "that a specific answer can be pre-established or a specific formula can be used as an acceptable answer" (183).

Combining both criteria we can obtain the following table:

		RISK	
		HIGH	LOW
AMBIGUITY	HIGH	UNDERSTANDING	OPINION
	LOW	MEMORY-II ROUTINE-II	MEMORY-I ROUTINE-I

(Taken from W. Doyle 1983: 183)

Routine and memory tasks are type I and type II. Type I implies the reproduction of a relatively small number of concepts, words, etc., or the use of a small number of algorithms to produce the answer. On the other hand, type II, represent the reproduction and use of a greater number of algorithms or those that are particularly complicated. Tasks related to understanding are those which present the most risk and ambiguity for the student, and because of this they require greater and constant attention and 'tutoring' on the part of the teacher whilst respecting the autonomy of students and groups. Taking into account this quality of tasks related to understanding, we should never confuse them with routine and memory tasks II, something which unfortunately occurs very frequently. However, we should not forget that in tasks related to understanding, we can find a number of routines that the student learns and uses, as well as data and information that they learn during the process of understanding.

PERFORMANCE CHALLENGES, SPECIAL PERFORMANCES FOR THE MOTFAL PROJECT

Apart from the specific types of performance that schools will design, within the framework of the project we want to emphasise and develop one type of performance that we are going to call performance challenges. Although, in our judgement, any performance that captures the interest of students implies a challenge of some type, in the context of the MoTFAL project, this type of performance is closely related with the use of mobile communication technology and with the collaboration and communication between participating schools.

A PCh possesses the following characteristics:

- a.- As a special type of performance of understanding, challenge tasks presuppose some type of action by students. Action that could be linked with the development of ideas (via the analysis of certain circumstances), the solving of specific problems, the production of explanations, etc. Like any other performance, PChs always involve the maximisation of student understanding using superior psychological processes.
- b.- PChs imply, whatever the planned performance, a challenge to the student; a practical and/or intellectual challenge which they have to face. PChs should not present intellec-

tual or practical activities to students that are not of interest, do not stimulate their curiosity and do not openly stimulate their intellectual courage to 'meet' the challenge. In some way, they should imply a task that goes beyond what they know, placing them in unknown territory.

c.- PChs must be related to activities which, to be completed, require the collection and organisation of information using various sources, but especially digital ones.

d.- To deal with PChs it will be necessary to use technological tools (computer, digital camera, GPS, electronic diary, etc.).

e.- Each School will copy with and will resolve the Pch created by the other school (pupils and teachers).

f.- Both the PChs and their solutions will be transmitted using digital technologies.

g.- PChs will be related to the content of the TCPs that the participating schools are going to be working on.

SOME IDEAS ABOUT THE TEACHER'S ROLE IN TCPS.

Underlying the ideas about TCPs that we have been expounding is the role of the teacher, about which we would like to suggest some limits.

We have to recognise that in the context of teaching for understanding, the activity of teaching assumes a huge complexity; a complexity associated – as Darling-Hammond (1997) has highlighted – with the simultaneous, multidimensional and unpredictable nature of the teaching/learning process.

TCPs offer a framework and orientation for teachers and schools, but – because of their very nature – they cannot be rigid teaching structures. The freedom and autonomy of teachers is found here connected, within the framework of the TCP, to their personal judgement and their practical knowledge (Schön 1983, 1987)

“A curriculum... provides a framework in which the teacher can develop new skills and relate them as he does so to conceptions of knowledge and of learning” (Stenhouse 1983: 157).

The development of understanding cannot be pre-specified as if it were a routine; the same way that happens with pre-specifying specific results, as if they involved predicted behaviour. TCPs offer ideas and possibilities for teacher action; but it is the teacher – and their professionalism – who has to decide at the last moment which experiences and performances

are most appropriate for the development of student understanding. To put it another way, a TCP is a hypothesis for teaching which has to be proved by teachers in practice. Because of this, TCPs do not only call upon their professionalism; in a sense, a TCP could be a medium for the development of a teacher's own professionalism. We can therefore refer to the words of Stenhouse, which can be perfectly applied to the idea of TCPs that we have been suggesting here.

“The curriculum is the medium through which the teacher can learn his art. The curriculum is the medium through which the teacher can learn knowledge. The curriculum is the medium through which the teacher can learn about the nature of education. The curriculum is the medium through which the teacher can learn about the nature of education. The curriculum is the medium through which the teacher can learn about the nature of knowledge. And the curriculum is the best medium through which the teacher can learn about these because it enables him to test ideas in practice and hence to rely on his judgement rather than on the judgement of others” (Stenhouse 1983: 160).

ROLE OF MOBILE TECHNOLOGIES

MoTFAL, as its acronym and name suggest, is a project that intends to use and experiment pedagogically with mobile digital technologies.

Firstly, we would like to explain the role that, in our judgement, digital technologies play in general in teaching for understanding, in order later to concentrate on mobiles.

One of the key elements of soviet psychology (Daniels 2001) and cultural psychology (Cole 1996) is found in the idea of artefacts (and cultural artefacts). An artefact, suggests Col, is “an aspect of the material world that has been modified during the history of its incorporation into human action directed towards objectives” (114).

Artefacts are not only “physical” and “material” elements (tangible things), they can be ideals (i.e. conceptual structures); given than these (like language) have been moulded through their participation in social interaction.

According to Wartofsky (1973) it is possible to establish three levels of artefacts. The first level consists of primary ‘artefacts’, which range from the bowl and the axe, to words, writing instruments and, even, mythical characters; the second level, would be formed by artefacts that imply a link between the primary artefacts and the way of using them, like for example, procedures, beliefs, recipes, rules, etc.; lastly, tertiary artefacts can form an autonomous world not necessarily connected with practice, transferable to other non-immediate contexts, such as works of art, ways of thinking and profound cognitive structures (Cole 1996: 118).

Using this classification system, we can see that digital technologies are, certainly, primary artefacts (if highly evolved) that, in the context of teaching for understanding (a secondary artefact), attempt to affect the thought processes of the student and their way of understanding the world, i.e. the tertiary artefacts of the individual and humanity.

Following this concept, Cole emphasises that although artefacts seem to be the immediate media via which we act and relate to each other,

in reality, they are 'secondary' or auxiliary. Practical activity is the "result and pre-condition for human thought"; and continues:

"Artefacts are created and used in the territory of activity/practice" (Cole 1996: 131).

Let us reflect for a moment on these ideas: firstly, and as Cole (1996) indicates, human practice (interaction with the medium, including the social medium) is the essential medium for the development of thought; secondly, in this interaction human beings 'create' artefacts that later serve as mediators for interaction with the natural and social world.

Here we find the idea of performance reinforced once again as an example of practical activity and it is here that we can justify the role of digital technologies as auxiliary media for student action. However, although digital technologies are presented as merely technical media, we cannot forget that, they themselves, are used to 'handle' and 'manage' symbolic artefacts such as concepts, images, classifications, signs, etc., which has put them in an intermediate position between their technical beginnings and their symbolic potential .

Mobile Technologies

The MoTFAL project is going to work with various digital technologies, but wants to particularly concentrate on mobile technologies. One of the elements that we believe enrich student work via TCPs is found in the design of learning experiences in which students have to lay their hands on a variety of sources of information:

- Textual information: books, magazines, etc.
- Digital information from CDs, the Internet and that collected by students digitally.
- Iconic information (images, photos taken by students, etc.)

Digital sources, can be divided – specifically for this project - into fixed technologies and mobile technologies. Amongst the former, as can be easily understood, are fixed computers, the Internet, multimedia CDs, etc. They are a basic part of the MoTFaL project, something which should be taken into account.

Mobile technologies are, on the other hand, the technologies which have at the last moment become the experimental axis of the project. ¿What do we mean by mobile technologies? The idea of mobile technologies that we are going to implement in the MoTFAL project is intended to be very generic, incorporating any technology which is not fixed that helps students note down information and communicate outside the context of the classroom and the school.

The mobile technologies that we are going to use in the project are, therefore, the following:

- .- Digital diaries
- .- Portable computers
- .- Mobile telephones
- .- Pen drives
- .- Digital photo cameras
- .- Digital video cameras
- .- G.P.S.

At the same time, we hope that within the framework of the project, the teleco-operation between participating schools can be brought about via asynchronised digital systems, that facilitate free expression between students sharing their ideas and experiences. To do this we will set up fora using the YaBB platform (which is software that manages an online meeting point), the basic system for co-operative work (BSCW) and the system for the creation of webLogs, MovableTYPE. All these resources are available from the following website <http://grupolace.uca.es/recursos.htm>

SOME SUGGESTIONS REGARDING THE COLLABORATIVE GROUP WORK OF STUDENTS IN TCPS

Basically, all the pedagogical philosophy of TCPs is based around student group work. We do not discount, obviously, individual work, but we are convinced that the development of understanding requires the active participation of groups of students organised and collaborating on a project.

Group work requires a series of conditions of which we highlight the following:

- Organise groups with a balance between the sexes
- Distribute tasks in such a way that each group understands its particular area of work
- Encourage the sharing of ideas between groups
- Be aware of gender issues, hyper-activity of boys to the detriment of the activity and participation of girls, etc.

With this methodology, teachers have to adopt a role that is much less 'central' in the teaching/learning process and much closer to tutoring and guiding of the work of the various groups. Group work is aimed at, in the final analysis, the development of autonomy, decision-making ability and internal organisation, ends that the teacher has to take care of.

In addition, teachers have to make sure that the groups do not become isolated cells. Idea-sharing, debates and discussions about work done should be essential elements. This is intended to be co-operative, not competitive, group work.

When the groups come together in co-operation so-called co-operative learning can take place that reminds us that interaction between students is relevant not only for socio-affective learning but also for cognitive learning (Edwards & Mercer 1987, Crook 1996). "Co-operative" organisation of work, discussion between classmates and confrontation with ideas, which distribution in groups supports (and which goes beyond individual juxtaposition), encourages self-reflection, self-criticism and the search for arguments that back up our ideas when faced with those presented by others, key elements – as we have shown – for cognitive development and the construction of knowledge.

Far from individualism, co-operative group work can foster, at the very least, the following aspects in students:

- Collective responsibility for the work and its distribution;
- Development of a feeling of group identity;
- Acceptance of external criticism;
- The importance and value of shared experience and knowledge.
- The development of communicative ability in a way that facilitates the group process (and when the groups disperse, the class process).
- The learning and use of social and organisational strategies that

maximise the potential of group work.

- The management of conflicts that may arise in the group, resolving them constructively .

We are convinced that the development of student understanding needs the methodology of group work as a corresponding and, to some extent, inseparable, element.

SOME SUGGESTIONS ABOUT STUDENT ASSESSMENT

In the section explaining the concept of teaching for understanding (TfU), we propose the idea of Ongoing Assessment. At this point we would like to put forward some complementary ideas and suggestions on this subject.

1.- Student assessment compatible with teaching for understanding is a long way from the usual systems of performance/results measurement via objective tests.

2.- Performance tests as instruments only imply a sample or selection of "questions or situations (called items) taken from a domain of content or from a universe of interest" (Madaus, 1988: 30). As a result, they only tell us if the student knows how to respond to the questions in the test, not if they know the material being evaluated.

3.- Performance tests do not help us to understand the educational reasons why certain marks are high or low, nor the methods of

solution or improvement of problems that can be detected (Berlak 1992; Broadfoot 1983, 1984; Broadfoot, Murphy & Torrance 1990; Gipps 1994).

4.- Student performance is used to justify the concepts of “successes” and “failures” of the educational system without analysing the different elements that are involved in it, such as the quality of learning experiences, the professional quality of teachers, etc.

5.- The use of this method of assessment results in classrooms that emphasise the memorising of isolated facts and vocabulary, to guarantee that students pass tests successfully. But they do not develop the ability to use the information in new circumstances, connect ideas from different subjects or fields, etc.

The MoTFAL project sees assessment as a complex, dynamic process; an element that is essential in the educational process. Therefore, and apart from the specific strategies that each school will want to develop, we would like to offer some methodological options and suggestions for carrying out student assessment.

The proposal that we are making, coherent with the idea of qualitative, global assessment that we have previously put forward within the framework of the project, consists of two groups of complementary assessment strategies:

- School Portfolio.
- Schools Collaboration Journal.

SCHOOL PORTFOLIO

Before elaborating on the School Portfolio; we would like to outline, if briefly, some ideas about the portfolio as an assessment strategy.

¿What is a portfolio?

A portfolio is an assessment instrument that consists of a representative selection of materials and tasks that students produce during a project or academic course. However, a portfolio is much more than a simple random collection of work. In fact, it is intended to be a selection or sample of those activities that can show the growth, richness, and evolution achieved by students, bringing together evidence of the achievements as well as things to be improved. Because of this, and because it allows the student to be aware of their own evolution during the process, a portfolio can be considered as one of the most interesting strategies for self-assessment.

<http://biblion.bib.uia.mx/cursos/Portafolios.html>

“A portfolio is a purposeful, meaningful collection of student work... this collection tells a story about the student’s developmental growth achievements, and progress over time” (PSSA, n.d.)

The concept of a portfolio comes from the collections that photographers or artists present as a sample of the quality or level of their work. We have to consider the relevance of the selection of tasks and elements to include. In general, some of the things to be integrated and included in a portfolio are: essays, solved problems, artistic work, exams, extra-cu-

ricular tasks, projects, collective work, commentaries on reading done, photographs, etc. But not only should texts etc produced during the project be included, but also all those comments, ideas, personal reflections and expectations that have arisen during its implementation.

We are convinced that the use of portfolios allows the teacher to be aware of what students do, how they do it, why they do it and above all, the effect it has on them from their own point of view; appreciate the thought processes, the evolution of these during the process, know their interests, doubts, fears..... it can definitely be an excellent strategy for getting to know students.

On the other hand, we believe that the use of portfolios is also useful for students :

- o To empower students to take responsibility for and ownership of their learning
- o To allow students to reflect on and evaluate their own work; to set goals and see them through to completion.
- o To allow students to select and showcase their best work; to show what they can do and even what doubts they have
- o To organise their work, given that this informs them about what they have done.
- o To provide students with a communication vehicle for their accomplishments
- o To encourage teaching based on student developmental stages and individual needs
- o To provide feedback to all students, teachers, parents concer-

ning student achievement and educational aims.

- o To help students and teachers focus on the process of learning as well as the product.

- o To provide a foundation for future decision-making.

- o To educate them in values such as criticism, responsibility, and autonomy.

- o As a key element to provoke debate, exchange of ideas, dialogue and co-operation between students and teachers.

- o To support mutual knowledge and co-operation between schools.

According to the PSSA Guide, there are at least three types of portfolios:

- Working Portfolio: purposeful collection of student work that has a stated purpose and aims. The key steps in building a portfolio are having students collect work, select samples of their work, and reflect upon their selections.

- Showcase Portfolio: A showcase portfolio is a purposeful collection of best work that showcases achievement and progress.

- Cumulative Portfolio: Includes a variety of student materials that show the quality of learning achieved by students.

Taking into account these types, in the MoTFAL project, with the help of a specific platform, we are going to develop a type of portfolio that brings together some of the characteristics of these three types and adds others which are closer to the purpose of this project. This portfolio, called the School Portfolio, consists of the following sections:

TYPES OF PORTFOLIO	Content	Explanation	Platform	Elements
Presentation of the Schools	Who are we? Where are we? What do we do?	Presentation of the schools participating in the project	Web-System	Text, links, photos, etc.
TCPs of the Schools	Basic plans for the TCPs	Explanation of the plans and the TCPs they are going to undertake	Web System	Text of TCPs; Structure and number of groups, ideas about the Performance for Understanding, etc.
Performance Challenges	Performance Challenges	Explanation of the P-Ch and their solutions- results given by students from each participating schools	Web System	Text, images and other elements that have been necessary to 'meet' the challenge
Final Project	The products created by students	Finished projects	Web System	Text, database, images, etc.
Project Journal (Binnacle Journal)	Student and teacher opinions on the project. This will be divided into three parts: Before, During and After the project	Opinions, doubts, suggestions, student and teacher criticisms about the application and development of the MoTFAL project	MobileType platform and Web system	Texts and images
Schools Co-operation Journal	Use of the Forum and Web-log to establish collaboration between participating schools	Debates, ideas, suggestions, opinions, anecdotes, FAQs, that the schools can share	MovableTYPE platform	Student and teacher texts, images, photographs, etc.

Presentation of the Schools

In this section of the portfolio, it is intended that each participating school presents itself by responding to three simple questions:

- Who are we?
- Where are we?
- What do we do?

To do this, they can use images, texts (stories, anecdotes), photographs, and as much information as it necessary. This presentation must be produced by the students that are going to participate in the project.

TCPs of the Schools

In this section, each school will outline the TCPs that it will apply and implement during the project: one connected with history and the other with biology.

This will include the basic structure of the TCPs, the sequencing/timing, the criteria for the organisation of the groups, the planned learning experiences, etc., i.e., all the basic elements of the TCPs.

Performance Challenges

This part of the portfolio will be produced at the end of the work with the respective TCPs. Each school will include on the Web system not simply

the answer, but also the process of producing the problem or challenge planned by the collaborating school.

Final Project

This section is aimed at the exhibition and publishing by each school of the work carried out by students in the two areas of work. Here the results of activities will be shown as well as documents, photographs, diagrams, schedules, stories, i.e., all the material produced by the groups of students.

Of all the sections covered up to now, this is the one which is closest to the idea of a working portfolio.

Recommendations for the Binnacle Journal

Before the project

The content of this part can be comprised of texts, as well as images and personal comments of all types. The following questions may serve as a guide to its completion:

- What impression do you have of the project to be undertaken?
- What information do you have about the content you are going to work on?
- How would you like the activities to be?
- Are you happy with your group?

- Could you describe yourselves as a group?
- What would you like to learn within the framework of the project?
- What attracts you most about the project?
- What is your impression of the other participating schools?

During the project:

- What is your opinion of the activities?
- What has been most interesting to you?
- What has been most difficult and why?
- How has the group work been?
- What would you like to change?
- How would you like to continue?
- How have you felt?
- What difficulties have you found?
- What technology has been the most interesting?
- What has been most difficult to use?

After the project

- Have your expectations been met?
- What aspects would you change and what needs to be improved?
- What did you like most and least?
- What can you say about what you have learnt?
- How did the project seem to you in general?
- What material was the most interesting?

- What do you think about the use of digital cameras, GPS, portable computers, in your work?
- What technology did you feel most comfortable with and why?
- What has been the most helpful and why?
- Would you have used other technologies and resources? ¿What?
- How did you feel working in a group?
- How did you feel about working and communicating with students from other countries?
- Do you think you could work on other subjects in this way?
- When did you feel lost and why?
- Were there any conflicts? How were they resolved?

Some Ideas for producing the final project

- Materials (texts, images, personal notes about teacher comments, etc.) which are the most representative of those used.
- Activities and work produced (drawings, diagrams, essays, Internet searches; problems set in class and solved; group activities, etc.). It will be essential to specify how they have been done (individually, in a group, sharing opinions on the Internet).
- Planning and description of the activities developed, i.e., to show the process that has been followed throughout the sessions (especially the field work); focussing on areas such as the following: teacher explanations, carrying out of activities, use of mobile and fixed technologies, use of other sources of information, etc.
- It is also very important to isolate and note down those steps that are followed in the various sessions and activities.
- Also at the end of a session or teaching unit it is very important

that you note down your personal comments, your evaluation, the aspects that you would change, remove and/or add, etc.

Schools Co-operation Journal

This is another part of the portfolio; a journal intended for the collection of information about the process of collaboration between schools during the implementation of the project.

Co-operation between schools from different European countries, within the framework of this project, implies an educational innovation (added to the innovation of the use mobile technology in the teaching of subjects such as Biology and History).

This collaboration will be based on the communication and exchange of experiences, materials, comments and opinions, between the different participating European schools (teachers and students), using the available digital platforms/tools: Yabb for photos and MovableTYPE for journals/weblogs.

Therefore, we suggest that a MoTFAL Co-operation Channel is set up based on the Web-Log and forum system. This way, throughout the implementation process in schools, these weblogs/fora will be open so that students can exchange comments, proposals, recommendations, interesting materials or texts that complement the session designs, student work, difficulties found in problem-solving, etc. At the same time, teachers, if they want to, could produce their own work log.

The Schools Co-operation Journal is intended to be a medium via which teachers and students can record events, situations, experiences and opinions, exchange materials, information and work produced, get help with problem-solving, etc., related to the processes of co-operation and communication between schools.

The weblog/forum will facilitate the necessary space for each school and its staff. The weblog will consist of two sections: one for teachers and the other for students.

In the teachers section they can make comments regarding the collaboration and the activities being implemented, as well as ask questions and raise doubts with other teachers involved in the project and the coordinators.

In the students section they can note down opinions, relevant and strange situations regarding collaboration with students in other participating European schools.

Schools co-operation WebLog/Journal	
Teaches' Section	Entries about collaboraion with teachers from other school
	Entries about collaboration with the coordinators of the project
Students' Section	Entries about collaboration with other students participating in the project

Below we suggest some aspects that could be entered in the Co-operation Journal:

- *Description and comments about situations in which interesting materials or texts have been shared with other schools: proposals for new activities, bibliography, significant images, steps to solve a problem, etc.*
- *Notes about the difficulties and advantages encountered in the activities and the use of mobile technologies.*
- *Notes about the difficulties and advantages of the channels of communication/collaboration used: flow of information, lack of collaboration, technical problems, language, etc.*
- *Evaluation of the contributions and recommendations shared with other schools.*
- *Analysis of the general working of the means of communication with other schools and members of the project and opinions about their use as a tool to foster the coming together and co-operation*

between schools in different countries.

- *Evaluation of the collaboration between different schools and the impact that this has had on the teaching/learning process.*

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