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## *Education as the creation of microcultures. From the local community to the virtual network*

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### ***Abstract:***

This article presents the work undertaken by a multidisciplinary group, comprising researchers from the fields of psychology, education and technology, as we set about developing new virtual tools for collaborative learning.

We began from our experience acquired in learning communities based on the “Fifth Dimension” model, in which ICTs are used in a collaborative fashion. The work undertaken with members of ethnic minority groups in communities of this type underlies the theoretical and practical development of the foundations for intercultural education.

Finally, we describe the process by which we constructed virtual tools that can be appropriated from a wide variety of contexts.

### ***Key words:***

Collaborative learning, intercultural education, learning communities, GNU, free software, e-learning, cultural psychology, social intervention.

### ***Authors:***

The authors are members of the Human Development, Social Intervention and Interculturality Research Group (DEHISI) at the Autonomous University of Barcelona. This group's work focuses on the building, both within and outside schools, of learning communities whose members are drawn from minority groups or those in situations of social exclusion. DEHISI is also involved in the development of technological tools for the setting up of virtual learning communities and conducts studies on development issues and social intervention in the cultural context.

In this article we wish to describe the process of theoretical thinking resulting in the design of an educational portal: ([www.5d.org](http://www.5d.org)). It is not our intention to describe this portal in detail, nor do we wish to enter into a discussion of its contents, rather we wish to analyse the process by which a practical experience in intercultural education led us to design this portal as a *collaborative tool* and to see the latter as a framework in which the *development of a "microculture"* might serve as the basis for its sustainability. In other words, we analyse the way in which the methods adopted by a local educational project (oriented towards collaborative learning based on the use of ICTs), which has seen the creation of its own particular microculture, offer guidelines for the construction of a virtual tool.

Ten years ago, a number of us began to ask ourselves the question: What difficulties do individuals from different cultures come up against when seeking to share meanings within the same school? That is: how do children who belong to a different culture from that of the school manage to internalise the meanings used by the latter? Might the high drop-out rates from school within some minority groups be due to the difficulties these children face in constructing shared meanings with their teachers?

Trawling through the literature, we discovered that Greenfield & Cocking (1994) had raised just this question. In a series of studies of three minority groups in the USA ("Afro-Americans", "Mexican-Americans", "Asian-Americans"), undertaken by themselves and a number of other authors, they conclude that there are marked differences in values and in the meaning attributed to identity, and that this affects integration in schools and relations between the family and the school. The goals of the developmental and educational projects of the families and the schools often differed greatly, and these differences were generally not made explicit, but rather they were manifest in collateral conflicts. Furthermore, they revealed an interesting point: the cultural differences that in some way interfered with the dynamics of the school did not originate so much in the ancestral cultures of the minority groups, but in the relationship between these and the main culture, that is, in the power relations. In other words, it was not so much that the cultures generated meanings independently and in a manner whereby these meanings did not coincide, but rather that they were produced in situations of confrontation, giving rise to such phenomena as resistance.

But these and subsequent studies (Greenfield, 1999; Greenfield and Suzuki 1998) limited themselves to discussing the way in which educational values and projects come to differ and how conflicts ensue (for example, individualism and collectivism), but they did not analyse the impact they have on teaching-learning processes, nor how the latter might be organised differently.

In seeking to respond to this, we have found it useful to consider education as a process of (re)construction of a culture in which old and new meanings are shared in some way by different actors. In other words, understanding education as an *activity*, with the meaning that Michael Cole, and Leontiev before him, gives the word. But, first, it would be useful to tackle two questions derived from the use of certain concepts developed within cultural psychology:

- All educational activity requires intersubjective agreement, and to achieve this the participants need to see each other as valid interlocutors.
- All educational activity can be understood as a microculture, although this is only possible if the participants appropriate the artefacts from which it is constituted.

## *Culture, education and intersubjectivity*

Insofar as every process of socialisation involves an “objectification” of the world, each culture represents a particular way of establishing its reality. This process is initiated by the family, and the other institutions of the culture are coherent with this basic objectification (Berger and Luckmann, 1966). Thus, when the child starts school, she finds a universe in which she shares the essential elements of this objectified world, in which there are no major contradictions, and where, therefore, it is possible to establish intersubjective agreements. At least, this is what happens when the family and the school belong to the same culture. But, what happens when this is not the case?

The schooling of a child from a middle class, autochthonous family is experienced by this family as an act that is performed *within the community*. Even when the school is not in the immediate neighbourhood, the choice of school is generally related to the fact that it belongs to a particular social group organised around ideological, religious, or class values. The school forms part of this universe. Its structure and the way in which it works are known, and what's more, these aspects are internalised and form part of the cultural framework. What the school seeks to impart, what a child should be, when her behaviour is appropriate, etc. are all questions on which there is an implicit agreement.

To a certain extent, these families form part of a *community* in which various *scripts* organise their day-to-day experiences in a largely similar way. As a result, these people share a certain way of understanding the world. Belonging to the same *cultural community* means the possibility of sharing implicit beliefs, that is, ways of categorising reality that do not have to be explained, as they are taken for granted.

Shweder (1986) refers to these as “constitutive suppositions”, preconceived ideas that do not have to be debated or made explicit, and which each cultural community establishes as a basis for understanding. Moghadam (2003) coins the term *interobjectivity* to refer to the set of objectifications of reality that are common to the members of a given culture. Only by sharing this interobjectivity – or, as we shall see, knowing and granting legitimacy to the different *interobjectivities* in a multicultural space – is intersubjectivity possible. Moghadam explains that this connection between the objective world and intersubjectivity is simple to understand in isolated societies such as that of the Tasmanians before they were exterminated; or of the Yanomami whose Amazon home has yet to be devastated; or the Amish communities in the USA, who shun all contact with the outside world. But the problem is more complex when we look at multicultural societies, in which different power relations exist between majority and minority groups. When the members of these minorities and majorities do not share the same interobjectivity, and especially when diametrically opposed objectivities are constructed in each community, intersubjectivity is extremely difficult to achieve.

The objectivities of a multicultural society are not static, since they are subject to processes of acculturation (Berry, 2001) and also, though operating in the opposite direction, to the generation of new differences (Ogbu, 1994). Thus, the way in which a minority group objectifies the world may gradually become more similar to, or more distinct from, the “objectivity” shared by the majority, according to the dynamics of the power relations. Clearly, this dynamic operates in the school in such a way that when dealing with the difficulties of the inclusion of a cultural group, we need to examine the barriers that stand in the way of the establishment of intersubjective agreements. When the members of a minority ethnic group with little power attend a school, they find themselves in a world in which the rules, language, relationships and objectives of the activity are far removed from their own or

they might even find that the former contradict the rules, the norms of language use, the types of relationship and the objectives, established with varying degrees of explicitness, of their own family and cultural group.

The key question in education lies in how the school - an institution which, in the western world, shares the interobjectivity of the dominant culture - can create spaces of intersubjectivity with members of minority groups who hold different, if not diametrically opposed, objectifications of the world. In other words, can the school recognise those pupils from groups that do not share its objectivity as valid *interlocutors* in order to establish intersubjective agreements? Can the school generate a meaningful *microculture* for all its members?

Being able to recognise pupils from minority groups as *valid interlocutors* is a fundamental step in the establishment of intersubjective agreements. It is interesting to note that authors who analyse the origins of intersubjectivity from markedly different perspectives emphasise this recognition of the role of interlocutor – that is, the consideration of the other as a participant – as being fundamental to the establishment of intersubjectivity. Thus, for Rommetveit (1998), “we need to believe that the other understands us in order to construct this level of understanding in reality”. In other words, only by considering the other – even *foolishly* – as an interlocutor, can we achieve a shared understanding. Similarly, for Trevarthen (1982) before we can achieve a shared understanding, we must recognise one another as interlocutors. He speaks of the establishment of a “primary intersubjectivity” between the baby and those who take care of it, involving the construction of a communication channel, a state of joint attention, emotional in origin, which is manifest through *protodialogues*, or turns of intervention. Thus, it is a prerequisite of intersubjectivity to consider the other as an *interlocutor*, recognising their capacity to take on this role and acting as if they were in this role. However, once the other is seen as an interlocutor, the question is how do we go about achieving intersubjective agreements.

### ***Appropriation of artefacts***

Every communicative act can be understood as a negotiation of meanings. But what it can never be is a private act, since these meanings, which mediate our relationship with reality, are in their turn cultural products and tools. Cole (1996) defines culture as a medium in which human life unfolds, and which comprises a set of interrelated instruments, shared by the members of the group and passed down from one generation to another. These artefacts include physical and symbolic instruments, the behaviours associated with the latter, knowledge, beliefs, and forms of social organisation.

Cole, taking his lead from Leontiev, presents the activity as the indivisible element in the study of human behaviour. We can understand the activity as being the system of complex relations between the subject, the objects and the artefacts that mediate between one and the other, in a specific context of social relations. These artefacts or mechanisms of cultural mediation (tools or signs) are supplied by the culture in contexts of specific activity, and the subject takes up (*appropriates*) these cultural media, reconstructing them in the process of the activity.

In this way, the activity defines the objects and the identity of the subjects. The objects to be transformed are defined by the tools used, but the subject is transformed in accordance with the goals the latter sets himself and the artefacts he uses to achieve them. This is well

illustrated by the classic example of the poacher who on becoming a farmer transforms his way of thinking, his way of life, his social organisation, thanks to his new goals and tools. Learning and development can be understood as the appropriation of the artefacts that mediate the activity. As the “external” artefacts become internalised, the internal representations become externalised in the discourse, gestures, writing, and manipulation of the material in the environment (Engeström, 1999). That is, every activity involves a process of teaching and learning.

Formal education - schooling - is a particular type of activity, where this process of *appropriation* constitutes the object in its own right, the main goal, albeit that the set of artefacts to be handled is decidedly complex. It should be stressed that it is not only a matter of physical tools and symbols (what Cole calls *primary artefacts*), but also of scripts that are pre-established by the culture, beliefs, ways of categorising, mental schema and forms of social relationships (*secondary artefacts*). In general, the latter are understood as having been acquired by the time a child starts school, or it is supposed that they will be acquired in parallel, in other contexts of activity, such as those provided by the family. Thus, for example, the acquisition of the “correct” language for school is not possible if it is not articulated with extremely clear representations of its contexts of use, its appropriateness, its goals, etc. The same is true of reading and writing, and of mathematics, which only become meaningful in relation to a network of artefacts operating at different levels and which are supplied in various institutional settings (school, family, etc.) that maintain a minimum degree of coherence between each other.

But, as we have pointed out above, the latter is only true to the extent that the school and the family share identical cultural referents. If this is not the case, the appropriation of tools faces major, often invisible, obstacles. In other words, the school is a meaningful context to the extent that certain artefacts are *a priori* and *implicitly* shared. Everyone is conscious of this when dealing with primary artefacts such as language (the child must know the language in which the teaching is conducted, for example), but it is not so obvious when dealing with the sharing of certain scripts, beliefs, appropriate behaviours, etc.

Thus, the school is not only an institution adapted to a specific culture, but also its history has deposited within it a set of artefacts that are only meaningful in a similar culture. The challenge facing an education system that seeks not to exclude comprises the real *appropriability* of its artefacts by all participating groups.

### ***The Classic Model of Education***

In an earlier study (Crespo, Lalueza, Portell & Sánchez, 2004), we analysed two schools in which 100% of the pupils belong to minority groups. The first of these schools typifies quite clearly the cultural barriers to which we have referred above. Here, we wish to stress two elements that illustrate this situation, and which will be useful for presenting what is a *counter-model* for intercultural education:

The implicit representation of cultural differences as *deficits* (which undervalues the pupils in their role as legitimate interlocutors).

The use of an educational model based on *transmission* (which impoverishes the role of the pupils as interlocutors).

As regards the first of these elements, both in the educational program of the school being studied and in the discourse of the teachers, the difficulties of each child are represented as an *individual handicap*, whose origin can be traced to a deficient family context. Children and families are, thus, defined as "lacking in": *lacking* in knowledge, so that the school is presented as the *supplier* of knowledge in a monopolistic regime, without recognising the role of the family as a generator of useful knowledge, and *lacking* in habits and norms of behaviour, so that the school needs to discipline both the pupils and the parents, in such a way that controlling their behaviour is the principal objective, with recourse to the authorities when the school cannot cope.

The minority culture – in this case gypsy culture – is thus seen as being deficient. But, furthermore, the cultural differences are presented as being *essential*. In other words, cultural change is impossible – be it in the majority group or among the minority, individuals can only be brought closer to the standard of the dominant culture. This consideration of cultures as something immutable leads to the negation of the joint-construction of meanings: the differences that separate us are so great that it is *they* that must change so as to *adapt* to our setting. Therefore, the responsibility lies only with *them*. This perception of cultural differences leads us to the fundamental issue: *the failure to recognise the other as a legitimate interlocutor*.

Thus, what we see in the relations maintained with the children and their families is an absence of dialogue and collaboration. For these families, and as a result for their children, school seems a hostile environment that is imposed on them. Failure to recognise the possibilities of negotiation hinders both the sharing of objectives and goals such as the active participation of interlocutors. And without this active participation, appropriation - a basic element - becomes an arduous task.

As for the second of these elements - the educational model - we are faced with a clear example of *an instructional model based on a theory of transmission* (Rogoff, Matusov, and White, 1996), in which schoolchildren learn the information to show that it has been codified and retained in response to certain evaluation tests that reproduce "piece by piece" what was learned.

The transmission model is based on a series of implicit beliefs. It is supposed that there are a number of prior agreements existing between the teacher and the schoolchildren. These are never made explicit as they are considered obvious. On top of this supposedly intersubjective base, the new knowledge is *deposited*. At the moment of truth, a whole series of implicit negotiations, heavily mediated by the power of the teacher, takes place. As the explicit goal is the correct codification of knowledge, the fact of whether teacher and pupils share meanings or not is of secondary importance. Indeed the meanings originating from the behaviour of the community of schoolchildren count for nothing, and are even considered a disturbance if they contradict or hinder the *reception* of formal knowledge.

This *counter-example*, should provide us with some guidelines (albeit negatively speaking) as to the characteristics that a non-exclusive system of teaching and learning should have. As opposed to a model that labels diversity as a deficit and gives exclusive legitimacy to the knowledge of the hegemonic system, what is required is a model that recognises the existence of a range of socio-historical contexts that provide different sets of meanings. And as opposed to model of transmission, what is required is a model of *participation* in which the process of teaching and learning would involve the creation of a new context in which each new meaning would have to be explicitly negotiated, and where the meaning would be constructed as a result of the experience acquired in educational practice.

## *The Fifth Dimension (5D) Model*

It was this challenge that led to the design and development of a series of *practical learning spaces* known as the *Fifth Dimension*, a model of activity developed by the Laboratory of Compared Human Cognition under the leadership of Michael Cole.

From the outset, the 5D model responded to the need to match the objectives and methods of the learning systems with the characteristics and needs of the socio-cultural context. The theoretical foundations of the 5D model are based on the research findings of Michael Cole and Sylvia Scribner in Africa (LCHC, 1983), where they concluded by recognising the importance of studying cognitive development in the setting in which it occurred, and by warning of the failure of educational models that pay little attention to the fundamental role of the cultural environment in the construction of meaning. In common with other authors whose lines of research have been developed within the framework of a socio-cultural paradigm (Wertsch, 1985; Lave, 1988; Rogoff, 1991; Lacasa, 1997), they argue that, above all, learning cannot be considered independently of the setting in which it takes place, given that it is a *situated process*.

These considerations underpinned the original design of the 5D model, which was constructed as a cultural microsystem that arises out of the appropriation of certain artefacts by members of a learning community. These subjects, inasmuch as they were participating collectively in these practices, organised by material and symbolic artefacts that are used as is seen fit, generate a *microculture*, that is,

“a system of knowledge, beliefs, behaviours and customs shared by the members of an interacting group to which the members can refer and which serves as the basis for new interactions. The members recognise that they share experiences, and that these can be alluded to with the expectation that they will be understood by the other members, using them in this way to construct a reality for the participants” (Fine, quoted by Cole, 1996).

The 5D, therefore, seeks to generate microcultures or systems of activity which, based on a set of artefacts, adapt their use in a flexible way to their local socio-cultural situation and context, as well to the needs of the community, understood here not only as the local context, but also as a complex reality in which there must be objects that are readily identifiable both by the adult members and the children in the local community, as well as by the educators and the researchers that are involved. In this *frontier* activity, the use of artefacts provides certain shared meanings at the same time as these artefacts are modified in accordance with the goals and interests of the members of the learning community. For this to be possible, the 5D presents a *low level of institutionalisation* which allows this system of activity to be appropriated by very different communities, generating systems of meaning that come to form part of the network constituted by the local culture.

This low level of institutionalisation hinders the abstract description of what a 5D site is exactly, thus below we describe one such site, set up by our team, in detail. The Casa de Shere Rom (henceforth CSR) is a learning community in which new instructional uses of information and communication technologies are tested. It is located on the premises of the Badalona Gypsy Association, in the Sant Roc district, of the Metropolitan Area of Barcelona, where a high percentage of the inhabitants are gypsies. Each week an average of forty children, aged between 5 and 14 years of age, take part. In general this group remains stable throughout the school year and since 1998 more than two hundred children have participated,

of which some twenty have taken part in each of the six years of the project. Students of Psychology and Psychopedagogy also become involved, attending once a week throughout a whole semester. In total, more than three hundred students have taken part to date. Finally, eighteen research workers have become involved in the project for periods of more than a year, while a similar number have been involved for shorter periods.

The CSR was gradually designed through a process of negotiation between agents with different objectives, including members of the community, researchers and educators (Crespo, Lalueza & Pallí, 2002). The need for an educational project of this type was supported by the statistics: 9.4% of the population was illiterate, to which should be added the fact that 28.7% had not completed primary education and only 3.1% had completed the higher levels of secondary education. Against this backdrop, various interests were at stake: an association of gypsies whose members believed that the children in their community were the recipients of a poor formal education, a research team interested in accounting for the worrying rate of school drop-outs in this ethnic group, a large number of children hanging out in the streets ready to try out anything that promised to provide some fun, an equally high number of university students keen to gain some practical experience dealing with real world problems, etc, etc. Thus, a *frontier activity* was set up, that is, a set of practices for groups of participants with different objectives, an intersection where various actors might seek to attain distinctive goals with a certain degree of collaboration.

The CSR is a space, equipped with computers and peripherals connected to the Internet, in which tasks are undertaken collaboratively. These activities are included in a *labyrinth* with various *rooms* so that on completing any task you can *enter* an adjacent *room* in which another task awaits (a *computer game*, a suggestion for the collaborative writing of a digital story, writing an article for a local newspaper, the chance to talk with children from other countries via the Internet, etc.). A guide organises each task into different levels (*task guide*), and once a level has been successfully completed the child can enter other rooms. Each child has the support of a university student, who brings his or her knowledge of the real world and formal language. Both, by interchanging roles, have to cooperate to reach certain targets which have been negotiated beforehand. To do this, they challenge, provoke and guide each other, they ask questions, respond, and make suggestions ... sometimes getting it right and sometimes making mistakes. In short, they collaborate to reach their shared targets.<sup>i</sup>

The most remarkable aspects of this activity are that: a) attendance is voluntary and the atmosphere is more like that of a play area than that of a place of study; b) the path to be followed from one task to another is entirely flexible and so the subject can choose between going into various rooms and taking different paths; c) various forms of collaboration are encouraged (directly between the children themselves or by using e-mail and chat rooms; students helping the children; children helping the students; children and students consulting a fictitious figure by e-mail or in a chat room who, despite this, sends a reply; children in delayed time, via the clues that they leave on competing a game, etc.)

Six years into the project we can see that children who have traditionally been considered by their schools as lacking in motivation, as being largely inefficient and ill-disciplined pupils and unlikely to succeed continue to attend voluntarily a learning activity that requires them to reach certain targets in order to progress. In other words, they show discipline and use appropriate cognitive skills.

We believe that this has been possible because the conditions described at the end of the first section have been met (the possibility of establishing intersubjective agreements and appropriating tools). The CSR has created a private universe of shared meanings among the



various participants which has raised the *activity frontier* (a space in which actors with different objectives converge) to a *microculture* (a space of shared meanings). That is, a learning space has been created centred around reading and writing activities using computers, a space that is considerably more flexible than the school and less dependent on the scripts laid down by the dominant culture. But it is by no means a space just for gypsy culture. On the contrary, it is a *microculture* which, starting out as a meeting point between actors with very different goals (children, students, adult members of the gypsy community, researchers, etc.), has gradually established the foundations for a private universe of meanings.

An essential element in this process is the fact that all the actors are considered as valid interlocutors, which is manifest in the constant explicit negotiation (from finding one's way around the labyrinth to the discussion concerning new games and activities) and in the collaborative set up of the activities. The fact of belonging to the same community drawn from various origins implies a mutual commitment and responsibility as regards the common undertaking, so much so that all parties are considered interlocutors.

Finally, we believe, an additional characteristic can be identified: in the microculture that is formed, identities are flexible. The taking on of the role of expert and apprentice is a good example of this. More than once it is found that it is the child that is the expert and the student who is the apprentice. This flexibility means that the interlocutors who take part in the project have to see themselves in a different light. Thus, the university student starts with the idea that they are going to teach the children, but often they find the situation is just the reverse - it is the child who teaches them. The child, who has a highly negative self-perception as regards their school competencies, finds herself in what is a new situation, that is, she knows more than her interlocutor (such as the way in which the institution works) and this knowledge is valued.

In short, the characteristics that make the CSR a non-exclusive activity, suitable for an intercultural education, are:

- Perceiving the school children and their families as interlocutors; perceiving their differences as legitimate ways of behaving; and perceiving their community knowledge as valuable.
- The educational institution is considered as something that can be transformed. It is not only the school children and their families that should change, but also the educational institution.
- Participation of the actors to the point that they bring about transformations in the dynamics of the institution. Negotiation is explicit.
- Low level of institutionalisation, which favours its appropriation by the participants, from whichever group.
- Flexibility of roles as regards teaching/learning, which means all knowledge is legitimate, and the participants are recognised as actors.
- Participation is intrinsically motivated, so that attendance is voluntary and the conflicts are not caused by the resistance to participating, but rather by aspects that can be negotiated.

## *Seeking a model for virtual artefacts*

Following the development of various 5D spaces in a number of European countries, the need arose to construct tools that would make an international network of researchers, educators, students and children sustainable. We sought to design a technological artefact that might provide a new channel of communication and collaboration between plural groups, but which at the same time would be a useful tool for the day-to-day activities of local groups, since without such a tool it would be difficult to guarantee success. Interculturality was a fundamental feature as it meant bringing together groups from the extreme north and south of Europe, and both sides of the Atlantic. The intercultural nature of the CSR therefore provided us with a basis for the development of a virtual model.

The consolidation of this network had shown itself in the past to be a significant factor for the sustainability and support of local activities, but now this new virtual tool could be a resource centre in which to store and share field notes, stories, articles, etc. concerning the whole basis of the 5D method: its *artefacts* (the labyrinth, its magician, games, task guides, clues, logbooks and rules). In other words, we sought to *pass on artefacts* thereby facilitating the collective memory and the recycling of experiences.

But such a tool would have to satisfy even greater demands: It would have to be useful for those familiar with the 5D method, while allowing those without this knowledge to acquire a minimum understanding quickly so as to participate and to enrich the whole group with its impartial perspective.

It was a question therefore of designing an artefact that could operate in a virtual environment enabling the creation of a *microculture* which, while respecting the essential characteristics of the 5D (flexibility, adaptability, intersubjectivity, laboratory for practical experiences, etc.), would provide insights into the educational model – as in traditional unidirectional webs – but above all it should allow bidirectionality between the visitor and the web site in a non-hierarchical environment so as to facilitate communication, collaboration, appropriation and the recycling of experiences. In short, we sought to take the 5D community onto the network. With these aims in mind and in an effort to avoid reinventing the wheel, we set out to discover similar undertakings. We found educational web sites, news groups, mailing lists, directories of links, resource centres, chat rooms, etc. that had some of these characteristics, but none of these projects met all the requisites of the artefact we wished to create.

It was at this juncture, thanks to the suggestions of the technicians in our research team, that we discovered a line of well-developed research that struck us as being similar to the methods of the 5D: This line of research went by the name of the somewhat cryptic, recursive acronym of GNU. The GNU project, set up by Richard Stallman at the beginning of the eighties and developed by the Free Software Foundation, sought the co-operative development of technological artefacts and rejected outright the then incipient (though quickly consolidated) tendency to privatise the source code of the computer programs. Stallman defended the creation of software in community, in a way similar to that adopted in the world of gastronomy, where recipes are shared and even sometimes are created in collaboration.

Stallman argues in favour of the defence of the basic liberties of any software user (Stallman 1996, Cornec, B., 1999, July 25) and over the last 20 years he has provided an ideological umbrella that has allowed hundreds of thousands of programmers, record keepers, testers and users to organise themselves in virtual space, drawing on the diversity of its members and

creating networks of shared meaning – in short, constructing microcultures for the development of an almost interminable stream of technological artefacts.

Sharing, adapting, the same rights (between equals) and co-operating in the creation of artefacts: undoubtedly, in this case, the affinity was clear. To all intents and purposes, it appeared to be the reference point we had been seeking in order to build our virtual learning community (portal 5D.ORG), and so we decided to continue our search by concentrating on the work of these collectives.

### ***Appropriating artefacts from GNU***

Below we present several examples of GNU projects that have similar characteristics to those that we were seeking for the 5D.ORG educational portal. Nearly all the projects we examined respected, to a greater or lesser degree, these attributes, but for the sake of maximum clarity, we shall comment in each case on the project that best exemplifies the properties we wish to highlight.

One of our first discoveries were the GNU project directories (such as: Free Software Foundation, 2004, SourceForge.net Site Documentation, 2004, OSTG Open Source Technology Group, 2004) where thousands of working groups – SourceForge boasts 80,000 projects and 800,000 users – adhere to Stallman's philosophy.

Most of the GNU initiatives, and these projects are no exception, were built to meet their members' day-to-day needs (*participative design*), in groups in which the roles become blurred (the creator is in turn a user of the artefact that is built and the apprentice is for short periods the expert) in a similar way to that experienced in the 5D.

Particularly interesting was the way in which the technological tools that made up these network directories (discussion groups, loading and downloading tools for the storage of projects, tools for collaboration, web browsers, personalisation of the portal, etc.) facilitated communication between the members, but also the accumulation and subsequent recycling of artefacts, in a way very similar to the resource-knowledge centre we wished to create. What is particularly common in these directories are “fork” developments, where new creators adapt existing projects to their particular needs. Thus, the passing on, refining and appropriability of the artefacts that we so much wanted to achieve was also possible in the virtual world, and even it was made more simple thanks to the digital character, and hence greater flexibility, of the artefacts being used.

If we accept that knowledge should be accessible to all and free of charge, access to these communities and the use of the artefacts that are stored there should be and was free of charge, allowing the new member unrestricted access to the portal. With just one exception, the creation of new project spaces (new communities) was filtered to guarantee the coherence of the contents.

Collaboration in groups seemed to establish itself as a *frontier activity*, where individuals from distant settings and cultures, sharing very few objectives, found a comfortable space for virtual collaboration to satisfy their local needs, and all this in an atmosphere that we perceive as being fun and carefree - similar in many respects to that of a *game*.

These communities were, without doubt, a model – or we should say: the model – for the development of our 5D.ORG tool. But in our desire to eradicate all hierarchies, we continued

to seek collectives in which collaboration was indeed between equals and in which no veto could be imposed – at least in terms of the tool, thereby allowing the community to organise itself as it felt fit mediated by the artefact, in order to construct a microculture with its own social order.

It was at this juncture that we became aware of the Wikis (The Wiki Community, 2002), another GNU project centred around the collaborative creation of web page content that allows anybody, without any need to register or without imposing restrictions of any kind, to edit texts that are then published at the site.

The Wikis had constructed, among other artefacts, an encyclopaedia with more than 300,000 entries, a dictionary with more than 40,000 terms and a library with 3,500 volumes in a collaborative space par excellence that broke with all hierarchies, and surprising as it might seem it was not subject to constant acts of vandalism. The texts were written in brief contributions by anyone who could provide information about the subject and they were revised in the same way, guaranteeing the continuity of the project against possible attacks with a simple security copy. It was the best example of collaboration between peers to be found on the web.

What remained for us to do was to translate to the virtual world an important element of the 5D: the activity as a laboratory for conducting tests. While we had seen how in various GNU project directories developments were subject to constant scrutiny, such practices were never so explicit as in the HackLabs. These “laboratories”, set up by the faithful disciples of hacker ethics (Pekka Himanen 2001), can be defined as non-controlled virtual learning communities that seek to break with the traditional hierarchies of learning in order to share knowledge and resources in a space for collaboration and experimentation.

All these sources of tried and tested experimentation were taken into consideration when constructing our virtual educational community – 5D.ORG – as a new microculture on the network. Furthermore, if the results were what we hoped for, 5D.ORG might come to form a network of microcultures that could lend support to both local and global groups.

### ***The design of 5D.ORG***

Due to its particular, and often high technical, nature, we shall not detain the reader in a lengthy description of the portal design process, although we should like to outline briefly some ideas and situations that derive, as expected, from what we have said up to this point.

When designing the tool, we were convinced that the projects we had studied had provided us with valuable insights and for this reason we chose to develop an educational portal in three blocks. We took into consideration the possibility of providing (i) Information about the 5D model using the traditional tools provided on the web, but we knew we needed to pay special attention to the web tools that facilitated (ii) Collaboration and (iii) On-line Training.

The block providing information needed to be dynamic, since the contents were to be subject to frequent modifications. We, therefore, opted to use a contents manager: a technical development which would allow content experts with little technological expertise to maintain in as straightforward a fashion as possible (i.e. editing directly in the web site itself, without a need for complicated publishing tools) all the texts, links and images that we wished to present there.

Based on our own experience, and as in the GNU projects examined above, we considered it essential to make our artefact bi-directional. Therefore, as discussed earlier, in addition to the forums – essential for guaranteeing the off-line communication of our future users – and the field notes, narratives and articles that we considered of great use for researchers, students and educators, we also created a tool that would allow the user to add, make comments about, download and eliminate, and in short automate the administration of a repository of 5D artefacts. Our study of the GNU projects showed us that in this way it would be possible to ensure the exchange of traditional 5D artefacts, which could then be tested in the many local activities-laboratories, as well as improved or adapted by any user who should so wish.

Convinced of the importance of local groups for the success of global collaboration, we designed another tool – “My5DCommunities” – in order to co-ordinate local activities from the virtual dimension. This tool enabled us to establish free and automated private forums, and to create picture galleries (particularly useful in the case of activities for children), activity calendars and a local selection of traditional 5D artefacts. The tool can also be used simply as a showcase for the activity carried out.

Finally, in order to make interaction with the portal as straightforward as possible for the many different collectives visiting the site, we designed a tool that would ensure the creation of dynamic, mutable and non-constrictive profiles, but which in their turn might offer contents and links adapted to the roles of researcher, educator, student and child, at the same time as allowing the visitor to change role, in line with this basic 5D principle.

Today [5D.ORG](http://5D.ORG) is no more than a recently constructed educational portal on the network in need of a number of modifications. It seeks to be a frontier space that can attract a range of different subjects. As it becomes more widely used, it will become possible to begin weaving a web of meanings that are shared by the members of a large, interacting group. If this occurs, we will have developed a microculture that is shared by subjects from many different backgrounds, in which new knowledge can be created and interactions can take place on the subjects of teaching and learning.

## ***Conclusions***

The dialogue established here between researchers in the field of education and those working in new technologies has, we believe, proved itself invaluable. Setting out with different goals, we found ourselves, in principle, engaged in a *frontier activity* involving the development of educational artefacts that could be accessed via the Internet. However, as long as we recognised each other as valid *interlocutors* – in spite of the obvious lack of competence of each group in the other's field, this dialogue (understood as a process of constant *negotiations* that enabled us to identify our initial, *shared goals*) was possible. These goals, in turn, gave rise to a set of shared beliefs, knowledge, behaviours and customs – that is, to a *network of meanings* that crystallised into a common *microculture*. In achieving this, we did not have to renounce our respective *professional cultures*, even though the result was not something that belonged specifically to either. Rather, what we created was a new hybrid product, in the same way as the identities involved and the objectives that were generated were new.

We discovered an identity within the processes of creating knowledge in the Casa de Shere Rom and within the research team, and from here we were able to develop the explicit model for designing new artefacts on the Internet. Each of these *activities* broke with the traditional teaching-learning model based on transmission, and the foundations were laid for collaborative learning. And this is always possible as long as active participation is

encouraged without calling into question the identity of any of the participants. The collaboration between legitimate interlocutors in this process has shown itself to be an excellent platform for the appropriability of new artefacts by apprentices. And in a setting that shows few signs of being institutionalised and in which the roles adopted are flexible, all participants take on the role of apprentice.

The *difficulties* that intercultural education must face have, thanks to projects such as that of the CSR, shown themselves to act as stimuli for new ways of understanding the spaces in which teaching/learning processes are promoted. These spaces, understood as *frontier* zones, and which are not the exclusive property of any one specific cultural group, have the potential to generate, through the adoption of collaborative methods, genuine *neo-cultures*, that is, microcultures. Here no one culture or group is dominant, but rather what we find is a universe of meanings accessible to the participants, who enter into explicit negotiations to collaborate in attaining their shared goals.

The approach to learning developed by the 5D communities has found a space for itself on the Internet, thanks to the vast experience accumulated by the GNU movement, where it can continue to conduct its research into education.

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<sup>i</sup> A more detailed description of the Fifth Dimension can be found in Cole (1996) and in Nilson & Nocon (2004); the CSR is described in Lalueza, Crespo, Pallí & Luque (1999), and in Lalueza, Crespo, Camps, Cazorla & Sánchez (2004). And also in "What is 5D" (5DNetwork, 2004).