Editor's Note: Innovation is necessary to upgrade our educational systems, but change is a complex process that requires imagination, creative planning, and constant feedback to improve on the original design. Introduction of ICT technologies in Andalusia is typical of innovative projects in having unanticipated problems. The feedback from year one shows how changeover to a new system requires enough time for buy-in, training, and orderly integration of technology into the curriculum. The key players are teachers and students and administrators and those appointed to manage the integration project. The outcomes are improvement of teaching and learning.

The ICT Centre Model in Andalusia (Spain): Results of a Resolute Educational Policy

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Spain

Abstract

This paper displays some results from research carried out in Andalusia (Spain) to evaluate the impact of the educational innovation policy developed by the regional government through widely introducing Information and Communication Technologies (ICT) in primary and secondary schools (ICT Centres). Specifically, it analysed the effect of the measures used to integrate ICTs on the educational administration and education centres. This integration is analysed not only at an institutional level, concerning the organization of the centres, but also regarding the classroom and its repercussions in teaching-learning processes.

Keywords: Technology planning, technology integration, ICT use.

1. Introduction

Our study stems from the rigorous analysis of the integration of computers as a common resource for teaching and learning. This process started to be developed some years ago, all over the world. Not long ago, computers were only occasionally found in schools or only in specific classrooms. We are now witnessing a huge political and economic effort working towards universalization of information and communication technologies (ICT). This is made evident by convocations, projects and programmes supported in most cases by international, national or even regional and local education administrations and institutions. This investment in facilities and maintenance of IT equipment – software and hardware – may not have adequate policies to support efficient and coherent use of these resources in schools. Problems include distribution, implementation and maintenance of these resources, ICT training for teachers, and evaluation of the impact of technology on the teaching-learning process.

In the last few decades, experiments and studies on integration of information and communication technologies (ICT) at different levels of education have occurred throughout the world. Area (2005) points out the abundant "empirical information about ICT in schools" and highlights studies[1] on quantitative indicators that describe and measure introduction and use of computers in school systems. He also lists studies on the effects of computers on the students' performance and

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[1] Area (2005) has carried out an interesting revision of the main research areas in integrating technologies in the school system. Some examples, which frame more specifically every perspective, are underlined: quantitative indicators which describe the introduction and use (Euridyce 2001; Cattagni and Farris 2001; Twining 2002; OCDE 2003); effects of computers on performance and learning (Kulik 1994; Reeves 1998; Parr 2000; Block et al. 2002); perspectives, opinions and attitudes of educational agents and teachers towards use and integration of technologies (Escudero 1989; De Pablos and Colás 1998; NCES 2000; Cabero, 2000; Solmon and Wiederhorn 2000; Cope and Ward 2002); practice of use of computers in schools and classes which are developed in real contexts (Gallego 1994; Alonso 1993; Bosco 2000; Zhao et al. 2002; Martínez 2002). For further information, read the whole article in this website: www.uv.es/RELIEVE/v11n1/RELIEVEv11n1_1.htm.

learning, on perspectives, opinions and attitudes of external educational agents (managers, supervisors, support teams), teachers, and students towards the use and integration of technologies, and also studies on the use of computers in the centres and classrooms, for many disciplines, carried out in real contexts.

In addition to this, "it is necessary to build a theory about this particular phenomenon in the school environment to help us understand the effects of computers in schools, the causes of the teachers' resistance to integrate these methods in their classrooms, or how to successfully implement incorporation strategies of ICT in a specific national or regional context."

With this goal for R&D projects in Spain[2], research was developed to determine the most recent impact of telematic technologies in education in Andalusia. The research is specific to centres known as "ICT Centres" that are characterized by their technological facilities for primary and secondary education. These centres have arisen as a consequence of a political and social commitment by the Andalusian government to widely implement ICT in schools based on similar projects throughout the country. Since the school year 2003/04, the "ICT Centres" plan has been developing, with yearly convocations, to which more and more centres respond.

Our study is focused on a significant sample, the first graduates from Andalusian ICT Centres. The telematic resources have been analysed, as well as the use of free software, not only at an institutional level, taking into account the organization of the centre, but also in the classroom, paying attention to its direct effects on teaching-learning processes.

Implementing free software in Andalusian centres represents a commitment to future proactive educational innovation. With this study, our aim is to describe the current use of technology in ICT schools and to analyse the overall profitability of these programmes. We have obtained contrasting information about the degree of implementation of the new free software resources and their impact on teaching-learning procedures which are generated directly in the classroom. In this article we will show specific contributions and research results to support this educational innovation policy based on integrating technology and using free software.

The data has been obtained through a descriptive methodology to analyse the introduction of technology in Andalusian schools and high schools and its repercussion throughout the educational system. With this objective, several instruments have been used such as surveys, group interviews or focus groups, analysis of centre organization documents, and non-participating systematic observation performed through control lists and estimation scales.

2. Antecedents of ICTs in Andalusian schools.

Various reports and research on integration of ICT in education can be found (Cabero 2001; Cattagni and Farris, E. 2001; Marchesi and Martín 2003; Area, 2005; Balanskat, Blamire and Kefala 2006; Becta 2006; Pérez and Sola 2006; Cebrián, Ruiz and Rodríguez 2007). They document increasing efforts of the administrations to provide and adapt schools for technology. However, not all results and conclusions are positive, as stated above. In this same area, this paper is oriented towards the study of the measures taken by the Spanish government, and more specifically by the Andalusian government, to promote effective integration of ICT in education using free software.

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[2] R+D Project SEC2004-01421, "Observatics": Implementing free software in Andalusian ICT Centres. Analysis of its repercussion in teaching-learning procedures", included in the R+D National Announcement Plan 2004-2007, Spanish Science and Education Ministry. It was developed by "@gora" Research Group (PAI-HUM-648), under the direction of the main researcher, PhD. J. Ignacio Aguaded.

The European SchoolNet (EUN) report prepared by Balanskat, Blamire and Kefala (2006) examines the impact of ICT in schools in Europe. Its makes recommendations for creation of policies and plans for ICT integration: emphasises the role of group work and independent study, and includes them in curricula and in evaluation plans, develops new ways of continuous training for teachers, and supports use of ICT and motivation for teachers to use ICT in their classes.

Extremadura was the first region in Spain to include free software in public administration and in primary and secondary schools in 2001. At the beginning of 2003 Andalusia began to apply this system, promoted by the *Consejería de la Presidencia* (regional ministry) Decree 72/2003, March 18, on Measures to Promote the Knowledge Society in Andalusia and set administrative and legal grounds for the universalization of information and communication technologies. Three clear objectives arose from its development:

1. Guaranteed access to ICT for every Andalusian, without any kind of discrimination regarding place of residence or social status.

2. Facilitate internet access to information and services offered by the administration (www.andaluciajunta.es).

3. Adapt basic public services, especially health and education services, for the demands and potentialities of the "knowledge society".

From that moment on, a number of official documents were drawn up as public announcements to shape this ambitious project: to give Andalusian public schools sufficient and necessary infrastructure for information and communication technologies to carry out this initiative, not only regarding material, but also training. As a result, several plans and programmes were developed: Red-Aula Program, Alhambra Plan and Zahara XXI Plan, finishing with Averroes Project, still active today. "Alhambra and Zahara Plans involved really significant efforts to systematically incorporate ICT into educational institutions".

> "They involved the first rigorous attempts to promote their presence in schools as well as training for teachers. In some aspects we must admit that they were the first ones in our country to incorporate ICT in non-University education" (Cabero 2003a).

Specifically, the Averroes Project relied in the gradual increase in equipment during the period 2001-04. At the end of this period, every pre-school and primary school centre, even in less favoured areas, would be equipped with a basic IT network that would give them access to information and communication technologies[3].

In the framework of this technological philosophy, the ICT Centres Project officially took off on April 4, 2003[4].

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[3] This equipment included five multimedia computers with network card and access to the internet through a router, a digital line with cables to connect the equipment, scanner, inkjet colour printer, office automation software, an electronic encyclopaedia and the suitable furniture for the equipment. Moreover, from that year on, the aim was to offer every rural school the basic reduced equipment consisting of a multimedia computer with modem, inkjet colour printer and the same electronic encyclopaedia. At the same time, a pilot project began: offering several pre-school centres a microcomputer per classroom to create "the computer corner". Redaula Plan, to offer PC rooms to pre-school and primary education centres owned by the *Consejería* (regional government), in the framework of the Telematic Network of Schools in Andalusia (BOJA 17-03-01) (http://averroes.cec.junta-andalucia.es; www3.cec.junta-andalucia.es/index.html).

[4] March 27, 2003, *Boletín de la Junta de Andalucía* (Oficial Andalusian Government Gazette). This order regulates the announcement for the selection of educational projects to include information and communication technologies in teaching.

2.1. The ICT Centre model

An ICT Centre in Andalusia is mandated for every public primary, secondary, or compulsory high school. It is equipped with IT material for students, to be also used by staff. The equipment consists of: one computer for every two students, tables that are adapted or computers in the classrooms, chairs for every table, computers with laser printer and scanner in didactic departments, library, teacher's room, the AMPA (association of mothers and fathers) office, the secretary's office and in the directive board offices, big capacity printer in the reception area, digital photo and video camera, video projector, laptop, broadband internet connection and connection to the Educational Platform where multiple activities can be found. Another distinctive characteristic of this equipment is the choice to use free software and open code in teaching using the Guadalinex operating system, based on Debian (Linux).

To be considered an ICT Centre, the school has to respond to the announcement of the ICT projects and meet several requirements.

Andalusian schools have access, throughout the school year 2006/07, to 49,000 new computers. Of these, 42,255 are assigned to the 315 schools and high schools which joined the ICT Centre Network in September. With the new schools that joined the program, the Network is composed of 823 centres, 30% of active centres in Andalusia.

The most innovative factor in this widespread integration of technologies is use of the computer asan educational tool in learning and teaching. In addition to IT equipment, Centres can access an intranet and an educational platform: Anda@red. These centres integrate ICT.

The Andalusian government published the first notice[5] to select centres that would work with information and communication technologies. Once the educational projects to integrate technologies were launched, 50 public centres were selected. Among these 50 centres, 14 were primary schools and 36 were Compulsory Secondary Education (ESO) schools. All these centres had 81,000 computers with the same operating system, Guadalinex, developed from Linux by the IT research group in the *Junta de Andalucía* (Andalusia Regional Government) to be used in Andalusia.

The projects that centres had to present in response to said notice was to put forward an action plan to integrate technology in teaching. They had to include, information about the experiences of the teachers regarding ICT, experiences of the ICT coordinator, the reasons or circumstances that made its introduction advisable, the objectives and the list of areas of knowledge in which ICT would be used. It is important to highlight the relevance of the coordinator, whose function was essential to advise the teachers about available resources, solve technical problems, establish ways to spread experiences and exchange information, and promote improvements in the project.

2.2. Support measures to ICT Centres

The Andalusian administration specified, from the beginning, a series of measures to support ICT Centres. These highlight: a broadband connection and equipment; educational programmes and materials to be used with free software; appointment of a coordinator; an increase up to 10% in working expenses for centres; specific training, assessment for better use of the information resources and their integration into teaching; publishing the experiences on the internet; publishing the produced educational materials; and acknowledgement of participation in the project as a specific merit.

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[5] Regulation on 2003-03-27 by the *Consejería de Educación de la Junta de Andalucía* (Andalusian Government Education Ministry). It regulates the announcement to select school educational projects to include information and communication technologies in teaching.

Research results have shown the challenges and possibilities for project improvement. It has proven that a lot of material does not imply an advance in methodology, and the centre must determine how far and how fast it can change the teaching-learning process. This is why today every centre decides how to integrate ICTs in teaching practices according to different classroom organization models which have to be included in the curricular development plan.

Perhaps the most outstanding measure to foster ICT Centres is the use of platforms and webs as modulating elements. Since the beginning of the project, the educational administration has offered ICT Centres a resource which until then had been little used in public compulsory education: the E-ducational platform. Every centre is given the chance to develop this virtual space, which must be managed by the ICT coordinator, as a complement to the traditional methodology. Both methods require the internet but use it differently.

3. The Study

Our study is framed within the teaching research trends of the last few years (Area 2005; Cabero 1995; Castaño 1994). Comparative studies are abandoned in order to research processes of integration in teaching-learning contexts. As Area (2005) points out, "the process of using and integrating computers in the school systems is a complex process, subject to many tensions and pressures with different origins (political, business, social, pedagogical). Thus, problems and research methods have evolved from the concerns of individual learning with computers in specific learning situations using experimental methodologies, to more longitudinal studies and with qualitative techniques to study cases in real teaching contexts". From this perspective the research was to discover the effect of ICT in schools among students and teachers.

In this article, we want to show results of the study regarding measures to implement and aid growth of "ICT Centers" in primary and secondary education. We consider that the mere presence of equipment, programs and technology does not imply improvement of educational processes. According to Ávila and Tello (2003: 179), today's society needs changes in school systems, basically to promote "innovative experiences in teaching-learning processes based on ICT, affecting the teachers and teaching strategies, communication, learning materials, and distribution systems. Success will be measured by teaching and learning outcomes rather than availability and potentialities of technologies. IT resources must be set in powerful and collaborative learning environments as tools to support the active process of learning construction and skill development". Thus, educational program management, organization factors, teacher training, programs promoted by the centre, and educational conceptions by the teachers, and their use of technological resources, will determine their didactic use.

The study was carried out with 634 teachers from 16 schools that took part in the first ICT Projects. The centres were chosen as a random sample, five are pre-school and primary education centres, and eleven are secondary education centres.

3.1. Techniques and tools for data collection: interviews, focus groups

Given the objectives and information we planned to obtain, we chose to carry out descriptive research in school contexts. We want to describe ICT integration, as Cabero (2003b) points out, from the point of view of them being not only information transmitting instruments, but also "thinking and culture instruments". This article will be limited to results obtained in interviews and focus groups. These results are more qualitative and provide detailed information to guide promotion of ICT Centres in Andalusia.

In the last quarter of 2005, dates were set for the interviews and focus groups.

For the interviews, a category system was established to facilitate the definition and formulation of questions to get the precise information according to the research objectives for later analysis.

Two interviews were carried out in every centre, one with the director; the other with the ICT project coordinator. It was expected that their perceptions would be different as well as complementary. The outlines were different in some questions to access these different perspectives, especially regarding organization, technical or administrative subjects. The research was focused on a sample of 16 centres. There were 31 interviews because the director was also the ICT project coordinator in one of the centres. The interviews were recorded, and later transcribed into Word format to be qualitatively analysed with a specific program, HyperResearch. They were finally analysed following the category system defined earlier.

Focus groups were created as "a carefully planned conversation, designed to obtain information about a defined interest area, in a permissive, non-directive environment (…) guided by an expert moderator" (Krueger and Case, 2000:24). The first meeting brought together people in charge of ICT Projects, both direction and coordination of the project, as well as researchers, and people important in the start-up and development of the Projects. These focus groups were aimed at collecting opinions, expectations, interests, etc. about the incorporation and use of ICT in schools. Nine discussion groups were formed, and the following topics were discussed: resources and organization handicaps, alternative measures, teacher training, didactic use of materials, educational platforms and free software and student and teacher competence. Once the sessions were over, and their contents had been transcribed and analysed, a second focus group with the same participants was carried out. Its aim was to make the conclusions known and to corroborate the data, as well as to include new contributions, experiences, opinions and suggestions for improvement in the projects or in the centres.

4. Results

4.1. Interviews

The interviews allowed us to evaluate, from a qualitative point of view, the results obtained through different sources. We were able to contrast and widen the information obtained and create the appropriate relationship and environment among the researchers in the centres.

The transcripts from the 16 centres in the study are constituted by a total of 31 interviews, which generated documents with thousands of informative parameters about situations that were analysed.

The documents related to the directors have been codified in 1466 units, while those related to the coordinators, giving a total of 1278, have been divided as shown in Table 1.

Table 1

Coding Frequency		
Codes	Directors	Coordinators
Project gestation and design	276	216
Project development	481	285
Teaching-learning	163	189
Support from the Administration	189	261
Teacher training	190	191
Evaluation	161	136
TOTAL	1.466	1.278

This gives us an idea of the interest of those in charge of the centres and ICT projects for the "project development", that is to say, the issues arising from its implementation, the changes in the centre, the direction and coordination, the start-up of the resources, spaces and technical assessment, key aspects which motivate reflection and often the claims from the direction.

The "Project gestation and design" received a large amount of codifications from the directors (276), together with "Support from the administration" and "Teacher training". The directors focused their interest on the training modalities developed in the centre. In "Support from the administration" the highest frequency was in collaboration of administrators when facing difficulties (34) and the management and problem-solving model (31).

The coordinators focused their reflections on "Support from the administration" (261), as they are the main referent in the centre regarding its relationship with the administration and they act as mediators between the administration and the members of the education community (teachers, parents and students). The coordinators frequently criticized the management and problem-solving model, with 56 negative codifications and 25 positive codifications. They also criticized collaboration with the administration when facing difficulties: there were 17 positive codifications and 26 negative ones.

Analysis of the data obtained in the interviews is the central subject in this article Measures to foster ICT Centres in Andalusia must be focused on information related to *Project gestation and design,* and *Project Development and Support from the Administration.* Both directors and ICT coordinators highlight the outstanding direction given by the centres teams d for its start-up. Personal initiatives are the most significant, because they indicate the individual impulse to improve the dynamics of the teaching staff and the educational community.

> *It was almost a personal initiative which some teachers with previous experience*
> *in the field of new technologies quickly joined*
> *(DIR16, GDI, TEXT, char 1311 to 1470 of page 1 of DIR16A.TXT).*

The thoughts and opinions of the coordinators show us that the initiative in launching the project, their previous experience in IT, their belief that ICT would be positive for the centre, the administrative promises about the revolutionary nature of the project and the accompanying investment were defining factors for this first stage.

> *An idea was very clear to us: the enrichment that this could mean from every*
> *point of view (students, teachers, family...). Although later everything has been*
> *developed at a pace that (...) has been criticized, we did know it was a way of*
> *getting on the new technologies train, especially thinking of the novelties that it*
> *would bring to the teaching-learning process*
> *(DIR01, GIP, TEXT, char 1026 to 1522 of page 1 of DIR01A.TXT).*

Another piece of information that arises from the coordinators and directors is that the centres have actively taken part in other plans or projects that were linked to technologies and computers, so we could say they were previously motivated to use ICT. The initial expectations for most of them were very high, taking into consideration what it meant in terms of change of furniture, technologies and infrastructures, communication, teaching models and even of environment.

One of the basic factors for the success and thrust of ICT Centres is the logical implication by those in charge. The directive board manages the projects as it is seen in many comments:

> *The project was particularly motivated by a director who is not here anymore,*
> *and he was very enthusiastic about projects in general. There was another*
> *colleague who was very skilful with computers, so it was almost natural that they*

put themselves forward. It was suggested in a teachers' meeting
(COOR06, GDI, TEXT, char 3071 to 3371 of page 1 of COOR06A.TXT).

The role of the coordinator stands out as the key to understand the whole process around him. He is the central dynamization element, together with the directive board. However, disappointment, disillusionment and weariness, especially due to false expectations which were not satisfied, appear in some coordinators. Expectations of change and novelties are the factors which were underlined by the coordinators. The satisfaction of having taken part in a project with great social and educational scope and which has dramatically changed the environment in the centres is an often-highlighted aspect.

> *There is indeed a bit of personal implication, but the importance it has in my life, I don't know if that is the question... At a personal level, well, let's say it has dropped when I have seen the daily routine of the project. I understood it from a didactic point of view, more pedagogic, about work among colleagues, etc., more than being the school technician. That really does not motivate me much*
> *(COOR07, GIR, TEXT, char 4639 to 5072 of page 1 of COOR07A.TXT).*

As far as the implication for students is concerned, directors and coordinators point out that, in general, the project generated a high level of acceptance and motivation, especially among the less wealthy communities who did not have access to these resources at home.

> *Most of our students are not wealthy and having the computers allows them to access the internet and any resources that can be accessed through them*
> *(DIR07, GIA, TEXT, char 4439 to 4672 of page 1 of DIR07A.TXT).*

The families' implication is strongly connected, in most cases, to the communicative capacity of the centre towards the parents. The mobilization, which the massive entrance of computers required, generated both uncertainty and optimism. Some centres prepared communication strategies: open days, communication through AMPA, town councils, leaflets, press releases or even local television programmes.

> *At the beginning there was a lot of expectation, but the participation rate has not been very high until now*
> *(DIR10, GIF, TEXT, char 1304 to 1415 of page 1 of DIR10A.TXT).*

Regarding the teachers' receptivity, in the first place, they admit the fears, doubts and initial lack of knowledge that the implementation of the project created. The fear of the unknown, especially among those teachers who were less skilled with technologies, could be felt in the stage of initial receptivity. Consequently, beginning a macro project with little time and almost "blindly" created a state of confusion that differed according to the teachers' level of technological culture.

> *At the beginning everyone was scared because they thought that it would mean a dramatic change in their work. They thought it would mean leaving the chalk and the book and being forced to use the computer for hours*
> *(DIR02, GRP, TEXT, char 3878 to 4126 of page 1 of DIR02A.TXT).*

Perceptions from the directors and coordinators regarding *Project development* give us an idea about the consolidation of ICT Centres. The delays at the first stage of the process are underlined, as well as the revolution caused by the change of furniture and communication in the centre and the students' motivation faced with these changes. They were surprised and delighted by the massive appearance of computers in the classrooms.

> *We began without internet connection, the platform did not work; in short, a little bit... a lot of work had to be done*
> *(DIR12, DIP, TEXT, char 3449 to 3564 of page 1 of DIR12A.TXT).*

The teachers' adaptation was initially more varied and even internal conflicts arose.

> *During the first years there was more effervescence and more conflicts. I think some teachers even had internal conflicts thinking "I look like a bad teacher because I don't use this enough, I don't feel able to do it, it is too late for me..." I think by now it is all more balanced*
> *(DIR09, DIP, TEXT, char 8492 to 8867 of page 1 of DIR09A.TXT).*

Implementing the project did not imply an overall revolution in its functioning concerning timetables, organizational and academic aspects, etc. Its start-up was harmoniously integrated in the daily life of the centres. On the other hand, an important sector states that the ICT Project has developed many wanted transformations regarding the organization and especially in the curricular field. According to them, the traditional model began its crisis when the computers for didactic use appeared. To solve it, they demand more flexibility for the centre regarding timetables and curricula.

> *The project itself implied from the beginning a completely different organization from what we were used to working with in the centre. In our school only the smallest classrooms have no computers, as the equipment could not fit in them because of their size. In all the other classrooms there is one computer for every two students, so the centre organization had to change: behaviour rules, use and maintenance rules... all that needed new organization*
> *(COOR10, DCC, TEXT, char 6541 to 7054 of page 1 of COOR10B.TXT).*

The directors themselves became aware of the important investment that the project implied, was sometimes excessive, in their opinion. The directors underline the huge benefits that the ICT Centre project has brought to the life of schools and high schools: material resources, computers, furniture, etc. They openly describe it as a revolution, especially for those centres which originally had less equipment. The economic allowance for the operation grew exponentially.

> *The idea of ICT is very positive. Many means have been offered and as we can see they have sometimes been excessive: 500 computers are too many, but it is the only way to access the ICT Centres*
> *(DIR07, DIN, char 2735 to 2946 of page 1 of DIR07C.TXT).*

The administration criticizes the deficiencies caused by the absence of a professional technician in the centre. The model of a centralized technical service has its advantages, recognized by the coordinators, but it also creates malfunctions. These, often, have to be assumed by the coordinators, who initially had to play a merely didactic role.

> *The technical help should not be the ICT coordinator's responsibility. The figure of a technician should be created, who would not always be in the centre, but could go there when necessary*
> *(DIR05, DTI1, TEXT, char 6820 to 7010 of page 1 of DIR05B.TXT).*

Among the measures taken to guarantee the success of the ICT Centres, the *Support from the Administration* was revealed to be fundamental by comments from both directors and coordinators. Opinions were expressed about help when facing difficulties, the management and problem-solving model and observations about introduction of demands from the centres influenced new proposals.

Taking into consideration the fact that all the analysed centres belong to the first year, we should point out that, in their opinion, administrative support has decreased with the inclusion of the new ICT centres in the following years, both in attention and response. They stress a lack of sensitivity when facing the difficulties generated in the project: the training problems, the technical difficulties, breakdowns and even the Service Inspection in some cases, because the organization

of these new centres is substantially different from the traditional model. This lack of attention is made evident by the lack of acceptable and satisfactory answers to the technical problems that undoubtedly arise. The feeling of carelessness is the one that causes most frustration and stress, especially among directors and coordinators.

> *The administrations should be much more sensitive if they want all to give this the importance it deserves.*
> (DIR01, ACO, TEXT, char 5252 to 5487 of page 1 of DIR01C.TXT).

The mobility of the teachers completely breaks the philosophy of the project. Some teachers who began it leave and other teachers arrive and don't know the dynamics of an ICT Centre. As far as training responses are concerned, there is a lack of general contentment: moral support is of a higher demand than strictly conceptual support.

> *Our demand is commitment from the administration, especially in those centres where some of the teachers are temporary staff. These members of staff should have more stability, especially when they are engaged in this kind of project. There has not been a high level of commitment in this sense*
> (DIR01, ACO0, TEXT, char 8803 to 9111 of page 1 of DIR01B.TXT).

Directors and coordinators are also aware of the doubts about the future. Doubts about equipment maintenance, warranties, repairs and the exponential growth that this projects supposes for the educational administration. Problems of saturation of the centralized service are very common when describing the difficulties.

> *The service obviously gets worse as the number of ICT Centres increases*
> (DIR12, AGE0, TEXT, char 6979 to 7084 of page 1 of DIR12D.TXT).

Finally, among the suggestions made to the administration, they demand higher consideration for the ICT coordinator. His role should be more focused on didactic assessment and less linked to technical problems. Moreover, this function is not rewarded economically or regarding transfers and promotions, so this is a cause of complaint.
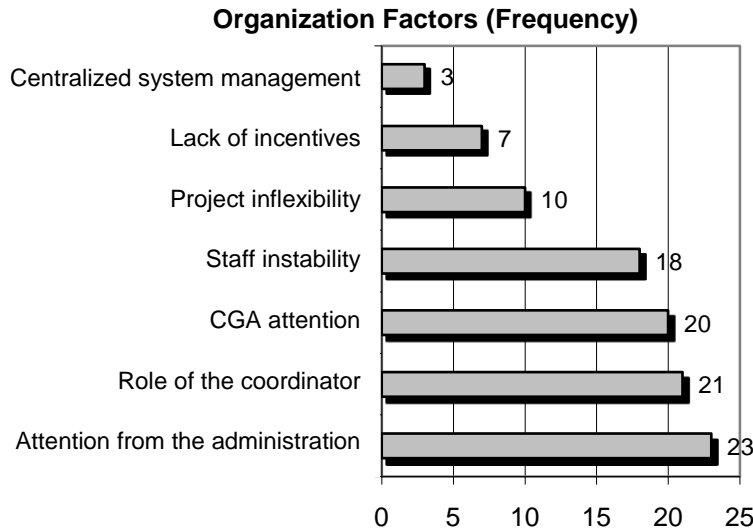
4.2. Focus groups

The analysis of the information provided by the focus groups corroborates much of the data supplied by the interviews. Regarding the resources and organization handicaps, which are basic for the development of ICT Centres, these sessions allowed us to share more explanations and opinions concerning the identification of organization problems: necessary equipment, space management, attitude and implication by the educational community, staff stability, effects on teaching routines, etc. The issues that caused most debate are organization factors, such as *support from the administration*, *coordinator role, CGA attention* and the problem with *staff instability*. Everything indicates that these are the main problems that the centres must solve in order to optimally develop their projects, as shown by the analysis of the interviews.

In frequent references to the administration, both ICT coordinators and centre directors indicate their need for support in developing their projects. Their comments refer to a lack of attention or unfulfilled promises by administration representatives. Almost unanimously, they stated there is insufficient relationship between centres and the administration so that directors and coordinators lack confidence in receiving adequate assistance. Opinions like this one are shown:

> *A growing gap exists between the administration and the centres, between what facilitates the implementation and assessment and what is actually done... Moreover, people in the CGA think that those in higher positions don't pay attention to them... The inspection does not really get involved...*
> (Informant 23).

Organization Factors (Frequency)

Factor	Frequency
Centralized system management	3
Lack of incentives	7
Project inflexibility	10
Staff instability	18
CGA attention	20
Role of the coordinator	21
Attention from the administration	23

The assessments about ICT Centres don't capture the actual problems and reality of these centres. Furthermore, the educational inspection, the main communication between the administration and the ICT Centres, seems to be, in general, insufficiently carried out in the project monitoring.

> *The crucial problem is that in many centres less than 50% of what was presented in the project has been carried out... not that the projects are not properly designed... but other changes and much more support are needed...*
> *(Informant 23).*

Finally, the alternative measures, which are emphasized in the results we have analyzed, are those regarding the *Project assessment and update*. An external and internal assessment in the ICT Centres is demanded, as well as improvement plans that are consistent with the results and with the support from the administration. In short, the aim is to really integrate the ICT Project in the PEC (Centre Educational Project). It will then become a living instrument that can be developed and adapted to the centre's specific characteristics and needs.

One of the most frequent suggestions for improvement is constant maintenance of the equipment and programmes. Technical assistance is indispensable in order to allow the coordinator to have more time to devote to focus group dynamization and to adopt a leadership role in the project:

> *But we also understand that if we go into a classroom and the computers do not work, what do we want so much dynamization for? The project must be complemented with other things. We have suggested the creation of a sort of internal ICT commission*
> *(session 1.3.a, maintenance, 8, char 18311 to 18537 of page 1 of S13A~1.TXT).*

The role of the coordinator should be recognized and, in order to promote the development of the project, his consideration as a member of the directive board is demanded:

> *The coordinator of an ICT Centre should be part of the directive board… If not, the directive board and the director should be extremely involved in this project and in many cases this is not the case. So the only solution is including the ICT coordinator in the directive board*
> *(session 1.2.a, coor_equipo_directivo, 2 char 283 to 685 of page 1 of S12C~1.TXT).*

Regarding the answers to the staff instability and the lack of implementation by teachers, it is suggested that specific positions be defined for ICT Centre teachers. This measure would allow the temporary workers arriving at the centre to get involved in the project, supporting and reinforcing the work of the teaching staff as a whole.

> *I do not know if the teachers' mobility has a solution, but at least those who come to an ICT Centre should have specific training because there are people out there looking forward to being in an ICT Centre*
> (session 1.2.a, plazas_especificas, 3, char 9042 to 9662 of page 1 of S12C~1.TXT).

Another suggestion is related to the incentives for teachers. The directors could recognize work done by the teachers in an ICT Centre, and this could be implemented as an incentive.

5. Conclusions

The success of the measures taken by the Andalusian government to create a "knowledge society", specified in the ICT Centres' program, requires ICT to be integral to day-to-day life in these centres. This integration is achieved through innovative projects leading to improvement in teaching-learning processes. This must be generated gradually, not through mass instalment of technology and equipment. This would cause conflicts and organizational chaos due to lack of planning, training, and real integration of technologies in the curriculum and school system.

These measures require an appropriate policy. Teachers have made significant efforts, but due to lack of incentives, encouragement and administrative support, there is a risk of decreasing teacher involvement. This plan is about teaching and learning and students and teachers. It is more than material, equipment, furniture and technical support. The logistical system should facilitate development of innovative projects. Integration of ICT and pedagogy can be facilitated by nvolvement and recognition of teachers to maintain their enthusiasm and successful outcomes.

The role of the ICT coordinator, who manages the dynamics of the processes of didactic innovation, is essential and indispensable. However, lack of support and resources has distorted this function to technical assistance instead of dynamizing focus groups. This situation ends up in disappointment and resignation. A maintenance IT technician is needed. Other measures would be introduction of ICT coordinators in directive boards, and limited working hours so they can devote more time to the issues for which this role was conceived.

Centralization of the system may raise objections if it favours project standardization and limits its capability to adapt to the individual centre needs. The possibility to adapt programmes so that every centre has its own will make it possible for the projects to define their own characteristics. An ICT Project is part of the curricular project of the centre and, consequently, it must respond to an educational project with its own identity.

The process of professional development based on focus groups (in the area or the department) are restrained by temporary worker turnover. This causes discouragement among the colleagues who stay in the centre because the momentum of the project decreases and wears down the staff. The administration should consider the requests for permanency from teachers who are involved in focus groups created to implement ICT Projects. They should also consider creating specific posts within these centres, which would allow the centre to choose part of its temporary staff depending on their training, interests and commitment towards the use of ICT. Teachers will accept these measures and we think they are appropriate, at least during the curricular integration process of ICT in the centres, and until their use is normalized in the educational system.

Assessment and monitoring of projects is essential for improvement and growth, regarding teaching, organization and administration. It would be appropriate to strengthen the role of the ICT inspector and his specific training to allow for strong criteria in the evaluation of projects.

Suggesting *a priori* computer equipment for every classroom in a centre is a mistake, because in many subjects and in certain contexts their use is not necessary and the equipment impedes developing other activities. The presence of ICT, in its different formats, requires new organization of space. The didactic possibilities must be exploited without preventing other dynamics to be carried out. In the last proposals, other material options have been suggested with implications in classroom organization.

Creating a centralized and up-to-date software database has to be one pillar of a policy to promote ICT in educational centres.

The impulse for these projects, taking into consideration the above considerations, will be faster with the support of new technologies and if the administration promotes growth of professional networks of teachers from several centres playing different roles: advisors, ICT coordinators, disciplinary and interdisciplinary focus groups, material developers, etc.

6. Limitations and Suggestions for Future Research

This research has been focused on the first years of the ICT project. Future studies will be needed to corroborate or discard our prediction for the near future regarding curricular integration and organization of ICT. We consider it is urgent to promote policies that encourage the cooperation among schools and universities for the development of innovative R&D projects in this area.

The development of professional networks for didactic innovation, the creation of original and adapted materials, the collaborative learning experiences among centres, the cooperative work through platforms, the generation of accessible databases which are friendly, intuitive and easily accessible, and the internal and external institutionalization of mechanisms to promote innovation... are areas of work which can solve the problems and dilemmas we have presented.

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