Integration of the Information and Communication Technologies in the Teaching-Learning Processes: The Inclusive School

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Abstract—**The quality educational inclusion - quality of education tandem implies the development of specific programs and internal and external supporting services. The problem that arises in the context of the inclusive school is that it must also respond to quality demands, not just for the education of pupils with specific needs of educational support, also for the regular students. One of the obstacles that face the inclusion of educational quality is the existence of systems that are not adapted to the training needs of their students. The preamble of the current educational legislation states that a student who is in compulsory educational schooling period should receive a comprehensive training. At present, the educational environment is characterized by the inclusion of Information and Communication Technologies (ICT) in the official curriculum to align the needs and trends of contemporary society to the socio-educational reality.**

Although pupils with specific needs of educational support have more human and material resources to receive the care they need, it is not always possible to develop in the classroom motivational activities that catch up their interest. Concept Maps applications help ICT curricular integration in the didactic programming, developing the aims of application and synthesis of Bloom's taxonomy (1972) in the teaching-learning processes. The pedagogic task should be challenging, assertive, motivating and must offer students education aligns to current demands.

Index Terms—**Concept maps, didactic aims, educational inclusion, ICT, taxonomy.**

I. INTRODUCTION

In the study of Coleman [1] about equal opportunities in education, the quality of educational institutions is questioned: "schools, human and material resources have any impact on academic performance students". Therefore, the issues involved in the process of changing syllabus designs to improve students achievements refer to socio-economic status and the conditions of access.

If we adopt a diachronic perspective of education, we note that throughout history there have been dramatic events happening among students (killing of students and teachers, student suicides...) which clearly indicate an immediate need to change radically the educational system and the evolution of today's education.

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The OECD report (1994) on schools and teaching quality attributed to schools the responsibility of not having been able to get students able to achieve cognitive objectives being low relevant the teaching-learning processes [2].

It is important to move back to the 1920 and 1950, when the first movement in the industrial sector emerged. Not efficient this first stage to change the educational system they received more attention in the decade of the 50-70 with a highly considerable participation of different professionals in the process of quality standardization determined by the needs of customer satisfaction.

In this sense, this second attempt to introduce innovation in the quality of educational institutions strengthens the early models to be developed, extending the field of education. Renewal movements started with the creation of the "effective schools" [3], concerning and focusing on the objective achievements in terms of academic performance. Later on, the paradigm of quality in educational institutions acquired more relevance.

II. QUALITY OF EDUCATION IN THE ATTENTION TO DIVERSITY BY THE CURRENT LEGISLATIVE FRAMEWORK

The changes that occur after the introduction of a new educational legislation do not involve changes at the organizational level of schools by changing the traditional structure but, especially in the field of Special Education, they are the only means that lead to improvements in the treatment of students with special educational needs. They may be done either through the creation of schools with required conditions for their care, either through the provision of educational resources (personal, social, human and material).

The Spanish legislation on education, the Education Act of May 3rd, 2006 [4] gives great importance to the process of identification and assessment of special educational needs of students to incorporate the most appropriate course or program, due to serious language deficits or their basic-skills or knowledge, to facilitate their incorporation into the educational system in terms of their abilities and needs. Many of the decisions teachers and parents adopt are taken after conducting psycho educational evaluation. This procedure represents an improvement on previous legislation in the treatment of people with disabilities.

The current Spanish Education Act has implemented in our educational system a significant conceptual change that is no longer a tautology. So far, conceptual categorization in Special Education referred to the designation of "special

educational needs", based on the Act on the Education System (1990) [5], that is, students who could not follow the ordinary curriculum. However, the present Education Act [4] widens this category and includes a generic one under the label of "Students with special educational need" divided into four subtypes of impairment:

1) students who require care different from regular education as having "special educational needs:
2) students who have joined late in the educational system;
3) gifted students;
4) students with certain circumstances (personal, family or social) that require specific educational attention [4].

Specifically, in Section One the Act defines the category of students with special educational needs as follows [4]: "Students with special educational needs require, for a period of schooling or throughout it, special support and special educative attention arising from disability or severe behavioral disorders".

It is easily seen that this term covers a broad typology of Special Education, a typology that deserves at least psycho educational intervention that varies depending on the students' disability. Therefore, this proliferation of diagnostic categories in the field of Therapeutic Education shows the old and recurrent use of tautologies that have been used over the years in the educative discourse and, more specifically, along the Reformation or education acts.

These terms created *ex novo* exemplify concepts empty of meaning that do not clearly define the central problems. It is therefore a logical question to state whether is required more appropriate educative intervention for students with special educational needs. Beyond the stylistic value, the terminological problem is clear enough.

The new terminology creates a complex and unnecessary vocabulary that confuses rather than helps, accompanied by a convoluted prose that hardly invites to read. It builds up in short a system that is justified by the need to give individual attention to pupils with special educational needs, but this is limited to achieving the objectives prescribed by the Education Act.

However, this terminology suggests that the new words to say are creating new things. In the present case is obvious. In 1990, the Act [5] created a new diagnostic group called "gifted" worthy of receiving a quality education tailored to their intellectual capacities, which until then had gone unnoticed, considered a nuisance to the teacher rather than a blessing. It even launched a series of measures to create special classes where these students were taught a special curriculum.

In contrast, the current Act [4] also includes the typology of students with special educational needs that show a potential cognitive: "high intellectual capacities". Here is another example of these tautological trends in legislative discourse in Education. The Act of 1990 [5] defined students with learning disabilities under the diagnostic category of students with special educational needs.

Currently, for the present Act there exist students with special needs. Do these proliferations of scientific terminology match with new patterns in the field of Education? Have diagnostic categories and / or new policy frameworks for people with disabilities been created? Have

we changed the protocols of schooling and educative programs for students with specific learning difficulties?

Note a significant change under current Spanish Act in the field of diagnosis, evaluation and educative intervention for students with special educational needs.

The most highlighted difference compared to previous legislation lies in the educational principles of "normalization" and "educational inclusion" as well as in the type of treatment prescribed for these types of students [4].

As a proof of this, special emphasis is set on four basic issues. First of all, considering the school stated in Article 74. Section one [4] where it says that "The teaching of students with special educational needs has to be guided by the principles of standardization, ensuring their inclusion, with no discrimination and real equality of access and permanence in the educational system. Flexible measures to different educational stages will be developed".

Secondly, in the conception of the social integration and employment it states (Article 75. Section One) [4]: "1. In order to facilitate social and professional integration of students with special educational needs that cannot achieve the objectives of compulsory education, public authorities promote training offers tailored to the specific needs of these students..."

Thirdly, in the field of school performance for students with high intellectual capacities it affirms (Article 76. Section Two) [4]:

"The education authorities will take the necessary measures to identify students with high intellectual abilities and assess their needs early. Also their responsibility is to adopt plans action appropriate to those needs".

Fourthly, with regards to the enrollment of students with late integration into the Spanish educational system it states (Article 78. Section Three) [4]:

1) "It is for public authorities to promote the incorporation of students with specific need of educational support that come from other countries or for any other reason join lately the Spanish educational system. This measure will ensure that, in any case, the compulsory school age..."

All these educative measures are developed through different specific educational programs [4]:

1) "It corresponds to the educative authorities to develop specific programs for students with serious deficiencies in their language or basic skills or knowledge...";
2) "The development of these programs will make easier the enrollment of students in regular groups, according to the level and evolution of their learning".

The future course of history for people with learning difficulties depends on the cause (biological, intellectual, physical, social or adaptation) and constitutes a major evolution.

Rhetorical concepts have been stagnant over the fear of speaking, treat or education of the poor. Our educational system pays special attention on the way to improve the mainstream, by making available necessary personal, human and material resources to education professionals [6].

To this end, we have implemented various measures, have intensified and split the support by Pedagogy Therapeutic and Primary Education that enroll students with special

educational needs. Language immersion programs as well as educative support programs to help students with language deficits or late entry with learning difficulties have been developed.

Similarly, individual attentions to students who require a different teaching way have been implemented. Current trends marked by an overriding requirement to develop teaching-learning processes in different stages of the educational system leading to quality in education, especially in the field of Special Education due to the importance the current legislation provides to attention to diversity.

III. INTEGRATION AND INCLUSION IN QUALITY EDUCATION

The interest in promoting quality education in schools that characterize the twenty-first century society has long extended. Shell stated already in 1998: "Inclusion means that students with disabilities attend schools in their environment, and individualized accommodations, curriculum adaptations and other supporting tools are offered to them in regular classrooms and in all activities school develops (dining, transportation, meetings and other)" [7].

A year later, Darling [6] indicates the need to consider inclusion as a progressive and growing tendency to assume responsibility for educating students with impairment or disability. The tandem quality-education including education must run in parallel and this requires not only support from the educative authorities but also the implementation of internal and external services to support students to the current social reality providing care individually and meeting their schooling needs.

The problem that arises in the context of the inclusive school is that it must also meet the requirements of quality, not only education of pupils with special educational needs rather regular students [8].

The consolidation of inclusive education as an alternative in the field of education involves placing students with special educational needs in normal schools rather than in special ones with the physical, organizational and methodological facilities required for the adequate development of the teaching-learning process, assuming the necessary support to promote the maximum development of their cognitive abilities.

In 1994, the Salamanca Declaration of UNESCO [9] strongly promoted the full inclusion of students with special educational needs. It included all types:
1) Integration framework (pedagogical assumptions);
2) Development of school inclusion (availability and adequacy of material resources, planning and organizational components).

These important factors considered in the macro-level educational institutions contribute to accept differences among students, as different services (not just schools) are provided to everyone (including minorities) without the need for specialized services and participating with all rights. There remains a group of people with severe and profound special needs that require educative treatment not in the ordinary classroom, but in special schools.

The generalization of integrated or inclusive education action has occurred mainly from the 90s and takes place within the extension of the principles of standardization, equity and quality for everyone. Gradually, therefore, school inclusion fits the paradigm of total quality, assuming that if integration is done from the school itself, there will be necessary school agents to acquire a global quality.

Consequently, integration is carried out from the real needs of schools extending the global interest in the quality of the institution, especially if such integration, including part of the pedagogical principles of its agents has been made voluntarily, not being imposed in the organization and planning of the center (micro political level).

IV. SCHOOL ORGANIZATION IN THE DEVELOPMENT OF INCLUSION

The schools that implement inclusive education must organize their level of performance to offer students with special educational needs the help they need. A first level of organization responds to the planning documents (curriculum), with a forecast of the number and type of curricular changes that allow the teaching to students with specific needs.

The availability of resources is therefore essential for adequate school inclusion. From general to specific, the school must have basic material resources in a proper ratio of teacher-student. The availability of teachers, mainly in small groups, promotes the integration of students.

To do this, teachers should have acquired sufficient teacher training, methodology and organization. This work can be seen widely supported by the collaboration of teams of educational psychologists who can assist in the detection of special educational needs, to guide students, families and teachers in the most appropriate educational programs, advice and support parents and teachers, etc.

The school resource management should be effective as long as the material, as well as the organizational and personal resources must be properly managed for the functioning of the institution. Good management improves the efficiency of the school [10].

The material, moreover, should promote the immersion of students with special educational needs in a motivational context, with a suitable social climate. Therefore, the importance of the architectural features influences the use of material resources, conditions, etc. Within the organizational criteria of the institution, the availability of personal resources is extremely important.

A greater number of specialist teachers are more likely to serve students with special educational needs, promoting quality in inclusive education (Therapeutic Education teachers support teachers, technical assistants, social workers, speech therapists, physiotherapists...).

Moreover, parents should know how to treat their children and how to adapt their performance against the pros. If we assume that integration-inclusion in the classroom is accompanied by the creation of a general environment in which students with specific educational support need at all times co-existence with others without such requirements, we are faced with an approach to total integration that some authors describe as inclusive education.

In this context, an important difference to note is that

integration refers specifically to pedagogical assumptions, while the listing would have to do with issues related to the availability and suitability of material and planning with organizational components that lead to the total immersion of subjects with special educational needs: "Inclusion is a policy that suggests that students are in school primarily to be with their age mates, and not primarily to learn" [1].

Although we cannot even talk about the final global results, research has shown that there is no convincing evidence that students' progress is higher in segregated schools and classrooms [6]. However, it is true that there have been numerous studies on the advantages and obstacles to provide the integration and full inclusion of these students.

IV. Advantages and Disadvantages of Inclusion

Some of the studies on the benefits of inclusion or integration, have concluded that full integration has no positive effect on social acceptance in all cases, but neither is been shown demonstrably to have a negative effect. Curricular adaptations, mental performance, emotional balance, self-concept of themselves and attitudes toward school for students with special educational needs have been developed.

On the other hand, the integration of such students in regular schools and classrooms is a dynamic factor of pedagogical renewal in schools (accommodation space, syllabus design, testing, etc.).

In ordinary students, the tendency is to show that integration is also positive for students without special educational needs in basic skills.

As for the cost of education, we must affirm that the costs of special schools for special education are higher than residential care integration, with similar levels of special educational needs.

Roughly, the disadvantage which may result from inclusion is to create a different educative system with organizational rigidity, where strict discipline, formal education, or evaluations are imposed.

Also, a long series of organizational barriers can be added, such as those that refer to the necessary elements to run a center, for example, excessive number of students per classroom, insufficient planning, schedules, groups, primacy of the discipline of communication, social and organizational culture conducive to social exclusion of pupils with special educational needs, etc.

Similarly, there may be obstacles in relation to infrastructure (architectural barriers, unfavorable physical environment, scarce economic resources, inadequacy of facilities, and lack of teaching materials).

Perhaps the most crucial factor for the successful educative integration is precisely a change of attitude towards individuals with special educational needs: "The process of inclusive education must be large, be a real change of attitudes and expectations for open education to all children" [1].

Sometimes exclusion occurs not because these people are incapable of being educated, but due to the belief that they were incapable of learning.

Educative integration will improve through the provision of resources: materials (facilities, furniture personal), coordination, appropriate specialists, functional framework and methodology. It will also improve through the accommodation of teachers by acquiring adequate training to encourage positive attitudes towards integration.

Obviously, this requires, in turn, the promotion of stability and teamwork following the principles of organization leading to the total integration, removing barriers, promoting early intervention, providing support and so on.

V. Information and Communication Technologies in the Inclusive School

The UNESCO established as a priority in education the improvement of quality in education through effective diversification of contents [11]. To achieve these objective teachers must use a variety of methods as part of an ongoing educative innovation process. The XXI century is characterized by the use of Information and Communication Technologies (ICT).

The curricular prescriptions for each one of the compulsory educative stages firmly states that students must learn in a comprehensive way through teacher's guidance. This training should be offered to students in compulsory education and is also marked by the inclusion of ICT in the teaching-learning processes. More now than ever due to birth of the digital society:

ICT are the result of the convergence of various technologies, particularly in microelectronics, computing and telecommunications, with the common denominator of the digital information encoding. Digitization affects the whole cycle of information processing: the generation, storage, processing and transmission. Thanks to this combination of factors, ICT now offer the same potential transformation to change that once had the press or the steam engine. The world has undergone digital [12].

The integration of ICT in Education does not imply a change in the educative system, new technologies are created, but the use of ICT in Education brings new perspectives, allows a more individualized learning acquisition, better syllabus design and is supported by online environments, whose strategies are not based on standard procedures used in the classroom.

These digital resources are useful in school, we only have to adapt our methodology, determine the aims we want to achieve and plug them in a digital format.

In order to integrate ICT with the curriculum prescriptions we have to assume new methodological approaches in the design of our teaching-learning processes. If we integrate technology into the curriculum, it does not have to limit training to one subject but it must have an interdisciplinary approach. This is possible and real and allows learning acquisition through the constructivist approach, focused on the student and the teacher.

We have to create knowledge from students' level, from his cognitive development, and then develop the learning process, motivating and activating their cognitive processes. Only then we will achieve quality in education.

With this conception of the teaching-learning process we can train students to be able to meet the challenges of

technological development, culture and society, not only by means of redefining the educative process, but also through the restructuration of the curriculum.

The adaptation towards modern society needs requires the acquisition of solid knowledge marked by the new trends. ICT should help to ensure that the teaching-learning processes are appropriate to students' needs.

This virtual teaching-learning process requires a methodological change, a flexible teaching capable of training students in a constructive way.

In this context, the inclusion of ICT in Education requires a methodological change encouraging students to perceive the development of their learning process as significant. Teachers have to adjust pedagogical principles to minimize the passive role of students in favor of an active role.

This type of technology needs an active student's participation, a redefinition of the traditional teaching models. ICT involve changes that affect not only methodological approaches rather specific activities, the classroom itself and the space and time distribution.

To implement these technologies several measures have been undertaken, such as the creation of online educative programs, providing a variety of resources which, in turn, raise motivation in students by enhancing their use in the teaching-learning processes.

One of the obstacles to achieve genuine quality in integration or inclusion in the educational systems is the lack of proximity to students' needs. The introduction of the current educative legislation states that students enrolled in different stages of the educative system must receive training, facilitating their incorporation into the working world.

Currently, the educational market, as well as the economic, political... is characterized by the inclusion of ICT in the official curriculum to align the needs and trends of contemporary society to social and educative reality.

Attention to diversity is receiving more consideration in the field of education since the introduction of the current Education Act. Though students with special educational needs need more human and material resources to receive the care they need, it is not always possible to develop in the classroom motivational activities to arouse their interest holding them in their long-term memory.

Concept Map type applications, like *CmapTools* or *XMind*, involve the use of ICT in the development of the didactic aims of Bloom's Taxonomy [13]. Thus the teaching-learning process is developed through concept maps. The pedagogical task should be challenging, assertive, motivating and must offer students an education in accordance with current demands.

The aforementioned computer programs allow students with special educational needs to work on the synthesis and application capabilities. If used as content the conceptual map can serve as a motivating tool for the student, since we are also using a computerized system, encouraging and maintaining their attention. We are then contributing to achieve better learning.

So gathering the principle of ICT inclusion in the teaching-learning processes [14], teachers have the required tools to apply it in the classroom. When the teacher explains a concept, learning has to be strengthened with a series of activities that facilitate students' acquisition.

On the other hand, the synthesis involves a highly complex ability, in an attempt to adjust the contents prescribed by the official curriculum to student's needs, interests and difficulties.

Concept maps applications allow the teaching and learning of concepts by mapping ideas in conceptual maps that implement the capacities of application and synthesis. The procedure in the classroom should start from the drawing of a brainstorming in the blackboard. Students with teacher's guidance create categories of analysis (color, size, family...).

The teacher makes a model of the activity with students in the digital whiteboard for the whole group class and then the students, with the brainstorming they have elaborated in the blackboard and the example that the teacher has shown, prepare a concept map individually (for example, about *plants*).

The inclusion of computer tools and programs in the development of our teaching sessions make possible a fair use of ICT within the methodological guidelines that sets the curriculum in the stages of Elementary Schools.

What is really important is to learn what kind of didactic uses can be derived from them, to acquire teaching strategies and develop specific methodology along new programs.

The integration of ICT in Education does not imply a radical change as far as new technologies are not invented. The use of ICT in education brings new perspectives on a more individualized, better planned and supported education in online environments, whose strategies are not based on standard procedures used in the classroom, but on strategies, such as teaching professionals [15].

We plug them in a digital format. The design decisions relating to education are limited by issues related to the type of facility (physical space available), with the design of instruction (teaching methods, teaching strategies, teacher's role, student's role, materials and resources) and self-learning (motivation, specific training needs, computer equipment ...).

VI. CONCLUSIONS

Schools, as part of society, should respond to changes and demands and must take into account the diversity of citizens. Therefore, schools must attend the diversity of students that represent a society that is not real, enhancing the development and training of specific activities for those intolerant to diversity.

To meet individual differences, the different ways of learning and the needs and characteristics of each student, it is necessary to plan strategies within the whole school community (parents, the Educational Team and other professionals that directly assist students).

We believe that to make an appropriate school inclusion a series of changes at the structural level are required. The promotion of professionalism in teachers and the creation of an appropriate social climate in school need structures and uses of existing material resources (such as ICT).

Thus we will contribute to the improvement of quality in education, caring about students with specific educational

needs. Only a closer engagement of each government, community and school can bring real change in this digital era.

A school system must adapt to the needs of their students, their diversity. For appropriate educative inclusion of students with special educational needs an individualized attention has to be developed with corresponding curricular, pedagogic and didactic changes in the teaching-learning processes.

However, when this does not happen, attention to students with specific need of educational support is only provided by certain organizational aspects.

Adaptations are meaningless if they respond to interventions of plots that do not directly affect or involve the general organization and therefore require a general rethinking from the accommodation spaces and facilities, to review the organizational assumptions and the adjustment of curricula.

In addition, teaching is also necessary for all parents and other students aware of the support needed by students with special educational needs. The current situation of school inclusion allows us to consider its great advantages, challenges and changes that come and assess the necessary cooperation of all educational stakeholders, educational policy, responsible for teacher training, etc.

The integration of ICT in Education does not imply a change in the educational system. New technologies are created, but the use of these technologies in Education brings new perspectives, allows a more individualized learning acquisition, better syllabus design.

Moreover, it is supported by online environments, whose strategies are not based on standard procedures used in the classroom. These digital resources are useful in school. We only have to adapt our methodology, determine the aims we want to achieve and plug them in a digital format. In order to integrate ICT with the curriculum prescriptions we have to assume new methodological approaches in the design of our teaching-learning processes.

If we integrate technology into the curriculum, it does not have to limit training to one subject but it must have an interdisciplinary approach. This is possible and allows learning acquisition through the constructivist approach, focused on the student and the teacher.

We have to create knowledge from students' level, from their cognitive development, and then develop the learning process, motivating and activating their cognitive processes. Only then we will achieve quality in education.

With this conception of the teaching-learning process we can train students to be able to meet the challenges of technological development, culture and society, not only by means of redefining the educative process, but also through the restructuration of the curriculum.

The adaptation towards modern society needs requires the acquisition of solid knowledge marked by the new trends. ICT should help to ensure that the teaching-learning processes are appropriate to students' needs.

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