EDITOR’S COLUMN

This issue of the WFATE Journal is the second half of the papers from the Barcelona Biennial Conference. The theme, *Innovation in Teacher Education within a Global Context*, led to a vibrant and challenging conference. Following the conference, presenters were encouraged to submit the full papers from their presentation. Each paper was reviewed and the papers in this issue of the journal were selected for publication. Because of the number of papers selected, there will be two sections of issue 3 (a and b). It has been a delight to work with the chair of the conference, Mireia Montane, and the committee from Barcelona. It has been equally positive to work with the Board of the World Federation of Associations of Teacher Education. It is great to have professionals who are thoughtful and creative and who trust the process to work well.

James Alouf, USA, has served as the guest editor of these two issues (3a and 3b). Without his skills and insights, the journal would not be such a positive venture. My thanks to the members of the Board of Directors (listed below),

For more information about the World Federation of Associations of Teacher Education, please go to our website: [http://www.worldfate.org](http://www.worldfate.org).

**Guest Editor Introduction**

Volume 1, Issue 3a of the WFATE Journal is the first journal in a two-part series dedicated to publishing papers presented at the Third Biennial Conference of the Association in Barcelona, Catalonia, Spain, April 21-23, 2016. The conference was a tremendous success with participants from Europe, Australia, China, the United States, and Latin America in attendance. The theme of the conference was *Innovation in Teacher Education Within A Global Context*. The papers published in this volume present research related to the fifteen sub-themes of the conference and reflect a wide array of approaches to promoting change in teacher education for the 21st Century. Volume 1, Issue 3b of this journal will present another series of research papers from the Barcelona Conference. The purpose of the conference was to create worldwide discussion of the future of teacher education and to create continuing dialogue around important issues common to all nations. Enjoy this volume of the journal!

Jim Alouf
**WFATE Board Members**

<table>
<thead>
<tr>
<th>Last Name</th>
<th>First Name</th>
<th>Country</th>
<th>Location</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salazar</td>
<td>Joana</td>
<td>Europe</td>
<td>Palma de Mallorca</td>
<td>ATE-E President 2013-2016</td>
</tr>
<tr>
<td>Morberg</td>
<td>Asa</td>
<td>Europe</td>
<td>Sweden</td>
<td>ATE-E President</td>
</tr>
<tr>
<td>Montane</td>
<td>Mireia</td>
<td>Europe</td>
<td>Spain, Barcelona</td>
<td>WFATE President</td>
</tr>
<tr>
<td>Lefever</td>
<td>Shirley</td>
<td>USA</td>
<td>Kansas</td>
<td>ATE-US President</td>
</tr>
<tr>
<td>Embry-Jenlick</td>
<td>Karen</td>
<td>USA</td>
<td>Texas</td>
<td>ATE-US President-Elect</td>
</tr>
<tr>
<td>Stachowski</td>
<td>Laura</td>
<td>USA</td>
<td>Indiana</td>
<td>Board Member</td>
</tr>
<tr>
<td>Stewart</td>
<td>Joan</td>
<td>Australia</td>
<td>Federation</td>
<td>Board Member</td>
</tr>
<tr>
<td>Burke</td>
<td>Jenene</td>
<td>Australia</td>
<td>Federation</td>
<td>Board Member</td>
</tr>
<tr>
<td>Cooper</td>
<td>Maxine</td>
<td>Australia</td>
<td>Federation</td>
<td>WFATE President 2011-2014</td>
</tr>
</tbody>
</table>

**WFATE Officers**

<table>
<thead>
<tr>
<th>Last Name</th>
<th>First Name</th>
<th>Country</th>
<th>Location</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooper</td>
<td>Maxine</td>
<td>Australia</td>
<td>Federation</td>
<td>WFATE President 2011-2014</td>
</tr>
<tr>
<td>McCarthy</td>
<td>Jane</td>
<td>USA</td>
<td>Nevada</td>
<td>WFATE President 2014-2016</td>
</tr>
<tr>
<td>Montane</td>
<td>Mireia</td>
<td>Europe</td>
<td>Spain, Barcelona</td>
<td>WFATE President-Elect 2016-2018</td>
</tr>
<tr>
<td>Paese</td>
<td>Paul</td>
<td>USA</td>
<td>Indiana</td>
<td>WFATE President Elect/Elect 2018-2020</td>
</tr>
</tbody>
</table>

**WFATE Ex-Officio Officers**

<table>
<thead>
<tr>
<th>Last Name</th>
<th>First Name</th>
<th>Country</th>
<th>Location</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alouf</td>
<td>Jim</td>
<td>USA</td>
<td>Virginia</td>
<td>WFATE Business Officer</td>
</tr>
<tr>
<td>Shelly</td>
<td>Ann</td>
<td>USA</td>
<td>Ohio</td>
<td>WFATE Executive Secretary</td>
</tr>
<tr>
<td>van Tassell</td>
<td>Frances</td>
<td>USA</td>
<td>Texas</td>
<td>WFATE Recording Secretary</td>
</tr>
</tbody>
</table>

**Affiliate Members**

- **Kappa Delta Pi**
  - Snodgrass
  - Faye

- **Educational Leaders Without Borders**
  - Papa
  - Rosemary

- **University Nevada Las Vegas**
  - Metcalf
  - Kim

- **Ashland University**
  - Casto
  - Carlos

- **Federation University of Australia**
  - Cooper
  - Maxine
Non-THEMATIC ISSUE

CALL FOR PAPERS

Journal of the World Federation of Associations of Teacher Education

The WFATE has begun to develop special interest groups related to our mission and goals. Papers, research reports and policy analyses related to knowledge generation and to the theme and sub-themes of the conference would be most welcome.

General Theme: Innovation in Teacher Education within a Global Context

Sub-Themes

1. Multiculturalism and Multilingualism
2. Technology and Mobile Learning for Pedagogical Innovations in Teacher Education
3. International - Local Teacher Education Networking Models for Knowledge Building
4. Teacher Education Curriculum and School Curriculum
5. School-University-Educational Administrations Partnerships for Creative Initiatives in Teacher Education
6. A Distributed Leadership for School Innovation Management
7. Monitoring and Evaluating Innovations in Teacher Education
8. Change for Innovation in Teacher
9. Initial and Ongoing Teacher Education for Innovation
11. Supporting STEM Education through Teacher Preparation and Professional Development
12. Strategies for Overcoming Inertia in Teacher Education
13. Disability Studies, Inclusion and Social Justice in Teacher Education
14. Innovation in Teacher Training for Early Childhood Education
15. Social Sciences Teacher Education for a New Era

NOTICE TO CONTRIBUTORS:

The Journal of the World Federation of Associations of Teacher Education is an electronic educational research and development journal. All articles are peer reviewed. We publish articles focusing on empirically driven research in major areas of education, carefully developed issue analyses, and clearly focused development articles.
To be reviewed, manuscripts must conform to the publication guidelines available on the website. The WFATE journal does not have a copy editor. Thus, authors are responsible for ensuring that their submissions meet the specified criteria. Since the Journal of the World Federation of Associations of Teacher Education is an electronic journal, special formatting guidelines must be followed to ensure the readability of the paper by reviewers using a wide range of word-processing software. In addition, the guidelines ensure the accurate rendering of the article on our Web site, irrespective of readers' platforms and systems, should it be accepted for publication. Articles of approximately 5,000 to 8,000 words are preferred.

**Papers are due by May 1, 2017 for publication in summer 2017.**
# TABLE OF CONTENTS

EDITOR’S COLUMN ........................................................................................................1

SYNTHESIS DOCUMENT: Fourth Biennial International .................................6
Conference Innovation in Teacher Education within a Global Context
Ann Shelly, Josep Gallifa, Carme Amoros, and Sandra Lund

GETTING ENGAGE: TRANSFERRING LEADERSHIP .................................12
Neus Lorenzo Galés and Ray Gallon

SELF-ASSESSMENT OF PROFESSIONAL PSYCHOMOTOR ..........................23
COMPETENCIES IN TEACHER TRAINING EARLY CHILDHOOD
EDUCATION
Lurdes Martínez-Míguez. Universitat Autònoma de Barcelona.

MULTICULTURAL CONCEPTS CAN PROMOTE GLOBAL ..................33
COMPETENCIES
Timothy S. Fry

IMPROVING THE QUALITY OF EDUCATION THROUGH ....................39
INDUCTION PROGRAMS
Marc Peñalver, Montse Guinovart, Dr. Ramon Palau

SCHOOL RESEARCH IN CATALONIA: BETWEEN TRADITION ............48
AND INNOVATION
Ivan Nadal, Antoni Hernández-Fernández, Frederic Luque, Núria Salan

OBSTACLES AND OPPORTUNITIES AT LEARNING HOW TO ............73
INQUIRE AND MODEL WITH THE Gowin V DIAGRAM IN
SCIENCE TEACHERS IN INITIAL TRAINING
Edith Herrera, Mercè Izquierdo

TEACHER TRAINING IN THE USE OF DIGITAL TABLETS TO ...........85
PROMOTE INCLUSION AND PARTICIPATION OF ALL STUDENTS
Maria Macià Golobardes

ONE INSTITUTION, THREE CURricula, 1600 LEARNING ...................97
APPROACHES
Maria Teresa Sole Clavero, Josep G. Lluis Queralt
SYNTHESIS DOCUMENT

Fourth Biennial International Conference Innovation in Teacher Education within a Global Context

Ann Shelly, Josep Gallifa, Carme Amoros, and Sandra Lund

Synthesis Document: The World Federation of Associations of Teacher Education (WFATE), in partnership with the Col·legi de Doctors i Llicenciats en Filosofia i Lletres i en Ciències de Catalunya, the Societat Catalana de Pedagogia (IEC), University of Barcelona, Ramon Llull University, and the Catalonia Ministry of Education, all Faculties of Education in Catalonia, and the Education area of City Council of Barcelona sponsored the Fourth Biennial International Conference, celebrated in Barcelona April 21-23, 2016.

Pre-conference Planning: The content coming out of the WFATE conference proceedings was developed over a long-term process that began in 2014. The Board selected the theme of the conference, “Innovation in Teacher Education within a Global Context”, to reflect the need in teacher education to build capacity for educators able to go beyond 21st Century skills to prepare learners for the challenges presented in a knowledge society. The conference proceedings aimed to build educational and cultural capacities that could support innovation at all levels to increase the knowledge-creation talent supply and make place for all in the Knowledge Age.

The conference brought together a wide variety of teacher educators from across the globe eager to seek responses to the major world education indicators, which point to a needed transformation and change in learning and teaching. The local Barcelona-based organizing committee, led by WFATE President-elect Mireia Montane, worked to expand on the conference theme approved by the Board, and recommended the resulting 15 sub-themes of the conference:

1. Multiculturalism and Multilingualism
2. Technology and Mobile Learning for Pedagogical Innovations in Teacher Education
3. International / Local Teacher Education networking for Knowledge-Building
4. Teacher Education Curriculum and School Curriculum
5. and
6. School / University / Educational Administrations Partnerships for Creative Initiatives in Teacher Education – A distributed leadership for school innovation management
7. Monitoring and Evaluating Innovation in Teacher Education
8. and
9. 9. Change for Innovation in Teacher Education / Initial and Ongoing Teacher Education for Innovation
10. Health, Physical/Sport Education and Physical Arts Education
11. Supporting STEM Education Through Teacher Preparation and Professional Development
12. Strategies for overcoming inertia in Teacher Education
13. Disability Studies, Inclusion and Social Justice in Teacher Education

6
Those recommendations were brought to the WFATE Board’s meeting in Paris to be ratified, thus beginning a true collaborative effort that was fine-tuned throughout the time leading up to the conference event.

For each sub-theme, definitions and preliminary descriptions were developed, and the invitation for papers was sent out to WFATE members in the fall of 2015. As paper proposals were reviewed by the Board, abstracts were sent to the local organizing committee classified by themes. Meanwhile, 4-5 chairs of each sub-theme were selected for a global mix, and members of the sub-theme groups were also selected from the diverse geographic areas in which WFATE members are active. All chairs from each sub-theme then began to communicate with each other through email, skype and other Internet-based communication platforms to make sure they had agreed on the subtheme’s definition while coming up with descriptions in coherence with the conference theme, and to give each sub-theme chair a better idea of what had to come out of the charrette sessions.

The sub-theme chairs met face-to-face for the first time during the charrette sessions to make an oral presentation of their theme. All chairs had the complete set of papers selected for content that would bring forth the best ideas about innovation in teacher education and to decide which might produce the new dynamic structure, evolution, and teacher education required for a constantly-changing society. It is the intention of the WFATE Board to convert these to become permanent working groups. Some may decide their job is done; others, however, will want to continue their work, making the next WFATE conference in Melbourne an opportunity to bring members together in collaboration while bringing more people into the groups.

Because this work in setting the stage for dialogue on the sub-themes was so profound, it was impossible to excerpt the vast amount of information, knowledge and experience reflected in the work of each sub-group. Therefore, we have retained the general ideas, challenges and recommendations of each sub-theme un-edited, as presented by the subtheme chair. These are contained in an appendix to the proceedings document. The complete conference proceedings with the Appendix of sub-theme groups, will be made available online by WFATE and Ramon Llull University. Additionally, the third issue of the Journal of the World Federation of Associations for Teacher Education, a peerreviewed journal, will contain all complete papers submitted, scheduled to be published in August, 2016.

**Conference Proceedings:** In order to craft the conference proceedings in a meaningful manner, we asked ourselves three basic questions:

- Why did we come?
- What did we learn?
- What will we be taking home to change teacher education in our own country?

We attempted to answer these questions in the broad sense, as reflected in the dialogue that took place during the conference’s events.
This year’s WFATE conference attempted to give us a universal view of innovation in teacher education. It allowed us to look at innovation in teacher education in a global manner instead of the traditional way of looking at education from a local perspective. While WFATE members have always focused on teacher education, the conference gave us a venue to continue sharing ideas and building networks.

The parallel sessions produced a richness of dialogue around the sub-themes aimed at improving on ideas, suggesting collaborations and networking with each other. Participating in the conference brought forth the importance of knowing the context of different settings in which education operates. Each education system around the globe is unique, relying on a wide variety of teacher training programs. Teachers, however, do not have to work alone. Under the conference’s theme, “Innovation in Teacher Education within a Global Context,” the conference allowed us to gain exposure to differences in order to understand context within a global view that will give us the “big picture.” There may exist a wide variety of differences but at the same time we shared commonalities, which render our differences less important. The internationalization aspect of the conference was important to broaden perspectives – allowing us to “get outside our own skin” and “walk in others’ shoes,” and made us realize, akin to a big puzzle, every institution forms a piece of the larger picture and can find their place among others. This brings about a realization that a single institution is not the center of the picture, but can find itself among colleagues grappling with some of the same issues and challenges. This exercise in globalization expands the definition of community, which is no longer confined to a geographically-defined area. However, as we saw with the case study about children learning the relationship of the past with the present and the future by studying local archeological sites, the concept of community also includes activities that lead to a richness of understanding the local environs in order to define the problems facing a local community. When children are able to compare these problems identified at a local level and develop relationships with their peers in communities in other parts of the world experiencing similar problems, learning becomes global.

Another important aspect of the conference was to showcase the relationship between higher education and the early childhood, primary and secondary education systems. Teacher preparation programs must work with schools, forming solid relationships as more of a partnership. Classrooms are not changing as fast as we thought they would, and many still look like they did 100 years ago. Often, teachers can better understand what changes must take place for the needed transformation toward embracing 4 innovation, and, therefore, teacher training program should recognize that this experience is fertile ground for research on real-world applications in teacher education. Collaboration between schools and higher education, however, is not easy. Recommendations came forth regarding the university and school systems needing to be open to each other. But in order to effectively work together, we all must be comfortable with criticism and innovation. Additionally, it is hard to communicate between higher education and school systems. Further recommendations included the need to have someone who speaks “school” in a university setting, and someone who speaks “teacher training” in a school setting. In regards to collaboration, we heard from diverse voices that will lead toward understanding different points of views and creating networking that will allow us to focus on problems where common-approach solution would be welcomed. Therefore, we should agree to discard
competition to embrace collaboration and creativity. Although much teacher training can be accomplished online, it is also important to have regular face-to-face meetings. The conference brought us together to plan collaborative endeavors, network and learn from one another. Other important themes of the conference included innovation, assessment, communication, physical space, and new technologies:

- **Innovation** - looking at the familiar and making it different, even unfamiliar. Innovation is not only coming up with something new; it is coming up with a different way at looking at something, organizing our thinking differently, or taking a different approach. However, innovation must be based in a framework and efforts should be supported to change schools into learning communities. The documentation of innovations is important, as well. Finally, we must keep in mind that better learning is our main goal.

- **Assessments**. Everyone agreed that evaluation is needed to determine whether something was done well. The question on everyone’s mind was whether assessments would become institutionalized. Additionally, the qualitative aspect of assessment, on which decisions will be made, was also brought forth as an important issue in teacher education. The purpose, design, results and interpretation of assessments are important considerations.

- **Communication**. Sometimes things have to be communicated to others helping to build knowledge. For example, Marlene Scardamalia focused a portion of her presentation on the differences between critical thinking and design thinking in order to improve ideas and grow individual ideas to a bigger idea.

- **Physical space**. The inauguration of the 21st Century Classroom, a joint venture between the Ramon Llull University and Steelcase, presented conferees with new ways of organizing classrooms: mobile chairs, power outlets in the floor, multiple-screen displays, and furniture that can be reconfigured for the purpose of the class.

- **New technologies**. Although the use of new technologies in the classroom is important, it should not be the only goal. Teacher training must provide educators with the tools to determine the purpose innovation serves, especially in relation to providing benefits for the learner. We shouldn’t lose our focus on learning being the most important outcome for students, who grow from learning experiences.

In focusing dialogue around teacher education, it was agreed that teachers are crucial at this moment to apply new ways of learning, and are the key to change in the education landscape. We need different kinds of teachers for the new challenges we face. What kind of teacher do we need? Dialogue around teacher education painted a different picture of who the teacher should be and what competences they should have. We didn’t expect to find a single model for teacher preparation, and found there are lots of ways to educate teachers. An important issue refers to students needing to acquire skills for the 21st Century workforce. After reflecting on the number of new jobs created over the past 5-10 years, questions were asked about how teachers can prepare students for jobs that do not even exist through teacher education programs that reflect real-life situations.
One of the big changes needed is requiring a more global perspective in teacher education, because globalization is a fact of life. People are moving around more. Mass migration is happening, changing, for example, the language landscape of the classroom. We must try to educate teachers in the same ways schools are trying to accommodate a changing demographic of students. If we insist on teaching in antiquated ways of the past, we will fail. Acquiring technology competencies is an important component of teacher education. Another change needed in education is to remove the silos and teaching isolation – teachers should not have to work alone. There are multiple opportunities for collaboration and networking. Teaching must accommodate differences – a wide variety of beliefs, students having different motivations to learn, for example – so that equity can be present in learning to become inclusive, accessible to all.

Additional topics discussed at the conference included:

**Research** – Teachers should be researchers of their students and cooperate with university researchers to reflect on practice. Collaboration needs be defined by projects, to serve as a knowledge-building link. Frequently, we forget how fertile the classroom can be for action research.

**Equity** – make education universally accessible, without leaving certain students behind.

**Community Responsibility** – Teacher educators have a responsibility both to a local community and to a global community. Education and educators should be characterized by an ethical commitment. Professional and ethical responsibility is important, to make sure all learn and grow holistically.

Conferees were offered an opportunity to visit two local schools, to see first-hand how innovation has been practically applied.

We are grateful to all the planners and participants for the rich discussion of critical issues facing teacher educators. We hope that the ideas and dialogue that have taken place during the “Innovation in Teacher Education within a Global Context” conference will help all of us grow and innovate, and continue the collaboration. We will see you all in Melbourne in 2018. Thank you very much!

This document was prepared through the collaborative efforts of many. We give special thanks to the organizing committee for the conference proceedings: Ann Shelly, Josep Gallifa, Carme Amoros, and Sandra Lund. We also thank Paula Mayoral and Eva Liesa from Ramon Llull University for their assistance.

The full conference program with abstracts of presentations and the complete synthesis document with all of the subtheme reports can be found at:

[Barcelona Program and Abstracts](#)
[Barcelona Conference Synthesis Document](#)
GETTING ENGAGED: TRANSFERRING LEADERSHIP

Neus Lorenzo Galés and Ray Gallon

ABSTRACT

Preparing students for an increasingly complex, pluricultural, and plurilingual world requires us to rethink what we understand by "leadership." Our educational goals, and the values behind them, need to be the product of collective reflection, culture, and decision-making. It requires buy-in all along the line, from top administration to individual students. Educational policies must be supported by data and analysis, and must be sufficiently forward-looking to promote desired change, and flexible enough to adjust rapidly when unexpected changes surprise us.

In this paper we suggest ways for educational organisations to develop their own leadership styles, taking advantage of individual strengths of each stakeholder, with an emphasis on engagement. To train leaders, we need to develop new leadership environments, with authentic projects that implicate and engage people at all levels. Most importantly, we need to be providing the students themselves with the equipment to become the new leaders that will take society forward in a positive manner.

When people are engaged, natural leaders rise above, work with everyone else to build a common vision and common objectives, and then collaborate to achieve them. We present leadership as acting on three primary fields:
- Oneself (who am I, what do I do, how do I do it?)
- Others (team building through creation, maintenance, roles, alternation, dynamics)
- Common project (proactive networking, projection, execution)

New tools such as big data can help orient educational leadership (PISA results and other international organizations' reports are examples of this kind of information), and raise awareness. The aim is not simply to be able to consult and cite data, but to integrate them into our leadership strategies.

Examples of practical activities for negotiating futures and developing forward paths that help us predict impacts, define objectives, and take us out into new fields of discovery are included.
GETTING ENGAGED: TRANSFERRING LEADERSHIP

Preparing students for an increasingly complex, pluricultural, and plurilingual world requires us to rethink the role of the teacher, and what we understand by "leadership" in the classroom and in the school.

The verb “to lead" comes from the Old English *læscdan*, meaning, "cause to go with one... guide, conduct, carry; sprout forth; bring forth." It is related to *lifethan*, meaning, "to travel." In the late thirteenth century, it began to take on the notion of writing or stating something meant to begin a discussion or debate, and by the end of the fourteenth century, the word began to take on a sense of "to be in first place" [Harper, 2001-2016].

It is worth noting that the original definition is not far from the original sense of "educate," and regardless of the nuance, as regards education, leadership seems to be a role that involves energizing others and catalyzing knowledge that leads to action.

If we compare different recent definitions of “to lead,” we can see fundamental variances in the underlying concepts that focus on very different strengths and energies:

- **OBJECTIVE:**
  “To lead is to accomplish established objectives by engaging other people to act” [Teixidó Saballs, 2012, p. 9]. This definition emphasizes the aim, the means and the final product, more than the process itself.

- **BEHAVIOUR:**
  "To lead is to act in such a way that people want to do what is required” [Fernández Aguado, 2012, No. 254]. In this case, the focus is on the leader’s personal behaviour and on the leader’s capacity to motivate others.

- **ROLE:**
  “To lead is to help a team in decision making, in order to improve” [Cornet, 2002]. This definition stresses the leader’s role of facilitator or catalyzer for group action.

- **ATTITUDE:**
  “Leadership means influence” [Maxwell, 1998 p. 15]. This view brings into focus the importance of relationships and emotions in human interaction, and emphasizes the energy of persuasion in a community.

Each of these definitions stresses different aspects of the interaction between a leader and a team, but they all share the idea that a single person can energize an entire group to act, as in the original Old English. This ethos runs deep in contemporary culture, but it is time for us to rethink: leadership does not flow from one single person, but from the interaction that is created throughout the whole group. Outcomes happen through a give-and-take exchange in which influence and respect grows and develops systemically inside the organization.
A society’s educational goals, and the values behind them, need to be the product of collective reflection, culture, and decision-making. If the system is to be efficient, we must take into account three important aspects of leadership:

- **Knowledge**: built on research, evaluation, and contrasting objectives, processes, and results.
- **Learning**: understood as growing development of capacities and competences within the whole organization.
- **Proaction**: Intentional, vectorized movement toward desired outcomes and benchmarks.

In the educational context, this requires buy-in all along the line, from top administration to individual students, and from any community of users and citizens to the institutional management. The school is not just a collection of teachers and students, but an interactive community that shares objectives, negotiates strategies, and builds evolving common values.

Perhaps it’s time to recall the dynamic connotation of leading that is contained in the Old English word, related to travel, to a voyage. Perhaps we need to emphasize the proactive, catalyzing function of leadership in all the aspects we have enumerated: objective, behaviour, role, and attitude, and apply it in a systemic setting.

For 2015, the Organisation for Economic Cooperation and Development (OECD) added Collaborative Problem Solving to its list of basic competences for fifteen-year-olds. Here is how the OECD defines it:

> Collaborative problem solving competency is the capacity of an individual to effectively engage in a process whereby two or more agents attempt to solve a problem by sharing the understanding and effort required to come to a solution and pooling their knowledge, skills and efforts to reach that solution [OECD, 2003, cited in OECD, 2013, p. 6].

The criteria for evaluation of this competence are clearly oriented to the idea of collective, systemic leadership.

The next sections offer activities of action-reflection, useful for training organizations through the empowerment of all the members of a community to develop systemic leadership:

1- **Empowering oneself through reflection and personal research** (who am I, what do I do, how do I do it?)
2- **Engaging and energizing others through collective learning** (team building through creation, maintenance, roles, alternation, dynamics)
3- **Sharing and exchanging to vectorize a common project** (proactive networking, iterative design, execution)

**1-Empowering Oneself** {FIRST-LEVEL HEADING}

To borrow from John Culkin, we shape our institutions, and thereafter our institutions shape us [Culkin, 1967 p. 70]. If we are able to train ourselves to understand the most advanced
theoretical emergences and reflect on their practical application to current education, we will develop synergies that can generate significant institutional change.

Most importantly, we need to be providing the students themselves with the skills and attitudes to become the new leaders that will take society forward in a positive manner. This means sensitivity to others and responsibility for one’s own actions.

The OECD has defined these levels of self-awareness for students in this context [OECD, 2013, p. 12]:
- Metamemory – ability to recognise their own strengths and weaknesses in relationship to the task
- Transactive memory – ability to recognise the other agents’ strengths and weaknesses.

These OECD descriptors are engendering a path for reflection that starts with self identity and empowerment, flows into a vision for action, and arrives at proactive planning and execution. One can create a host of design thinking processes, which, step by step, help students, teachers, administrators, or educational agents to envision improvements for the future. Training leaders for better self-understanding should include activities such as the following:

Figure 1: Empowering self-knowledge
This type of exercise allows educational organizations to create their own development styles for systemic leadership, taking advantage of individual strengths of each stakeholder, with an emphasis on collaborative engagement.

2- Engaging and Energizing Others {FIRST-LEVEL HEADING}

In the current world situation, it is essential to include among basic learning competences, those related to communication and interaction for social construction and organizational development. Interpersonal and intrapersonal skills are the glue that facilitates the cohesion in a community that is necessary for starting a project [Goleman, 1995].

The OECD has already formulated three levels of competency in collaborative problem solving that have been tested for the first time in the PISA 2015 evaluations [OECD, 2013, p. 12]:

1. Bridging from myself to what I want to be: what's missing?
2. Research resources for doing I want to do
3. What do I need to learn to know how to do it?
- Establishing and maintaining shared understanding – establishing or negotiating shared meanings, verifying what each other knows, and taking actions to repair deficits in shared knowledge.

- Taking appropriate action to solve the problem – recognising constraints, following the relevant rules of engagement, troubleshooting problems, and evaluating the success of the problem-solving plan.

- Establishing and maintaining team organization - taking steps to ensure that agents are completing tasks and communicating important information. This includes providing feedback and reflecting on the success of the group organisation in solving the problem.

Following these three levels of leadership skills, training courses should include activities that encourage individuals and groups to create spaces for mutual understanding and socialization, situations for collaborative problem solving, and opportunities to build sustainable relationships.

Here are three examples of possible activities:

Figure 4: Team Building: Who are your resources, what can they bring, what do they need?
Figure 5: Engaging others: Create roles and rules, then fill them appropriately

Taking appropriate action to solve the problem

- What can you provide, as a leader to these people?
- Needs know-how
- Needs delegation and autonomy
- Needs understanding or repurposing
- Needs persuasion and encouragement

Can you fill in every section of this chart with names from your team?

Figure 6: Energizing others: Facilitate the dynamics of productive negotiation

Establishing and maintaining team organization

In a team of six (A-F) negotiate and conciliate protocols for team operations: needs detection, activity flow, assessment...

This type of activity needs to be understood as a 360-degree activity – that is, every member of the community needs to do these exercises, and the anonymous results need to be explored by the entire team in a non-hierarchical manner, in order to ensure that each team member contributes according to their talents and abilities.

3- Sharing and Exchanging {FIRST-LEVEL HEADING}

The results of systemic leadership cannot be seen as successful unless the achievements are shared and understood by the wider community beyond the working team. Sharing and exchanging outside the group is a way of vectorizing the project, i.e. energizing it and sending it...
out in various directions. Every recursive process that leads to success can be identified as an indicator of efficiency, or evidence of best practices. Measuring the achievement of these objectives is part of self-assessment for teams, organizations, and individuals.

One measurement system that can be useful was developed by Stevens and Champion [1994] based on these five criteria:

- **Conflict solving** — the ability to recognise and encourage useful conflicts and to employ appropriate conflict resolution strategies when conflicts are not useful.
- **Collaborative problem solving** — the ability to identify situations requiring group problem solving and decision making.
- **Communication** — listening skills and a willingness and ability to develop open and supportive communication.
- **Goal setting and performance management** — setting acceptable and appropriate goals and providing feedback.
- **Planning and task coordination** — the ability to coordinate activities with other team members.

If we take these five criteria as a unit, a sort of “quantum” of systemic leadership, we can apply it at multiple levels, in a fractal manner – to the work of an individual, a single team, to groups of teams, or to an entire community, for example. The method remains valid at any scale.

These "quanta" of evaluation are applied to a process that must be seen as not only scalable in a fractal fashion, but iterative. Each iteration can be seen as one "Deming cycle for Learning and Improvement," as defined by W. Edwards Deming. A complete cycle is comprised of the activities Plan-Do-Study-Act (PDSA) and is intended to be reiterated regularly in order to increase learning and improve the product of the activity [Deming, 1993, p. 135].

The following activities reinforce the process.

Figure 7: Engaging with a network
Training for Systemic Leadership

Because systemic leadership represents a departure from the usual concept of leadership embodied in one individual, training is critical. We need to develop new leadership environments, with authentic projects that implicate and engage people at all levels of the educational community.

One useful training approach is Team Dimensional Training (TDT), originally developed for the US Navy. It has been validated in a number of settings with a variety of types of teams [Smith-Jentsch et al., 2008].

TDT is itself a training programme that is facilitated, rather than taught. Bencaz and Thornson [2010] report that sessions include these characteristics:
Team members self-correct

- The facilitator creates and maintains a psychologically safe learning climate
- Goals are explicitly learning-oriented rather than performance-oriented
- Discussion is structured around an effective model of teamwork
- Balanced discussion of positives and negatives, rather than focusing in all positives for well-performing teams and all negatives of poorly performing teams.

In other words, TDT is oriented toward self-evaluation, based on observation of the behaviour of one's own group. Teamwork is rated along four dimensions [OECD, 2013, p. 44]:

- **Information Exchange** — addresses “what” is passed “to whom” and is meant to capture those processes foundational to a team’s ability to develop and maintain shared situation awareness.
- **Communications** — addresses “how” information is delivered.
- **Supporting Behaviour** — captures how teams compensate for one another in service of achieving team objectives.
- **Initiative and Leadership** — encompasses guidance and direction provided by team members.

All these criteria provide a network of values that help to integrate community action. Teachers’ coordination, student participation, and family involvement will interact towards a common aim, developing recursive actions in a coherent project. In this vectorized landscape, systemic leadership is represented by collaborative problem solving.

### Conclusion

Educational policies must be sufficiently forward-looking to promote desired change, and flexible enough to adjust rapidly when unexpected changes surprise us.

Training teachers to develop leadership skills is more than just preparing their coordination abilities in class. It means preparing the consciousness necessary for them to promote responsibility among young people, and to facilitate learning scenarios where students will be protagonists of their own projects: recursively planning, developing, sharing, and evaluating them. This will help students to take responsibility for their own growth processes, and become the essence of generational renewal.

The objective is not only to promote individual change, but to integrate the idea of a transformation society as the driving force for the common good. Schools can then become the nodes of research, performance, and learning laboratories, where each person can discover their personal added value to contribute to society.

### REFERENCES


**AUTHOR BIOGRAPHIES**

Neus Lorenzo Galés is inspector of education in the city of Barcelona, Spain, and a co-founder of The Transformation Society. She is a speaker on many education subjects, particularly applications of technology to education in plurilingual and intercultural environments. She can be reached at nlorenzo{at}xtec.cat.

Ray Gallon is a veteran communicator who has worked both as a radio journalist and technical communicator. He is also a co-founder of The Transformation Society. Ray is a speaker on communication, culture, and technology and their intersections. He can be reached at ray{at}transformationsociety.net.
Self-assessment of professional psychomotor competences in Teacher Training Early Childhood Education

Lurdes Martínez-Mínguez. Universitat Autònoma de Barcelona.

ABSTRACT

In Higher Education a new conception emerges in the scheme of work based in competencies and learning swinging on them and not on the contents or objectives. The aim of this study was to analyze the suitability of a self-assessment scale ad hoc elaborated, to know whether students Teacher Training for Early Childhood Education were able to evaluate their level of acquisition of professional psychomotor competences during their initial teacher training. The research methodology used was quantitative. The sample was composed of 96 students who were enrolled during the course 2014-2015 the subject of "Psychomotor Education" in the "Universitat Autònoma de Barcelona". Students respond to a self-assessment scale to be aware of the developments that are taking in the acquisition of professional psychomotor competences. We have been analyzed for this partial study 8 of its 13 items that correspond to all of which the student must respond attending a Likert scale of 1-4 (where 1 indicated nothing, 2 little, 3 fairly and 4 much). The results indicate that the students in the sample consider that they have assimilated the professional psychomotor competences very well (an average of 3.48 out of 4) and that the auto-evaluation scale has been very useful to realize it (3.27 out of 4) because it facilitates the recognition of the outcomes achieved, becoming conscious about the academic evolution made in different phases of the subject through the auto-evaluation, allowing to detect the improvements through recognizing strong and weak points and encouraging the reflective capacity. It concludes that all the indicators, categories and psychomotor professional competences can be learning in the Teacher Training Early Childhood Education; self assessment is like an efficient assessment to evaluate the psychomotor professional competences; and students are satisfy with the scale because it’s helpful and the can be conscious about their learning process.
Self-assessment of professional psychomotor competences in Teacher Training
Early Childhood Education

INTRODUCTION

Lately there have been significant changes in university education. It has remained the concern about getting students to develop the intellectual and cultural level. But while it has built hard and increased the obligation to obtain the necessary professional development to enter the labor field in which you want to practice the profession for which they are formed. It has also been moved from an accumulation of knowledge to learn to learn, or what is the same, to learn for life.

In Higher Education in recent years it has emerged a new conception of university curriculum competency-based learning swinging on them and not on the content or objectives. Bolivar and Pereyra (2006) consider that the competences are the ability of a person to be able to integrate knowledge and personality, trying to solve issues in work, school, social and personal environment.

There are so many classifications and types of competences. The most extended in Higher Education divides in: generals or transverses and specifics, disciplinary or professionals. In this study we focus in the second type and we called professional competences. For Escudero (2008:2), this second competences: “explains as what the students are expected to learn in a degree”. For Tejada (2012) it’s linked to the action, experience and the social and professional environment. For this reason, the professional competences can be considered as an instrument to connect Higher Education with the social or work request. Or what is the same: academic world or the business world. However, the students and the teachers think that this connection and acquisition is not satisfactory enough.

In this study researchers doubt whether they really can design courses that connect these two worlds came. And they agreed that a keyword could be dialogue. There must be continuous communication between rigor and relevance with theoretical and conceptual skills and aptitudes that must learn to practice a profession. And this dialogue must be done through an active and participative methodology by the student being the protagonist of their own learning. And also through a formative and shared assessment to keep it informed on their progress throughout their training process, and not just a numerical grade and end of the process, or when there is no possibility of improvement.

To understand the present study, it is necessary to contextualize the profession of psychomotricist in Spain. In different European and south American countries, it is a recognize job with a specific formation. However, in Spain it’s not like this. It is included in the initial teacher training.

That’s why every Spanish teacher can teach psychomotricity in early childhood and in elementary school. Still, some professionals believe that more need to be trained in this discipline, so that perform specific masters and postgraduate courses.
It is increasingly necessary to use different types of evaluation both temporally and people. That is, both initial evaluations, as continuous end should be performed. And different subjects must be involved through self and co-evaluations or performing dialogued between faculty and student evaluations.

This study focused on self-assessment considering a strategy that educates the responsibility to learn how to evaluate, criticize and reflect on the teaching and learning process made individually by the student. In this way, also it helps to develop their critical favoring independence and creativity.

This study focused on self-assessment considering a strategy that educates the responsibility to learn how to evaluate, criticize and reflect on the process of teaching and learning made individually by him, learning, helping to develop their critical favoring independence and creativity.

The conceptual framework developed led the team of this study formulated two research questions: Which kind of psychomotor professional competences do the teachers need to learn in the Initial Teacher Training? And is the self-assessment an efficient way to evaluate them?

**AIMS**

This paper seeks to answer the following research objectives. On one hand: Propose which indicators and professional psychomotor competences have to learn in the Initial Teacher Training. On the other hand: Analyze the level of satisfaction in scale of perception to self-assess the level of acquisition of the professional psychomotor competences of students in Early Childhood Education.

**METHODOLOGY**

**Method**

Regarding the method used it is mainly quantitative court.

**Context**

These aims have able to reach thanks to one research projects granted entitled: Improvement and innovation in initial teacher training psychomotor. Analysis of mechanisms linking theoretical learning with actual practice in schools using active methodologies and formative evaluation. It was success for the Research Group in Psychomotor Education. It’s considered an emergent group by the Agency for Administration of University and Research Grants (AGAUR). The purpose of the call is encouraged making investigation groups with professors and teacher to investigate in net: generating new knowledge, providing social value on education and increasing the prestige of the teaching profession. It is immersed in Program Improvement and Innovation
in Teacher Training (MIF), started in November 2013 signed by an agreement between the Ministry and nine Catalan universities.

It is a project inspired by the entitled: The teaching skills in the initial training of physical education teachers. Research, Development and Innovation Project (I+D+i) of the State Plan of Scientific and Technical Research and Innovation 2013-2016 belonging to researchers: Network Formative and Shared Assessment In Higher Education. This network is composed by more than 100 members all over Spanish Universities.

The context of study has been the subject of Psychomotor Education in preschools, fourth year Bachelor in Early Childhood Education at the Autonomous University of Barcelona. The students after the theory they have to design a session in groups designed and put into practice a session first with his fellow college and then in a real context of a group class a school nearby. Students respond to a self-rating scale as the initial assessment, after the meeting with his colleagues and at the end of the course. To be aware of the developments those are taking in the acquisition of psychomotor professional competences.

**Sample**

All 140 students enrolled in these subject during this course composed the study population. Finally 96 valid subjects have been acting as a unique sample of probabilistic and representative study. Null subjects have been produced by voluntary or not complying with the timetable set character.

As can be seen in Table 1, the sample consisted mainly of women from nearly 24 years of age (minimum age of 19 and maximum of 47) with little teaching experience, almost no experience as psychomotor and an average rating of academic records 7.68 of 10.

<table>
<thead>
<tr>
<th>CHARACTERISTICS</th>
<th>DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Size</td>
<td>96</td>
</tr>
<tr>
<td>(57.14%)</td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>2</td>
</tr>
<tr>
<td>(2.1%)</td>
<td></td>
</tr>
<tr>
<td>Women</td>
<td>94</td>
</tr>
<tr>
<td>(97.9%)</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
</tr>
<tr>
<td>Mean (M)</td>
<td>23.92</td>
</tr>
<tr>
<td>Standard Deviation (SD)</td>
<td>2.99</td>
</tr>
<tr>
<td>Years teaching experience</td>
<td></td>
</tr>
<tr>
<td>Mean (M)</td>
<td>0.62</td>
</tr>
<tr>
<td>Standard Deviation (SD)</td>
<td>1.27</td>
</tr>
<tr>
<td>Years psychomotoricist experience</td>
<td></td>
</tr>
<tr>
<td>Mean (M)</td>
<td>0</td>
</tr>
<tr>
<td>Standard Deviation (SD)</td>
<td>0</td>
</tr>
<tr>
<td>Average rating academic records</td>
<td></td>
</tr>
<tr>
<td>Mean (M)</td>
<td>7.68</td>
</tr>
<tr>
<td>Standard Deviation (SD)</td>
<td>0.46</td>
</tr>
</tbody>
</table>
We note that throughout the study have been followed ethical principles of anonymity of the subjects and data provided by the participants.

**Instrument**

The data were obtained through the *Self-assessment scale acquisition of psychomotor professional competences*, elaborated from : *Assessment instrument of psychomotor competences in education* (Forcadell, 2014).

Specifically, we have been analyzed for this partial study 8 of its 13 items that correspond to all of which the student must respond attending a Likert scale of 1-4 (where 1 indicated *nothing*, 2 *little*, 3 *fairly* and 4 *much*).

There were two items that the student must answer only at the end of the subject and referred to the final degree of *Acquisition of competences* and *Utility Scale Self Assessment*. And there were 6 categories that were divided into a total of 30 items which related to different competencies to be acquired, and that they should necessarily be answered in the 3 different times discussed above.

**Data Analysis**

For the treatment of data points 4 an ordinal scale identified. We used a descriptive study through the main and standard deviation of each of the indicators and categories. We used the Computer Software SPSS (18.0) and Excel (2007).

The data were organized from six categories that are: programming (1), organization (2), climate (3), assessment (4), teamwork (5) and diffusion (6).

The first category relates to *programming* of psychomotor sessions and all aspects to be taken into account like planning, design and organize.

The second category refers to the *organization* of device that accompanies each session referring to: space, time, materials and activities.

The third category refers to the *climate* or atmosphere in classes or sessions regarding issues such as security, standards, coexistence, recognition, participation, initiative, autonomy, respect and step motor action to representation or mental abstraction.

The fourth category refers to the *evaluation* or assessment of both boys and girls, as the adult, teacher or psychomotricist.

The fifth category refers to teamwork and consists of a single item or indicator of the ability of the student to work in collaboration with other classmates or teachers.

And the sixth category it’s the teachers’ *diffusion* about their work, learning process and all it happen in the sessions.
RESULTS

Here are the most important results of this study. First those related to certain categories among questions 1 through 6. Table 2 shows the averages of each category at any time and between different times or times to answer the scale shown.

Table 2. Averages and standard deviations of each category and measurement time.

<table>
<thead>
<tr>
<th>CATEGORIES</th>
<th>TIME 1 (T1) M</th>
<th>SD</th>
<th>TIME 2 (T2) M</th>
<th>SD</th>
<th>TIME 3 (T3) M</th>
<th>SD</th>
<th>T2-T1</th>
<th>T3-T2</th>
<th>T3-T1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. PROGRAMMING</td>
<td>2.76</td>
<td>0.86</td>
<td>3.54</td>
<td>0.52</td>
<td>3.85</td>
<td>0.34</td>
<td>0.78</td>
<td>0.31</td>
<td>1.09</td>
</tr>
<tr>
<td>2. ORGANIZATION</td>
<td>2.90</td>
<td>0.76</td>
<td>3.61</td>
<td>0.52</td>
<td>3.91</td>
<td>0.30</td>
<td>0.71</td>
<td>0.30</td>
<td>1.01</td>
</tr>
<tr>
<td>3. CLIMATE</td>
<td>2.97</td>
<td>0.73</td>
<td>3.45</td>
<td>0.56</td>
<td>3.79</td>
<td>0.40</td>
<td>0.48</td>
<td>0.35</td>
<td>0.82</td>
</tr>
<tr>
<td>4. ASSESSMENT</td>
<td>3.04</td>
<td>0.72</td>
<td>3.59</td>
<td>0.50</td>
<td>3.88</td>
<td>0.32</td>
<td>0.55</td>
<td>0.28</td>
<td>0.83</td>
</tr>
<tr>
<td>5. TEAMWORK</td>
<td>2.80</td>
<td>0.82</td>
<td>3.60</td>
<td>0.49</td>
<td>3.88</td>
<td>0.33</td>
<td>0.80</td>
<td>0.27</td>
<td>1.07</td>
</tr>
<tr>
<td>6. DIFFUSION</td>
<td>2.53</td>
<td>0.73</td>
<td>3.09</td>
<td>0.68</td>
<td>3.79</td>
<td>0.45</td>
<td>0.57</td>
<td>0.69</td>
<td>1.26</td>
</tr>
<tr>
<td>TOTAL SCORE AVERAGE</td>
<td>2.83</td>
<td>0.77</td>
<td>3.48</td>
<td>0.54</td>
<td>3.85</td>
<td>0.36</td>
<td>0.65</td>
<td>0.37</td>
<td>1.01</td>
</tr>
</tbody>
</table>

We can see that the evaluation categories (3.04) and climate (2.97) are in the students at time 1 or at the very beginning of the course, as they feel more competent, while the diffusion (2.53) is not the lowest.

At moment 2 or middle of the subject, and at the moment 3 or the end of it, all the average increases, with the organization (3.61 and 3.91) and teamwork (3.60 and 3.88) are the higher, and repeat diffusion (3.09 and 3.79) and the lowest all and more increased (1.26) and the most divergent among students as the subject progresses. This may indicate that competition is perhaps more knowledge and new learning has provided.

While the least increase has is the evaluation (0.82), perhaps because he had already begun the highest.

Table 3 shows the results the 30 items or indicators regarding the questions 1 to 6 in the three moments that the data has been collected and the three possible differences between these averages are presented.

In general terms it can be seen that: the perception of the students regarding the level of psychomotor skills he had acquired at the beginning of the course, was quite high (2.83 out of 4); all of the averages of the indicators have improved during the year; the level is very high in all indicators at the end of it; the standard deviation decreases, so there are fewer differences between students regarding psychomotor skills acquired. We can take into account the diversity favoring the heterogeneous needs and styles learning of each student.
In the second time and after conducting a test session with his university colleagues, the results show that they have made a good acquisition skill of indicators (4.e.-3.50 / 4.c.-3.38 / 3.d.-3.25 / 3.e.-3.25). They are items regarding attitudes, empathy, coexistence and recognition. While unreach concern very distinguishing aspects of motor skills and their conceptual basis, dissemination, reflection and facilitate action step to abstraction.

In the second time and after conducting a test session with his university colleagues, the results show that they have made a good acquisition skill of indicators (4.e.-3.89 / 3.b.-3.78 / 3.a.-3.73) related to: rules, acceptation, space in the class and placement of the material. While still emerge
with little awareness of acquired skills related to items (3.g.-3.16 / 6.a.-3.10 / 6.b.-3.08) on foster relationships between children and disseminate the work done.

In the third moment or final, after having carried out the session at school, only two more items appears in the high average (1.e.-3.98 / 4.e.-3.96 / 2.a.-3.94). It refers to criteria and assessment tools, accept everyone as they are, and the distribution of space.

Table 4 displays the responses to item 10 on the final level of acquisition of psychomotor professional competences. The results indicate that students who participated in this study considered after completing the course, they have acquired the skills worked very averaging 3'48 of 4.

Table 4. Average and standard deviation of the final degree of acquisition of psychomotor competences.

<table>
<thead>
<tr>
<th>ITEM10. Degree of acquisition of psychomotor professional competences</th>
<th>DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean (M)</td>
<td>3.48</td>
</tr>
<tr>
<td>Standard Deviation (SD)</td>
<td>0.50</td>
</tr>
</tbody>
</table>

The item number 11 referred to the usefulness of self-assessment scale acquisition of skills (Table 5). The results show a high evaluation of this instrument: 3.27 out of 4. The scale can be considered an effective way to: facilitate students through self-assessment recognize learning acquired, become aware of the academic progress made at different times of the subject, encourage reflective capacity, and allow improvements through knowing your strengths and weaknesses.

Table 5. Average and standard deviation of the final degree of acquisition of psychomotor competences.

<table>
<thead>
<tr>
<th>ITEM11. Utility grade Scale Self-assessment to verify learning and psychomotor professional competences acquired</th>
<th>DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean (M)</td>
<td>3.27</td>
</tr>
<tr>
<td>Standard Deviation (SD)</td>
<td>0.73</td>
</tr>
</tbody>
</table>

CONCLUSIONS

This work had a double claim within a context of initial training in Early Childhood Education Graduate of the Autonomous University of Barcelona and from the point of view of the perceptions of students. On one side was, outline indicators and psychomotor skills that students should acquire during their initial training as teachers. On the other hand, analyze the degree of satisfaction of a perception scale to self-assess the level of acquisition of these skills.

We believe that both the self-administered as a research and quantitative data analysis carried out, have been a suitable method to achieve the objectives.

After presenting the results, we turn to realize the most important conclusions of this study.
• All indicators, categories and psychomotor professionals competences profiled seem suitable to be acquired during the initial training of teachers in the context investigated.

• Self-evaluation is shown as an effective system for the student to assess psychomotor competences he has acquired.

• Students are satisfied with the performance of the Self-Assessment Scale Psychomotor Professional Competences developed ad hoc. They consider that helps them be aware throughout the process of formation of the competences they acquire and which they still have to acquire.

PROSPECTIVE

In order to expand and improve the work, we recommend to extend this study to other theoretical and practical teaching or other Spanish, European or from other parts of world universities subjects. And a second proposal would revolve around validate the Self-Assessment Scale Professional Skills Psychomotor with a much larger sample.

REFERENCES


Tejada, J. (2012). La alternancia de contextos para la adquisición de competencias profesionales en escenarios complementarios de educación superior: marco y estrategia. Educación XXI, 15 (2), 17-40. DOI: http://dx.doi.org/10.5944/educxx1.15.2.125
AUTHOR NOTE

Research carried out in the framework of two granted projects:


AUTHOR BIOGRAPHY

*Lurdes Martínez-Mínguez is Doctor of Education. Lecturer of the Department of Teaching Musical, Plastic and Corporal, Faculty of Education Sciences of the “Universitat Autònoma de Barcelona” (UAB). His main research and publications revolve around skills assessment and formative assessment in Initial Teacher Training and psychomotricians. E-mail is:*
lurdes.martinez@uab.cat
MULTICULTURAL CONCEPTS CAN PROMOTE GLOBAL COMPETENCIES

Timothy S. Fry, Washburn University

ABSTRACT

This paper proposes that the multicultural concepts of culture and multiple perspectives should be emphasized in teacher education courses to promote global competencies. Strategies to promote these concepts in the curriculum include a personal culture profile worksheet along with historical examples of multiple perspectives.
MULTICULTURAL CONCEPTS CAN PROMOTE GLOBAL COMPETENCIES

The principles of multicultural education applied in teacher education programs have helped future teachers create more equitable and inclusive classrooms. Many of these same multicultural principles can give future educators global competencies to interact with a diverse and increasingly interconnected world. The goal for including these concepts in teacher education would be to enable future educators to be in a position to promote understanding among the world’s people and to promote the positive aspects of interdependence. Two multicultural concepts that promote global competencies examined in this paper include culture and multiple perspectives.

Culture can be an “illuminating” topic to explore in both teacher education classrooms and, especially, the social studies curriculum (Fry, 2012). Exploring culture allows students to see their own cultural background(s), and when included in the social studies curriculum, students have the opportunity to see themselves in the curriculum. A working definition of culture that I like to use is--_learned or shared beliefs, values, traditions, or loyalties that guide the behavior of a group of people_. Students often mistakenly think that individuals are members of “a” culture or just one culture. In fact, we are members of many groups that help guide our behavior--our religions, languages, living locations, age groups, socioeconomic status, gender, and even our occupations can all be considered as cultural groups. Association or identification with these groups helps guide our behavior and as teacher educators, we have certain beliefs, traditions, and values that help guide our behavior. As teacher educators, we are a cultural group!

While people around the world are different, as human beings we have much in common with each other, especially when looking at culture. These cultural similarities and commonalities can be highlighted as students create a personal cultural profile using the “Cultures in Our Classroom” worksheet (see below). Students are instructed to circle anything that applies to them and they can circle more than one in each category. After students have had the chance to circle groups that they associate with, the class can go through each group category on the worksheet and students may voluntarily self-identify any items circled within that category. Additional discussions and information can be added for each category. This is a good opportunity to affirm the language skills of plural-lingual students. Allow for additional discussion especially if students are members of a cultural group that is not listed in a category as each category can have “others.”

_Cultures in Our Classroom_

Directions: Circle any group that you identify or associate with. You can circle more than one in each category and can fill in the “others” blank.

1. **Language** --English; Spanish; French; Chinese; German; Russian, Portuguese; Hindi, Arabic; Bilingual; Plural-lingual, Others____________

2. **Ethnicity/National Origin**-Mark any area from which you have with at least one ancestor: 
   Native American--Tribes/Nations ______________
Central/South American--Countries/Regions: ________________

European--Countries/Regions______________

African--Countries/Regions ______________

Asian--Countries ______________

Middle East--Countries ______________

Pacific Islander--Countries______________

3. Religion

Christianity

Major Branches-- Catholic; Orthodox; Mormon; Protestant

Protestant Denominations: Baptist, Congregational,
Disciples of Christ (Christian Church); Episcopal (Anglican)
Friends (Quaker), Lutheran, Methodist, Mennonite, Presbyterian, others or
non-denominational____________

Islam (Muslims) Branches of Islam: Shiite; Sunni

Judaism (Jewish); Hindu; Buddhist; Shintoism, Confucianism; Taoism; Sikh,

Spiritual Non-religious Other religions______________

4. Musical Preference: Country-Western, Rock, Jazz, Rap, R & Blues, Latin,
Tejano, Religious, Hip-Hop, Bluegrass, Oldies, Pop, Classical, Reggae,
Others___________________

5. Clothes: Casual, formal, uniform, ethnic, Hawaiian shirts, athletic, others___________

6. Food: Fast food, traditional diet, ethnic, vegetarian, others___________

7. Drinks: soft drinks, coffee, tea, milk, alcohol, others________________

8. Athletics: Golf, American Football, Soccer, Basketball, Volleyball,
Swimming, Baseball, Gymnastics, Softball, Cheerleading, Dance,
Tennis, Track/Cross Country, others_________________

9. Housing: Apartment, Single-family dwelling, dorm, duplex

10. Living location: City/urban, rural, small town

11. Politics: Democrat, Republican, independent

12. Transportation: Bicycle, walk, auto, bus, subway, horse

13. Computers: Windows, Macintosh
A slightly different version of this culture worksheet, along with an accompanying lesson plan was originally published in the article cited earlier and was entitled “Cultures in Our Classroom” (Fry, 2012).

As students identify some of the cultural groups that they are members of, they come to realize that they are not members of a single culture but that we are all indeed multicultural! When we explore the many cultural groups that are present in our own classrooms, we realize that we all have much more in common with each other than we have that is different. Exploring culture is kind of like a balancing act between similarities and differences. We can and should acknowledge differences but also balance that with the fact that we have much more in common as human beings. The inclusion of the study of culture in the teacher education curriculums can promote tolerance and acceptance among the world’s people.

Cultural connections between people from around the world have been used on many occasions bring the world closer together. The love of sports and athletics is a powerful uniting force as the modern Olympic games show. Ping-Pong or table tennis diplomacy helped thaw relations between the United States and mainland China in 1971 (Griffin, 2014). Even Nelson Mandela used soccer to help unite South Africa (Bond, 2013). President Obama’s historic trip to Cuba this year included a baseball game in Havana between the Tampa Bay Rays and the Cuban national team (Bort, 2016). Music is also a powerful aspect of culture that can be used to promote commonality. In May 1977, the Nitty Gritty Dirt Band, an American Bluegrass musical group was allowed to tour Russia, Armenia, Georgia and Latvia - the Soviet Union. They played 28 sold out concerts and appeared in a televised broadcast that was estimated to have been watched by 120 million people (Syndicated, 2013). Over the next decade, many more American bands followed and as has been noted by some, these musical performances may have started the “parting” of the iron curtain (Markowitz, 2014). In training future teachers, I like to include examples of how culture has in the past and continues to unite the world in my social studies methods courses.

In the United States, social studies and the social science disciplines were marginalized in the curriculum during the No Child Left Behind years. As the recognition of the need for education to become increasingly global increases, the social studies and the social science disciplines will hopefully regain their essential status in the curriculum. An important concept shared by both social studies and multicultural education is the concept of “multiple perspectives.” This concept says that it is possible to view any idea, event, or era in more than one way. Stories from history and important civic issues involving humans can almost always be viewed from more than one perspective, which often involves conflicting perspectives (Fry, 2013).

One example of multiple perspectives involves the story of Elian Gonzales and the very different way that two newspapers reported an incident involving Elian in the year 2000 (Fry, 2013). At the time, Elian Gonzales was a young boy from Cuba who had only been in the United States for a short time, having recently lost his mother to drowning when their boat from Cuba broke apart as it washed up on a Florida beach. Surviving, Elian was sent to Miami to stay with some relatives. Elian’s father, who had remained in Cuba, asked the United States government for custody and for Elian to be allowed to return home to him in Cuba. When the relatives in Miami
refused to turn over the boy to authorities, the United States Justice Department, under Attorney General Janet Reno, stepped in. The headline the Wichita Eagle newspaper ran was one word that filled an entire line across the paper—“Seized!” Directly below the headline was a large picture of a uniformed military man carrying a weapon and a small young boy. The rest of the page was the text of the story except for a small picture at the bottom of the page of a smiling boy and a smiling young man. An obvious, contrasting perspective was reported in the *Hutchinson News*, which ran an equally large headline that read, “Reunited!” Below this headline was a large picture of a smiling Elian and his smiling father. Like the other paper, the rest of the page contained text of the story except for a small picture at the bottom, but this time, the small picture was of the military man carrying both weapon and small boy.

Another lesson from history that powerfully illustrates multiple perspectives was exemplified in an article entitled “Letter from a Young Boy Following the Panay Incident” (Plante, 2008). Teaching students about war can lead to many stereotypes and skewed perceptions if the hostility is not viewed from multiple perspectives. In the years leading up to WW II, Japan and the United States were entrenched in hostilities that led to the Japanese military bombing a US ship called the USS Panay. Many Japanese, after getting word the Japanese military had sunk the ship and killed three while injuring 48, began to feel sympathetic for the American sailors. Japanese citizens began sending what little money they had to the American Embassy in Tokyo, in an effort to help the grieving families in the United States. A Japanese schoolboy wrote a letter that included a sincere apology to the families of the U. S. sailors, and contained all of the boy’s money (2 yen). Donations began piling up and after war was declared, the Japanese government did not know what to do with the money (about 37,000 yen) as it would not be right to send aide money to the country they were at war with, but the Japanese government did not want to offend their own countrymen. The dilemma was settled when the Japanese government put the money into a trust and used it to care for the graves of American soldiers and sailors buried in Japan. This story is a great tool for teaching multiple perspectives and shows that even though two nations may be at war with one another, it doesn’t mean that all people have ill will and lack of respect for the citizens of the other nation.

If students realize the many different perspectives there are in the world, they can begin to understand the importance of accepting and affirming difference. Everything can be interpreted through different lenses and from different times and places. Efforts should be made to explore ways that “multiple perspectives” can be emphasized in teacher education to promote global competencies. Future educators need to be aware that they are in a real position to promote tolerance and peaceful resolution to conflict around the world through the application of the concept of multiple perspectives.
REFERENCES:


AUTHOR BIOGRAPHY: Timothy Fry is an Associate Professor at Washburn University in Topeka, Kansas. He teaches courses in social studies methods and educational psychology. His email is: tim.fry@washburn.edu
IMPROVING THE QUALITY OF EDUCATION THROUGH INDUCTION PROGRAMS

Marc Peñalver, Montse Guinovart, Dr. Ramon Palau
Rovira i Virgili University

ABSTRACT

In our country, there are many outcomes which claim for the imperious need of improving the quality of our education system: a high rate of school drop-out, our assessed school results are well below average in an international context, there is a clear lack of a prestigious professional training, a shortage of quality in our bilingual teaching system and a dearth of connection between the school and the labour world (Marina, 2015).

Investing in teachers is essential to improve the quality of education (UNESCO, 2015). And there are several evidences which prove the poor quality of our teachers: 40% of the principals from ISCED 2 in Spain consider that teachers in their schools have a lack of pedagogy qualification (European Commission, 2013). Moreover, the Spanish society perceives a lack of support towards teachers, but they do not specify which type of support would be the most suitable (Fundación Europea Sociedad y Educación, 2013). Therefore, it is essential to promote initiatives which unify the education agents and improve the teacher’s preparation.

In the last years, in Europe, the integration period in schools of newly qualified teachers has been emphasised, and there has also been a tendency to implement support measures for beginning teachers through induction programmes. Its purpose is to help beginning teachers develop efficacious teaching practices (Le, Journe, For, Tion, & Achers, 2015).

Using the literature review methodology, this study aims to describe the fundamental guidelines so as to develop a coherent induction program (European Commission, 2010) and to collect a wide range of induction program designs from different countries, as well as describing their most distinguished aspects (PAEDEIA, 2014; European Commission, 2010 and European Commission, 2015).
IMPROVING THE QUALITY OF EDUCATION THROUGH INDUCTION PROGRAMS

Teachers: a key factor in education quality

We have extremely clear that education has a great influence on each individual, therefore, also on society. And we do know that the world is submitted to an accelerated change. Hence education needs to keep changing and maybe to an increased speed.

In our country, there are many evidences which proof that our education system has a wide marge of improvement: we have a very high dropout rate, we occupy a low position at a standstill in the international assessments, we also lack a prestigious teacher training and there is a clear disconnection between the school and the reality of the professional world (Marina, 2015).

As many authors claim, it is indispensable to focus on teachers if we actually want to improve the quality of our education system. It is stated that, in many recent studies from different authors, teachers are considered the essential and most influential component on education’s quality (European Commission, 2010). But if we have a look at the current situation of education from a global view we realize that the teacher’s context is somehow alarming:

There is a teacher’s dropout rate higher than 10% in Europe. It is common in many Member States to give full responsibility over classes to newly qualified teachers. Consequently, a gap is created the supported and comfortable environment that a student teacher has experienced during her/his initial training (IT) and the reality of the school. Most schools tend to increase this gap by the way they are organized: once the teacher is full responsible of the class, he can reach a sense and feeling of isolation. Moreover, the teaching profession lacks a gradual approach that allows beginning teachers to develop and grow in their professional roles (European Commission, 2010).

As it is said before, there is a dearth of connection between initial training and the reality of the school. IT doesn’t prepare appropriately teachers for the professional world and this can be traduced to a lack of class management abilities which become frustrating for both the teacher and her/his students.

The perceptions of Spanish teachers are also worrying: they seem to agree that they perceive a lack of autonomy and a high percentage of time spent in areas bureaucratic tasks, which might be unflattering for the teacher’s profession prestige. This lack of prestige may also be caused by the loss of authority, due to constant legislative changes and also the lack of support they have. The TALIS survey in 2009 demonstrates that Spanish teachers are neither quite effective nor satisfied with their work in comparison with teachers from other countries. Furthermore, Spanish people perceive a lack of support towards teachers without specifying what kind of support might be appropriate. In fact, the teaching profession is seen as an individual one, where teachers are not fully integrated in the school or in educational processes of constant evaluation and improvement. A comparative view of the prestige of the teaching profession among Spain and the countries of the OECD, adding the society’s vision points to a realistic view of the
profession: Teachers are vital for education, and the countries with the best educational outcomes from PISA data tend to have a major teaching profession prestige. In Spain, the teaching profession seems to have a certain status, given that society has a positive sense of the experience at school. However, they are some realistic aspects which should be reinforced: autonomy, training and support for teachers. At the same time, there is an agreement among teachers, students and society when claiming the need of strengthening the teacher’s profession (Fundacion Europea Sociedad y Educación, 2013).

**Becoming a teacher: focusing on the induction phase**

The concept of induction, in the educational field, is understood as the support given to all beginning teachers once they finish their IT and they start working in a school for the first time, when they are integrating in the professional world.

As European Commission states (2010), induction programs are the best way to help teachers being incorporated in the education systems. The fact of providing them this kind of systematic orientation in this phase has a really positive implication related to their future professional commitment and gives them enough self-confidence so as to believe they are competent. Therefore, teachers drop out during their first years is avoided. As we have seen, many beginners in a wide range of countries might feel abandoned. To sum-up, induction programs create more and better teachers (European Commission, 2010). This support measures afforded by inductions programs have the following aims:

First of all, improving the quality of beginning teachers. Induction programs have a fundamental role in the stage where novice teachers go from beginners to experimented teachers. It helps them to adapt to the school’s reality. An induction program can also have can be formal or informal. Formal programs have the objective of providing support to novice teachers but, at the same time, they can also control the quality of the teachers who enter in the education system. The first years of their career are also understood as a probationary period which, in some cases, requires passing a final test. Non-formal programs are not connected with a specific probationary period and are basically focused on offering support to beginning teachers.

Secondly, induction programs aim to provide professional, social and emotional support. The different kinds of support offered in an induction program are given so as to cover the teacher’s needs during their first years. In the majority of countries from Europe, the teacher career has a lack of training that truly allows beginning teachers grow when talking about the acquisition of their professional functions. Hence, the teacher has to take full-responsibility of the class for the first moment he goes into it. These also creates a great gap between the emotionally secure situation which the teacher experiences during her/his IT and the responsibility that implies starting to work in a school and having to guide a class on her/his own. This situation is even more emphasised in those schools where each teacher is in charge of his class exclusively. It foments on beginning teachers a feeling of professional, social and emotional isolation. This sudden shift contributes to the praxis-shock phenomenon, where the novice teachers faces their period in the school with the wrong conviction that he has to know perfectly well how schools work, what students need in every moment and how teach correctly. With this feeling of having to be self-sufficient that the system imposes and that does not offer many measures of support
and therefore considers the beginning teacher as an experienced one who has to be able to solve every single conflict, when problems come, teachers do not feel prepared to overcome them and solve those. Hence, they tend to reconsider their teaching competences in a negative perspective (Stokking, Leenders, De Jong, & Van Tartwijk, 2003).

Thirdly, promoting a learning environment in schools. In many cases, the new teachers can be a source of new ideas and inspiration for their classmates. However, in many schools the teachers cannot develop this novel educational creativity as they have the need to integrate rapidly into the culture that prevails in the school and accept its rules, which usually are difficult to change, given that many veteran teachers expect new teachers to adapt their way of acting.

Induction programs in this aspect, may contribute to the development of a culture of learning within the school where teachers -not only beginners- can learn.

Finally, induction programs provide feedback to the educational institutions which are responsible for teacher training. These are the link between the initial training of teachers and de continued professional development. This stage shows clearly if teacher’s initial training was effective and if it has prepared successfully for the reality of the teaching profession. That is why this induction period should be used so as to learn the aspects mentioned above to adapt initial training and connect the gap between the theory taught in the faculties and the reality of the school.

The four interlocking systems of coherent induction program

Several investigations show that these three types of support mentioned (social, professional and emotional) are considered as essential dimension that have to be covered in an induction program (European Commission, 2010). These three dimensions can be translated into four interconnected systems that together become a coherent induction program. These are the mentoring system, the expert system, the peer system and the system of self-reflection.

The mentoring system

The mentoring system is an induction system that imparts an experienced teacher, who is in charge of a novice teacher and that should help him supporting and offering personal, social and professional support. The main objective of this system should be encouraging learning using different approaches such as coaching, training, discussions... All these approaches include meetings, which must occur regularly as they are the key of effective mentoring. Tutors are important; perhaps the most important factor in induction programs but it must be coordinated with the vision and the overall structure of the system.

The role of tutors is highlighted, given that they help and can give advice to novice teachers, in a context were beginners feel comfortable and can trust this person when searching someone to share their problems and looking for help without feeling judged. For this reason, it is recommended that mentors should not be involved in the assessment of novice teachers. Therefore, the relationship between novice teachers and mentors should be a fluid relationship and to achieve that, it is important to pay close attention when choosing mentors, so as to avoid conflicts related to more personal aspects, rather than professionals.
The system recommends the mentor to be the person who takes care of the three aspects that must develop an inexperienced teacher, but it also considers as possible other teachers offering support to the beginner. The benefits of mentoring affect mainly the new teacher but also help the mentor developing new skills.

**Expert system**

The expert system provides to novice teachers access to various experts that allow developing specific skills in the professional field. These approaches can be given by experts through seminars, courses and it can facilitate beginners having access to resources and materials specially created to help beginning teachers and addressed to face a specific aspect of the curriculum.

In those cases where, through formal induction, the teacher has to pass a final exam after the induction period, these experts should be offered by national or local agencies and also universities, because it is understood that these professionals should have a level of theoretical knowledge that not all the current teachers have.

**The peer system**

The peer system offers novice teachers the opportunity to create a network of work and communication between colleagues who are in the same situation. The system supports both social and personal dimensions by sharing problems and concerns among teachers who are in the same situation and who have an atmosphere of confidence where they will not feel judged. Through this system professional issues may also be treated, but given that most participants have little experience, it is not the best support to solve such kind of problems.

The peer system is essential in order to create a safe environment where participants are in a relaxed atmosphere and to discover that they all do have the same or similar problems. Although it is recommended that the meetings should be attended physically, it is also interesting considering a virtual community. The peer system and the system of mentoring can be intertwined with each other in case the novice tutors and teachers gather in groups and share their doubts and practices that they have developed. When schools are big and have a great group of novice teachers, peer groups can be made in the same school. All in all, groups can benefit from the fact that all participants work are working in the same context. Nonetheless, in small schools, where there might be one or two beginning teachers, the peer group system would be integrated by different small schools. In these situations, many interchanges from different perspectives of the schools would be done.

**Self-reflection system**

Induction programs should offer a margin of reflection for beginning teachers so as to reflect on their learning. Self-reflection ensures a long-term and continued learning and cognitive development, promoting, at the same time, professionalism and ensuring the development of an attitude of long-life learning. Moreover, it provides enough time for reflecting and sharing experiences with others in a positive atmosphere and, consequently, it promotes the development of a culture of sharing with a distinctive character in the same profession.
The self-reflection system should include a recording method. For instance, portfolios, observation and feedback in the daily teaching practices… Self-reflection can be stimulated from the revision with peer groups or the actions in the class. This system can also be part of a national assessment formal system which could provide the full qualification of teacher to a beginner, or it could also be integrated in the local politics, at the school level.

**The induction period in United Kingdom**

All qualified teachers who are employed in a relevant school in England must, by law, have completed an induction period satisfactorily, subject to specified exemptions. If the teacher doesn’t want to go through this program or the teacher fails it, he only can go to independent schools or academies even if he/she has the grade in primary education.

Statutory induction is the bridge between initial teacher training and a career in teaching. It combines a personalized programme of development, support and professional dialogue with monitoring and an assessment of performance against the relevant standards. The programme should support the newly qualified teacher (NQT) in demonstrating that their performance against the relevant standards is satisfactory by the end of the period and equip them with the tools to be an effective and successful teacher. Even there isn’t a must to start this process after ending the grade and get the “Qualified Teacher Status (QTS)” it’s true that the authorities recommend starting the induction program the sooner the better.

Once the beginning teacher starts this induction program he receives some supports and has some requirements to make this experience useful and meaningful: the director makes some recommendations about how they have to work to reach the standards they must have at the end of the year. The beginning teacher receives some tasks and supports to allow them to show what they are able to do in a real class. The beginning teacher has a mentor who takes care of their job and helps them in all the situations they can front.

The beginning teacher has only the 90% of the hours of a normal teacher. This allows them to prepare their classes and have meetings with the people involved in the induction program. It is also recommended that the college should not ask to the beginning teachers to do something they are not trained for. They have to be like all the other teachers. The last thing they recommend is that it should not be ordered something to the beginning teacher if they cannot be supported so as to success.

An induction program has to last a scholar year and the beginning teacher can decide if it has to be done at full or partial time. If the beginning teacher decides to do it at full time the induction will takes a year. In the case the teacher wants to do it at partial time, a commission will decide the equivalence to know how much time the beginning teacher has to do.

The support provided by the mentor has to cover a wide range of aspects: the support and help has to come from an experienced teacher who has to help the new one to organize and do his/her job properly. The mentor has also to watch and discuss with the beginning teacher about the important aspects to improve and finally, he has to analyze and review the progress of the beginning teacher. This support is really hard to be done, so it is necessary that the mentor has a
big capacity to guide the student and do, at the same time, all the other functions of a proper teacher.

Every three months the mentor or the director should have an interview with the beginning teacher to see the progress and collect their impressions on a paper. The progress has to be based directly on the standards. After the meeting, the student has to be informed of the results and have a copy of his/her evaluation. Using this method, at the end of the course, the beginning teacher will avoid any kind of unexpected result.

An NQT has only one chance to complete statutory induction. An NQT who has completed induction, and is judged to have failed to meet the relevant standards at the end of their induction period, is not permitted to repeat induction (although they may appeal against the decision). While such an NQT does not lose their QTS, they cannot be employed lawfully as a teacher in a relevant school, including any post where they would carry out specified work. Their name is included on the list of persons, held by the National College for Teaching and Leadership, who have failed to satisfactorily complete an induction period. (Williams, 2004)

The induction period in Finland

Through the PAEDEIA’s program, the year 2014 a pilot induction program was implanted on Finland, Sweden and Turkey.

PAEDEIA is a multilateral project created by the department of Lifelong Learning of the European’s Commission (Pedagogical Action for a European Dimension in Educator`s Induction Approaches). This word refers to the Greek word paideia (the education of the good people). The main aim of this program is to develop methods to support the beginning teachers during their induction phase: from the initial training until becoming a full recognized teacher.

The methods used to do this project is based on the dialogue, that we can descry as a methodology we can use to share experiences and successful experiences in the education.

In Finland, the education providers are the ones who have to talk with the teachers. They have to decide the method they want to use and the places they need to cover. This process is open and the vacancies are published on the newsletters, on the webs and in education magazines. For all the teachers, a master is required and also some pedagogical training, but the educations providers have also to consider many other aspects. The aim of this process is to choose a qualified person but also one who would fit best in the educational community.

In Finland, there is a cooperative association (Osaava Verme) who connects the institutions with the teachers. The aim of this progress is to develop a peer group mentoring (PGM) to help the beginning teachers. This PGM and mentors have one meeting every month and there they talk about topics or problems related with their job. These meetings are based on the constructivist perspective. For this reason, it is essential to discuss to create comprehension for the job of the teachers.

The preparation of the mentors has been entrusted to various educational institutions at the regional level and is it seen as a module of 10 ECTS credits and lasts one year. This preparation
includes group dynamics, ethics, confidentiality, dialogue, narrative, social interaction, reflection and welfare at work.

Within this network, the PAEDEIA program is also linked, which was first implemented during 2014-2015. It was focused as an elective course, which was aimed at novice teachers and students in the last steps of his early education as teachers. The idea was presented to participants as an opportunity to share experiences and knowledge, as well as the possibility of building new ones. In the meetings, which would be from six to eight times, the profession of teachers was examined and it tried to promote among the participants the identity as a professional.

The working methods of PAEDEIA Café (the name given to this section of the pilot program) were based on the principles of work of mentoring of the peer group. The meetings were led by teachers who had completed mentor training program in the national network mentioned above, Osaava Verme. (PAEDEIA, 2014)

**The induction period in New Zealand**

In New Zealand, schools are required to employ only those teachers who have applied for, and have been awarded, with the provisional teacher registration status by the New Zealand Teachers Council on graduation from an accredited “provider” of initial teacher education. The minimum period of provisional registration is two years. The Ministry of Education provides an allowance to state schools to employ a beginning teacher at an 80% of a full-time teacher salary for the first year, and a 90% for the second year. The additional allowance is intended to support schools to provide beginning teachers with an advice and guidance programme to enable them to become fully registered teachers. The time allowance can be shared between the beginning teacher and a tutor teacher in primary schools.

Schools are required to appoint a tutor teacher or supervising teacher with responsibility for working with the beginning teacher to tailor an advice and guidance programme appropriate to the needs of the new teacher. In primary schools, the tutor teacher is usually a teacher who teaches in the same teaching syndicate. The tutor teacher in primary schools is paid a small honorarium ($2,000) in acknowledgement of this role. There is no requirement that tutor teachers be trained for their roles, although some courses are available through School Support Services, universities and colleges of education. Currently, there is no formal acknowledgement in the salary scale or career structure for tutor teachers, although the New Zealand Educational Institute (NZEI) is currently discussing career pathways and required training or qualifications for the tutor teacher role. In addition, in larger secondary schools, a pilot programme was introduced in 2005 to create Specialist Classroom Teachers (SCTs) to support and assist beginning teachers and other colleagues to develop and demonstrate purposeful learning environments and effective teaching practices. SCT positions attract a time allowance of four hours a week and additional salary of $6,500 for each appointee. After a minimum of two years of supervised teaching, the Provisionally Registered Teacher applies to the Teachers Council for full registration. According to the information on the Teachers Council website, to move from provisional registration to full registration the teacher must: complete a total of two years supervised teaching following the gaining of an approved teacher education qualification, have a teaching load of a minimum of 12.5 hours per week, be employed as a teacher, not a teacher aide or a volunteer worker, participate in an advice and guidance programme for the two-year period, which includes a
structured programme in the first year and continuing supervision by a fully registered teacher throughout the second and subsequent years, meet the “satisfactory teacher” criteria laid down by the Teachers Council, be recommended for full registration by the professional leader of the learning centre which is employing the teacher and possess a current practicing certificate (Cameron, 2007).

The Teachers Council audits a random 10 percent sample of records from registration applications as a check that the process has occurred. If there is insufficient evidence of an advice and guidance programme through the two-year induction period, the Teachers Council requests further documentation. Where the evidence is not forthcoming, the Provisionally Registered Teacher may remain provisionally registered until this documentation can be provided (Cameron, 2007).

REFERENCES


ABSTRACT

The research-work (RW) is part of an official school curriculum in Catalonia. The relevance of the proposal focuses on the fact that it complements the traditional tutoring project and is open to all educational levels with the same methodology. The main goal is that the students enter into the world of research and experience this as a bridge between school and university. It emphasises the methodology of teaching and learning in the development of research and combines two aspects of investigation: written work and oral presentation. It uses different free services platforms of Google and Google Classroom, a suite of free productivity tools for classroom collaboration. This method enables the educational community to approach the world of research and allows them certain freedom to organise the development of the RW under the supervision of a tutor, and follow the schedule of presentations defined in the calendar. It allows students to create a trajectory of learning that begins at school and continues throughout life.
SCHOOL RESEARCH IN CATALONIA:
BETWEEN TRADITION AND INNOVATION

INTRODUCTION

Project/Problem-Based Learning (PBL) is a model that organises learning around projects and, according to Thomas (2000), includes projects based on challenging and engaging questions, or problems, that involve students in design, problem-solving, decision-making, and research activities that culminate in realistic objects or presentations (Thomas, 2000; Thomas, Mergendoller & Michaelson, 1999). More recently, many PBL approaches focus on Secondary School effects. PBL is a dynamic classroom framework in which students actively investigate real problems and challenges, and procure a deeper level of knowledge through a self-directed learning experience (Compass Learning, 2015; Huberman et al., 2014).

On the other hand, Inquiry-Based Learning (IBL) or Challenge-Based Learning (CBL) are another kind of learning methodology that, through fostering intellectual engagement and entrepreneurial spirit, advocate that students develop competencies through a process of inquiry and discovery (for a review see Friesen & Scott, 2013). Good pedagogy in the 21st century is inconceivable without these kind of approaches to learning that involve students as partners and creators of their own knowledge.

Therefore, as we shall see, the case of Catalonia is paradigmatic in the introduction of the research projects in secondary education: well run, these projects will be the seed of the researchers of the future and the development of a knowledge-based society (DOCG, 1998; UNESCO, 2005).

An approach regulation: the case of Catalonia

Several decades ago, the Catalan government and its Department of Education introduced the Research Work (RW) component to the curriculum as a mandatory requirement for students in the last two years of high school (for students aged 17-18). The initiative was innovative to the extent that currently Catalonia (since 1998; DOCG, 1998) is the only autonomous community of Spain, now with the Region of Murcia (since 2010; BORM, 2007), that implemented this as a mandatory component of the school curriculum (fig. 1a). Moreover, since 2009, Catalonia has also included a subject named ‘Research Project’ (RP), intended as an introduction to research (fig. 1b), in the final year of secondary education (4th of ESO; DOGC, 2009). This initiative sees high school students undertake a compulsory research project which they can carry out in whatever field of knowledge they want, or that their teachers propose.
Fig. 1. Normative framework. In red, the hours for research. Adapted from: Guidelines for the implementation of new curricula for fourth year of Secondary School and Baccalaureate (high school).

<table>
<thead>
<tr>
<th>SECONDARY (AVERAGE WEEKLY HOURS)</th>
<th>4th</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catalan language</td>
<td>3</td>
</tr>
<tr>
<td>Spanish language</td>
<td>3</td>
</tr>
<tr>
<td>Foreign language</td>
<td>3</td>
</tr>
<tr>
<td>Mathematics</td>
<td>3</td>
</tr>
<tr>
<td>Social Sciences, Geography and History</td>
<td>3</td>
</tr>
<tr>
<td>Ethical and Civic Education</td>
<td>1</td>
</tr>
<tr>
<td>Physical Education</td>
<td>2</td>
</tr>
<tr>
<td>Biology and Geology</td>
<td>3*</td>
</tr>
<tr>
<td>Visual Education</td>
<td>3*</td>
</tr>
<tr>
<td>Physics and Chemistry</td>
<td>3*</td>
</tr>
<tr>
<td>Computers</td>
<td>3*</td>
</tr>
<tr>
<td>Latin</td>
<td>3*</td>
</tr>
<tr>
<td>Music</td>
<td>3*</td>
</tr>
<tr>
<td>Second Foreign Language</td>
<td>3*</td>
</tr>
<tr>
<td>Technology</td>
<td>3*</td>
</tr>
<tr>
<td><strong>RESEARCH PROJECT</strong></td>
<td>1</td>
</tr>
<tr>
<td>Tutoring</td>
<td>1</td>
</tr>
<tr>
<td>Religion (voluntary) / Alt. Activ.</td>
<td>1</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>30</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HIGH SCHOOL - BACCALAUREATE (AVERAGE WEEKLY HOURS)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMPULSORY SUBJECTS</td>
</tr>
<tr>
<td>Catalan language and literature</td>
</tr>
<tr>
<td>Spanish language and literature</td>
</tr>
<tr>
<td>Foreign language</td>
</tr>
<tr>
<td>Physical Education</td>
</tr>
<tr>
<td>Philosophy and Citizenship</td>
</tr>
<tr>
<td>Sciences for the Contemporary World</td>
</tr>
<tr>
<td>History of Philosophy</td>
</tr>
<tr>
<td>History</td>
</tr>
<tr>
<td>Tutoring</td>
</tr>
<tr>
<td>Religion (voluntary)</td>
</tr>
</tbody>
</table>

**RESEARCH WORK** **STUDENT** → **70 h**

* The student must study three

(Government of Catalonia, 2008)

According to the Department of Education of the Generalitat of Catalonia, in a guide on the RW, this research activity to be carried out for all high school students. It should preferably be started during the first year and is obligatory in the second year (Generalitat of Catalonia, Education Department, 2015). Accordingly, it is an activity that lasts more than one academic year and must total around 70 hours (2 credits). The content of the RW is divided into two main groups: the written part and the oral presentation. It is important to follow guidelines around organization, although the RW tutor guides students to develop it according to their characteristics and those of the school. Officially, the following (EDU365.cat, 2013) building on the pedagogical lines and general criteria for the development of research projects were established:

- Choice of topic is free, although the school can propose default themes. The topic should be specific rather than general.

- Raising the initial questions: once the overall topic is defined, it must be developed from more specific questions. This also allows the variables to be defined.
- Planning the research: it is important to have a calendar that guides the development, from the searching of bibliographic sources to the necessary materials.

- Searching for and processing information: it must be borne in mind that not all information can be equally valid. Students must select and adapt information to the needs of the research.

- Synthesise and evaluate: it is important to choose the information needed, as well as applying critical skills on the chosen approach, which may or may not be the correct one.

- Presentation of the report: it must have a suitable structure and content, following the criteria set by the tutor.

The oral section must take into account:

- Making the presentation: it must be appropriate and fit within the allotted time. It has to introduce three main sections: introduction, body and conclusion. It must combine images and text. Finally, it must offer a new perspective in relation to the written work.
- Preparation: before submitting it to the examining board, the student has to rehearse with the tutor and correct any errors. The student is recommended to make use of cue cards with notes on the main aspects they want to highlight during the presentation.
- Presentation: students should be mindful of issues such as gesture and vocalization, which must be appropriate. Certainty in the explanations provided and supporting arguments help make the presentation more effective.

Both the written and oral parts are evaluated. The school determines the weighting of each and informs the student. The written part is usually weighted higher than the oral. The monitoring process is also usually evaluated too, since the RW is considered a continuous activity which is not completed until it is presented to the examining board (fig. 2).

Fig. 2. Overview of school research projects in Catalonia.

Research in schools as a bridge to the university world

There is much talk of the importance of research in society; so-called R&D, a term that is often included in professional fields, and the need for a knowledge-based society (UNESCO, 2005). But there is other research that takes place in schools, which is easier, but no less important. This
term in the educational world can have different meanings, often unrelated to its ideal: to bring something new. What do you bring to your work? This is the most important question the student has to answer when carrying out research (Belmonte, 2011).

The RW allows students to enter the world of research as a bridge between school and university. It is work owned and decided by the student, supervised by the teacher, and that gives the student the freedom to choose the subject, develop their interests and present it in the most appealing way to the examining board for assessment. Although it is an individual piece of work, collaboration is important because the tutor and author of the research must properly coordinate their input to achieve the best results. Quality both in written format and oral presentation must be of a sufficient standard to obtain a final grade that allows students to enter the university world as prepared as possible.

In this sense, the methodology used must be adequate to achieve the quality that you would have to demand of the job in question. In addition, if we want an education for the entire population, that is accepting of differences and leverages diversity as an opportunity to promote learning, we should carry out educational practices to stimulate creativity, information management and communication of results (Menoyo, 2014). This is the line that the proposed methodology follows – that of promoting the realization of the RW by students from the later primary grades through high school, including those courses in which research is not present in the curriculum. This is the first objective: to take an inclusive approach (fig. 3).

Fig. 3. Project justification. This methodology aims to extend research to other educational levels as a motivational tool and as a means of educational excellence.

Secondly, the proposed method is intended to be a bridge between school and university. The proposed model gives priority to the methodology of teaching and learning in the development of research (Friesen & Scott, 2013, Thomas, 2000). It increases the students’ knowledge of certain skills (technological, communication, etc.), always with the support of their tutor and, if possible,
with different institutions related to the topic of work (universities, etc.). It means, to be collaborative.

Other objectives pursued by the proposed methodology, in part coincident with the literature on ABP in secondary education (NYC Department of Education, 2009), are as follows:

- Promote research as a learning process from the base of secondary education.
- Increase the quality of the training process by following a strict procedure that is adapted to the needs of students and teachers.
- Achieve skills in project areas through the interdisciplinary intended nature of the RW (fig.4).
- Assess the work externally by presenting it at events associated with research (awards, exhibitions, lectures, among other places), while the work is being carried out.

Fig. 4. A comparative example between the basic competencies of the curriculum and those covered in the proposed procedure.

In the field of secondary education there are limited examples that seek to innovate in the promotion of research competencies of students (Friesen & Scott, 2013, NYC Department of Education, 2009), combining different techniques and utilities (which will be explained later in our case), in order to increase the motivation of students and teachers themselves (Alonso Tapia, 2005).

Rather, the offer at a university level is great and diverse, with the creation of different working groups (Group Gea-Clio, EDO Group, UAB, UIC, UDL, or RIMA-UPC Project, among others). In particular, there is also collaboration with the Institutes of Education Sciences, as with the UAB and the UPC (Salan et al, 2012; Grau et al, 2012; Martinez et al, 2009). Still, Martinez et al. (2009) consider that students’ degree of knowledge of the scientific method is not always adequate, affecting their level of motivation. Other collaborative approaches focalize in partnerships between the university and school through mentoring in initial teacher education (Villiers & Mackisack, 2011).

The RIMA Project UPC-BARCELONATECH (fig. 5) was constituted in 2007 to promote the participation and exchange of experiences among teachers of the UPC in various fields of
educational innovation and research (Martinez et al, 2009). RIMA presents numerous working groups related to STEM (Science, Technology, Engineering and Mathematics) that also allow interaction with different educational levels, not always university-level, as with the GIDF, Group Interest group in the Teaching of Physics.

In this sense, GIDF for example opens the door to the intelligent spreading of physics between the fields of secondary education, university and society in general (Hernandez & Aragoneses, 2013; Aragoneses et al, 2016). In general, the objectives of these groups of educational research are (RIMA, 2016):

- Encourage the participation and involvement of the academic community, especially the UPC but also open to other institutions.

- Willingness to put together projects that advance the University on the road to improvement and innovation in teaching.

- Provide guidance to achieve results that can be disseminated and have an impact on our community.

- Disseminating performances and sharing experiences.

- Be willing to participate in the training, advising and providing information to our community.

- Try to be leaders in the field.

Fig. 5. Web page of RIMA Group.
Project Background

Although the function of tutorship of the RW has been carried out since 2001 in private, subsidized and public schools, since 2010 there has also been collaboration between different Educational Services dependent on the Department of Education of the Generalitat of Catalonia, spaces of information and resources for teachers, advisory activities in different schools interested in improving the organization and monitoring the research carried out there. The methodological basis focuses on the combined use of ICT and the most traditional systems of mentoring and creating materials that will be the starting point of the RW. Many of them are available online (Passegem pel nostre entorn, La Vinya to Maresme, among others. Fig 6).

Fig. 6. Previous activities shown to teachers as a methodological basis.

There are different schools interested in the methodology and which play a collaborative role. This collaboration focuses on classroom assessments that combine fieldwork with online tracking of the different work through the use of ICT, in addition to conducting extra-curricular activities (table 1). The starting point is the visualization of a series of materials online (see bibliography) by teachers, in addition to introductory lectures aimed both at teachers and students alike (fig. 7).
Table 1. List of schools that have collaborated or collaborate in this project (with its name, name of the activity and its start date).

<table>
<thead>
<tr>
<th>SCHOOL NAME</th>
<th>NAME OF THE ACTIVITY</th>
<th>START DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sec. d’Institut El Vern (Liçà de Vall)</td>
<td>Grup Extraescolar de Recerca Científica (<a href="http://recercacentificainselvern.blogspot.com.es">http://recercacentificainselvern.blogspot.com.es</a>)</td>
<td>2010-11</td>
</tr>
<tr>
<td>INS Carles Vallbona (Granollers)</td>
<td>Bojos per la Recerca (<a href="http://bojosperarecerca-jescarlesvallbona.blogspot.com.es">http://bojosperarecerca-jescarlesvallbona.blogspot.com.es</a>)</td>
<td>2012-13</td>
</tr>
<tr>
<td>INS Thalassa (Montgat)</td>
<td>Bojos per la Recerca (<a href="http://bojosperarecerca-isthalassa.blogspot.com.es">http://bojosperarecerca-isthalassa.blogspot.com.es</a>)</td>
<td>2014-15</td>
</tr>
<tr>
<td>INS Aiguaviva (Mollet del Vallès)</td>
<td>Bojos per la Recerca</td>
<td>2015-16</td>
</tr>
</tbody>
</table>
METHODOLOGY

Participants

A total of 81 middle and high school students have been directly involved in this program up until the 2014/15 academic year; taking part in the after-school activities proposed in the different participating schools (table 1). Eight other students have followed the method privately, alongside teachers who have also been tutors. In total, 61 RW have been tutored, on a range of subjects, from 6th grade to high school, using the same methodology. In addition, an unknown number of students and teachers of schools that collaborate use it or have used it. Currently, for academic year 2015-16, a new school has been added, as can be seen in Table 1.

In addition, there have been a series of lectures explaining the methodology proposed in another school (INS Manolo Hugué; fig. 8), aimed at students, the faculty, students of the master faculty of the University of Barcelona (fig 9a/b) and teachers in the context of the closure of the summer course ‘Experimentation in Science Classes’ of the Catalan Foundation for Research and Innovation (FCRI).
Context and roles

The program runs in the same way for both teachers and students alike. Firstly there is an introductory meeting (fig. 10) where the context of the activity and tutoring is presented. This emphasizes two important aspects: methodology and cooperation. For the former, it includes both the documentation used and delivered as a supporting dossier in which the introductory lecture slides are included, as well as the various documents that allow the work to be carried on...
out. For the second aspect, it emphasises the importance of students and teachers working together in order to complete the work successfully.

Fig. 10. Introductory conference in the INS Aiguaviva (Mollet del Vallès, Barcelona).

The student is therefore the protagonist in the idealisation and realisation of the RW. The idea that the students presents to the tutor teacher is assessed through an initial meeting, and if the resolution is positive, the procedure can continue. If there is any doubt raised, subsequent meetings will be held to achieve this first objective.

The mission of the tutor is to guide students to success in their work. The tutor contributes towards the maturing of the idea, but without influencing substantial changes that may happen, since these must be proposed by the students. The meetings held throughout the research process are essential to maintain the cohesive and collaborative nature of the proposed methodology.

Finally, the contribution of external institutions, such as universities or companies, is essential for creating an excellent piece of work. The proposed method combines work in the school with the voluntary submission of the different stages through which the RW passes. The idea is that an external evaluation of the work should take place, in addition to the tutor’s evaluation. A second objective is, in parallel, to motivate students.

**Instruments and Procedures**

The main reason why the use of new technologies (ICT) for monitoring and evaluation of the RW in schools was implemented was the difficulty of using them solely in person. In addition, it allowed the process to adapt better to the temporary needs of students and teachers.
Instruments

In general, a complex infrastructure to implement the proposed methodology (fig. 11) is not required.

Fig. 11. Resources needed to carry out the proposed methodology.

In addition to material, space and human resources, computing resources are important. Most of them focus on the Google environment. This platform has a number of free services that allow you to track work:

- Gmail: it is essential to have a Gmail email to contact and exchange content with the tutor / to work and organize contacts that can be achieved throughout the research process.

- Drive: create, edit and store a variety of documents that will be necessary for development. Currently the most used are Google Docs (text editor), Google Presentations (to create the poster and oral presentation), Google Spreadsheets (use focuses on statistical studies and data collection), Google Forms (which complement spreadsheets), and Google Drawings (a small image editor).

- Google Calendar: for temporary organization of the process that allows the RW to be carried out.

- Other presentations: focusing on Blogger and Google Sites applications that create blogs (in Blogger) or websites (Google Sites) about the research work in question.

You can also use other free apps like Dropbox for storing documents and later sharing them.

Finally, in the event that the school has corporate email and is signed up to the platform Google Apps for Education (free registration), these materials work well, importantly, with the Google Classroom platform. This was created by the Google Company at the end of the
academic year 2013-14 as an experimental in order to gather most of the utilities described earlier and allow virtual classes to be set up.

In all cases, the set of specified applications continues to evolve and provide features that allow students to work in a more dynamic way. In short, the operating diagram can be observed in Figure 12.

Fig 12. Scheme of the different steps to carry out the RW with the proposed methodology.

Procedures

Once the administrator has created the corporate email accounts and the centre signed up to Google Apps for Education, a virtual class on Google Classroom can be prepared. This environment, as a content management system, allows most Google applications to be merged in order to simplify the creation, distribution and classification of tasks with the mindset of a paperless environment.

In the role of teacher, the class is created once it enters Google Classroom (fig. 13) through the corresponding link located next to the user name on the top right of your Gmail window (www.classroom.google.com). To do this, you must select that role when you enter Google Classroom for the first time. Otherwise, students can only enter the class created by the teacher.

Fig. 13. Main menu of Google Classroom suite.
The Google Classroom Suite has three major features: Activities Panel, Students and Information (fig. 14). To date, in the Activities Panel you can create two major types of activities - questions and tasks - which can be defined, awarded deadlines and evaluated. In the Students section, students can be invited to join the class or contact each other. Finally, in Information, you can attach supporting materials for the class (documents, videos, etc.), which will be public for the duration of the course (fig. 15).

Fig. 14. Examples of classes.

Fig. 15. Some of the features of Google Classroom.

Once the class was created, students who already had their corporate email were invited to join.

The timing of the proposed methodology lasts just over a school year. It consists of six phases divided throughout depending on the event at which students can present (fig. 16A / B). For each one there are guideline documents attached (fig. 17). The phases, in brief, are:
- F0: three processes are included: brainstorming, defining the subject and organising folders within the Drive. Once the topic has been defined and jointly approved (student and tutor), the different folders to which documents will be added and where work will be stored are organised. Supporting documentation was unique: D01. GENERAL IDEAS. Finally, a first title was proposed. All of this was carried out over September and October.

- F1a: following the rules established by Exporecerca Jove, an international research fair that encourages young researchers from 12 to 25 years old to present their work, a 3-4 page report was developed in this second phase, following the scientific method. Finally, a summary of six lines was written as well as six keywords separated by commas. Two types of documents were worked on for this, D02. REPORT and D03. SUMMARY, divided into two phases: scheduled and final. This second phase was completed in December.

- F1b: Continuing the development work, while awaiting the resolution of the research selected by the Exporecerca Jove organization, the students developed the poster and prepared an oral presentation, regardless of whether they had been selected or not. Only one document was provided here: D04. POSTER. The deadline usually varies each year, but takes place during the months of March or April.

- F2: the work continued once the Exporecerca Jove fair finished. In this most of the work is carried out until there are around 20-30 pages, based on the previous report. What stands out among the most important developments are the division of the report into two blocks - theoretical and practical/experimental - as well as the students’ creation of a series of teaching materials based on their studies (materials as much for them as much as for the other students who are correcting the work). In this sense, the objective is that the study's authors change their role and become teachers. The ultimate goal was that students would present voluntarily at a new international fair, Ciencia en Acción (Science on Stage Spain), at which teaching staff and students exchange experiences and ideas. Two new documents were developed: D05. MONITORING OF THE THEORETICAL PART and D06. MONITORING OF PRACTICE / EXPERIMENTAL PART. This was completed during May.

- F3: is the last phase of the first school year. The aim was to complete the RW in around 70-80 pages, developed from the content of the previous phase. A supplement was also produced, following the rules of a number of awards among which were the Catalan Premis Recerca Jove (Barcelone), at a regional level, and the Certamen de Jóvenes Investigadores (Mollina, Málaga), at a national level. Lastly, we requested a final assessment of students and teachers in relation to the methodology followed; something that has allowed us to develop it further over the years.

- F4: Finally, in the second school year, in December students presented at a national event called Encuentro de Jóvenes Investigadores (Salamanca). The presentation, voluntary as always, was made from updating the report of the F1a and preparing a slide show (D06. PRESENTATION) also performed in the F1b. Should a student be selected, given that it is a presentation, training sessions on public speaking were provided.
Fig. 16a. Timing of the proposal methodology.

![Timing of External Evaluations Diagram]

Fig. 16b. Timing and associated rules.

<table>
<thead>
<tr>
<th>PHASE</th>
<th>MEAN ACTIVITIES</th>
<th>TIME LIMIT</th>
<th>RULES</th>
</tr>
</thead>
<tbody>
<tr>
<td>F0</td>
<td>IDEA / TITLE</td>
<td>OCTOBER</td>
<td>-</td>
</tr>
<tr>
<td>F1a</td>
<td>ABSTRACT / REPORT</td>
<td>JANUARY</td>
<td>Exporecerc Jove (<a href="http://www.magmarecerc.org">www.magmarecerc.org</a>)</td>
</tr>
<tr>
<td>F1b</td>
<td>POSTER / PRESENTATION</td>
<td>FEBRUARY / MARS</td>
<td>Exporecerc Jove (<a href="http://www.magmarecerc.org">www.magmarecerc.org</a>)</td>
</tr>
<tr>
<td>F2</td>
<td>WORK DEVELOPMENT / DIDACTIC ACTIVITIES</td>
<td>APRIL / MAY</td>
<td>Ciencia en Acción (<a href="http://www.cienciaenaccion.org">www.cienciaenaccion.org</a>)</td>
</tr>
</tbody>
</table>
| F3    | END OF WORK     | MAY / JUNE | Premis Recerca Jove (http://193.145.216.14/)  
| F4    | ORAL PRESENTATION | OCTOBER / DECEMBER | Encuentro de Jóvenes Investigadores (http://inice.es/event/31-encuentro-de-jovenes-investigadores/) |
RESULTS

In order to reach the stated objectives, the proposed methodology can be divided into three stages (Table 2), each with its own results:

- Initial organization: the student organised all documents requested according to the tasks of the virtual class into folders.

- Development and monitoring of work: from the delivery of the different activities and comments that were added to the documents, the work was developed.

- Presenting at events: although it is a voluntary action, the fact that studies are selected impacts their quality. These presentations are considered as external valuations and the opportunity to contacting other people and/or entities, as well as expand the studies’ content.

Table 2. Phases of development of RW.
Until June 2015, we obtained results from a total of four out of five centres, since the INS Aiguaviva (Mollet del Vallès, Barcelone) began working this year (see table 1). The results show that the improvement in the process of implementation, monitoring and evaluation of the RW has been progressive over the time taken to implement the methodology in the different centres. This improvement can be summarized in three major items:

- Rating: generally positive by students, affecting their learning, organizational skills and increased motivation, often caused by working on a subject that they really like, as well as participating in some of the proposed events.

- Academic: the average grade of the papers presented from monitoring by the proposed methodology was more than 8 out of 10. Given that, in the case of high school, IT content is 10% of the final grade, these high marks favours students’ entry into their chosen career.

- Extracurricular: the number of papers presented at external events increased, which was highly rated. In the case of the high school research, some students are already thinking about new topics for future editions. In general, taking part in research leads to increased motivation.

In general, and throughout this time, the number of studies that have followed the methodology has grown. In some cases, such as the Secció d’Institut El Vern (Lliçà de Vall, Barcelona) or the INS Aiguaviva (Mollet del Vallès, Barcelona), they have implemented it in monitoring those works that do not participate in extracurricular activities. The other schools have continued with the traditional monitoring system.

Although the percentage is not a majority in relation to the total work done in each school, it has been observed that for those who have followed the methodology, their quality of RW is higher than those who have presented in any of the events listed above (tables 3-6). In addition, many of them have achieved some recognition.

Table 3. Results for Secció d’Institut El Vern (Lliçà de Vall, Barcelona).

<table>
<thead>
<tr>
<th>SCHOOL YEAR</th>
<th>NUMBER OF PARTICIPANTS</th>
<th>NUMBER OF PROJECTS</th>
<th>AWARDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011-12*</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>2012-13</td>
<td>10</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>2013-14</td>
<td>16</td>
<td>9</td>
<td>7</td>
</tr>
<tr>
<td>2014-15</td>
<td>21</td>
<td>10</td>
<td>11</td>
</tr>
</tbody>
</table>

* Pilot test
Table 4. Results for INS d’Argentona (Argentona, Barcelona).

<table>
<thead>
<tr>
<th>SCHOOL YEAR</th>
<th>NUMBER OF PARTICIPANTS</th>
<th>NUMBER OF PROJECTS</th>
<th>AWARDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011-12</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2012-13</td>
<td>7</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>2013-14</td>
<td>6</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>2014-15</td>
<td>13</td>
<td>6</td>
<td>9</td>
</tr>
</tbody>
</table>

Table 5. Results for INS Carles Vallbona (Granollers, Barcelona).

<table>
<thead>
<tr>
<th>SCHOOL YEAR</th>
<th>NUMBER OF PARTICIPANTS</th>
<th>NUMBER OF PROJECTS</th>
<th>AWARDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011-12</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2012-13*</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>2013-14</td>
<td>7</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>2014-15</td>
<td>6</td>
<td>5</td>
<td>3</td>
</tr>
</tbody>
</table>

* Pilot test

Table 6. Results for INS Thalassa (Montgat, Barcelona).

<table>
<thead>
<tr>
<th>SCHOOL YEAR</th>
<th>NUMBER OF PARTICIPANTS</th>
<th>NUMBER OF PROJECTS</th>
<th>AWARDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011-12</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2012-13</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2013-14</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2014-15</td>
<td>12</td>
<td>9</td>
<td>7</td>
</tr>
</tbody>
</table>

**DISCUSSION AND CONTRIBUTIONS**

From the point of view of the curriculum, the research is carried out only partially, only in the later school years (fourth year of Secondary School and Baccalaureate). That is why it should be extended throughout the compulsory education system (first to third year of Secondary School). The proposed methodology, which is the same for all levels, makes this easy to apply.

ICT skills are not a problem for students of this age, although they can be for teachers, who are less used to them. Students had a number of shared documents that served as a reference for managing their RW. This allowed them to have some freedom to organize, under the supervision of a tutor, and use the calendar and the activities proposed in the Google Classroom application.
The use of ICT has allowed this methodology, monitoring and orientation of RW, to achieve a greater efficiency than the classic pen and paper. The dynamism that remote systems allow makes the quality of work increase and enables students to be evaluated by people outside the school.

It also indicates that this methodology will allow students to have a better integration in carrying out their research as they use RW systems more familiar to them, in comparison with other more traditional systems which still dominate in today's classrooms. This increases the students’ motivation while the work is being carried out, as well as the scope of potential media (media appearance; fig. 18).

Fig. 18. Youth research and media.

Although there were existent guidelines on using traditional Google environments, the introduction of the Google Classroom suite improved the operation and development of the work, since its use and internal mechanisms of organization allowed their inclusion. Students of this age have no problem acquiring the skills in the world of new technologies, although this tends not to be the case for teachers, who have less experience in this area.

The students had a number of shared documents that served as a reference for the implementation of their RW. This gave them a certain organizational freedom, under the supervision of a tutor and in giving some presentations as defined in the calendar. In addition, the fact that the tools used comprise collaborative characteristics favours intra-group communication.
The quality of the results achieved varied during this time, depending on the characteristics of each group, but has allowed some of them to be selected at different national and international events; something that subsequently prompted a clear increase in quality.

Finally, it can be considered that the quality of school research is not at odds with being carried out at universities or research centres. Having a good methodological basis, as is intended with this system, helps students who want to continue, helping them to adapt to future spaces (fig. 19). Collaboration between institutions such as schools or colleges with universities’ working and innovation groups is essential to bring professional research closer to students. Thus, we strongly encourage other teachers to develop research projects in the same line.

Fig. 19. Mean conclusions and future proposals.

REFERENCES


Servei Educatiu del Baix Maresme. La vinya al Maresme. https://sites.google.com/site/lavinyaalmaresme/


AUTHOR NOTE

I would like to thank the many people and organisations that have allowed me to develop the methodology explained in this article over the years. In particular, the various secondary schools (See Table 3), management teams, teachers, students and families involved. We also thank the Catalan Society of Technology for their support. Also, we would like to thank Julie Sheridan for editing and proofreading this document. Finally, the organisation of the different events (see fig. 16b) that have positively assessed the methodology and recognized it with various awards to both students and their teacher mentors. Antoni Hernández-Fernández work is supported by 2014SGR 890 (MACDA) of AGAUR (Generalitat de Catalunya) and TIN2014-57226-P of MINECO (Ministerio de Economía y Competitividad del Gobierno de España) projects.

AUTHOR BIOGRAPHY

Ivan Nadal is a high school teacher (Biology, Technology and Mathematics) in the INS Thalassa (Montgat, Barcelona). He is also secretary of the Catalan Society of Technology (SCT-IEC) as well as an ICT trainer in the Servei Educatiu del Baix Maresme (Alella, Barcelona). He coordinates and advises numerous research papers in collaborating schools. His email is ivan.nadal@insthalassa.cat

Antoni Hernández-Fernández is linguist, physicist and PhD in Cognitive Science. Now is teaching in vocational training (Escola d’Art i Disseny de Terrassa, Barcelona) and in Institut de Ciencies de l’Educació (ICE-UPC). He coordinates GIDF-RIMA group and develops his research in LARCA group (UPC). His email is antonio.hernandez@upc.edu
Frederic Luque is Teacher of electrotechnical and automatic systems and Full-Tenured Professor of Technology and Postgraduate in Technology teacher's at UPC, Master of e-learning (education and ICT) at UOC, Master of Smart Cities at UdG (Girona). He was a researcher in DIM group at UAB and member of the High-Technology ICE University of Girona. Ex-president of the Catalan Society of Technology (SCT-IEC) and current Vice President. He has been Research Tutor for many years. His mail is: fede.luque@gmail.com

Núria Salán Ballesteros has a Ph.D. in Materials Science and Metallurgical Engineering from UPC-BarcelonaTECH, and a Metallurgical (Chemistry) Degree. As professor in the Department of Materials Science and Metallurgical Engineering, since 1992, she teaches several Degree and Master subjects in School of Industrial, Aeronautic & Audiovisual Engineering of Terrassa. She has been the Academic Coordinator of RIMA Project (Research and Innovation in Learning Methodologies) since 2007, in which are involved 18 Communities of Practice related to Skills and Learning Methodologies in TECH environments. She is also leading a girls mentoring program (M2m) as a pioneer experience in TECH universities and since early 2016 is the President of Catalan Society of Technology. Her email is: nuria.salang-upc.edu
OBSTACLES AND OPPORTUNITIES AT LEARNING HOW TO INQUIRE AND MODEL WITH THE Gowin V DIAGRAM IN SCIENCE TEACHERS IN INITIAL TRAINING

Edith Herrera
University of Bio Bio . Chile
Mercè Izquierdo
Autonomus University of Barcelona .Spain

ABSTRACT

In this preliminary study, the process is described by which future professors of Natural Sciences of the UBB-Chile experience an innovation in investigation and modeling using Gowin’s Uve diagram adapted to school science. The study considered the learning of the methodology, after which five cases were monitored to analyze the construction and organization of the relationships between thinking, doing, and communicating in the resolution of a problem using the V diagram. Reflections were made on the obstacles to this method, and an assessment of the practical meaning given to the innovation was given. The preliminary results are indicative of the difficulties in comprehension used to organize theoretical and practical knowledge while resolving problems with the V diagram. The reflection on this action gives an indication of the complexity generated by the changes in learning and the key role of these future science educators in making new educational proposals to their students in the classroom.
OBSTACLES AND OPPORTUNITIES AT LEARNING HOW TO INQUIRE AND MODEL WITH THE Gowin V DIAGRAM IN SCIENCE TEACHERS IN INITIAL TRAINING

Introduction

As someone who trains science teachers, I share the uncertainties of student teachers (ST) during their first time entering the classroom, when they find themselves faced with the challenge of making sense of their previous concepts and theoretical, practical, evaluative and attitudinal knowledge, while also having to meet the demands of real-life teaching contexts they are immersed in at schools.

Mellado (2003) indicates that when teachers in training begin their university phase, both elementary and high school training has left them with a structure of “beliefs” that is already formed with regard to science teaching, based on the traditional model, which manifests itself in the idea of “teaching the same way they were taught”.

Because of this, the initial training is constituted around a key factor for the “change” in teaching style for sciences, with a focus on the attainment of a sufficient basic scientific literacy of students in the classroom. In this sense, we propose the investigation and modeling using the V diagram as a learning strategy to generate a reflection axis for student teachers (ST), beginning with the professor responsible for the training program (TP) and continued by monitoring in the practice schools with classroom guide teachers (GT).

To carry out this process, the ST learned to use the didactic elements that constitute the V diagram in a group format, to then resolve the proposed problems/phenomena and reflect on their obstacles and opportunities. The first results obtained indicate the difficulties of the organization of theoretical knowledge (knowing) and practical knowledge (doing) to resolve the problems in the V diagram. In their reflections, they express the dilemmas generated with the ST, learning about this innovation to make use of an approach different from more traditional ones, once their training is complete.

Theoretical framework

The focus on school science for investigation and modeling

There is an abundance of investigations available related to what may possibly be effective in the initial training of teachers. As is recognized in NRC (2011), some of the lines of investigation refer to the study of beliefs, conceptions, or difficulties that future teachers face (Fernández et al., 2002), or in the essential characteristics (Gil, 1991), questioning (Mellado, 1996), knowledge (Mondelo et al., 1998), and competences that must be developed for an appropriate initial training for science teachers (Schibeci y Hickey, 2000; Loughran, 2007). However, little is known about what is really offered regarding design, concrete content, and how to make these elements work with the courses included for initial teacher training in DCE (Oliva, 2005).
We locate this, as indicated above in the design of a didactic proposal for initial training and its subsequent monitoring in the practice schools, within the framework of school science training, which is to be investigated and modeled (Izquierdo, 1999 y Caamaño, 2011).

**The proposal to investigate and model with the V diagram**

The approach that we propose as an innovation in science classes is to carry out an investigation centered on modeling, using the V diagram as a support instrument that sustains school science. For that we have made a connection between the inquiry, modeling and learning cycle (Jorba y Sanmartí, 1994) of our didactic proposal in class. As shown in Figure 1.

![Fig 1. Didactic Design of Classroom in to Inquire and Model with the Gowin V Diagram (authors, 2014)](image)

This is characterized by integrating the modeling into the beginning of the class, selecting a phenomenon or fact that is found to be interesting about a key idea (Izquierdo, 1999 y Caamaño, 2011), in such a way that the students are free to explore and make clear their prior ideas about the phenomenon they observe, in order to arrive at the investigation question, which is the most appropriate for a solution strategy (Izquierdo, 1995).

The V diagram, adapted to school science for investigators (2014), is used to respond to the investigation question and for the construction of the investigation design stemming from the proposed hypothesis. This heuristic instrument facilitates the relationship between ideas, scientific concepts, and theoretical models (the *thinking side* of the V diagram) with the organization of the results (the *doing side*) to finally *communicate* (center of the V diagram) a conclusion using scientific arguments.
In this training proposal, we have highlighted the idea of the teacher as an investigator from reflexive practice and the dilemmas that this generates, when the science ST must assume his/her role as an educator, for an approach that differs from traditional ones.

The Uve diagram as a scaffolding for school science

The current didactic paradigms insist on the need for students to participate actively in the construction of their knowledge, which allows us to assess the usefulness of Gowin’s Uve in education from new perspectives (1981). The V diagram, as a didactic instrument, was adapted prior to the questioning mode used by teacher’s trainers (2012) and was successfully used to promote investigative activity in Primary and Secondary school students. The V diagram, adapted (2014) to school sciences as shown in figure 2, has been assessed by teachers who are experts in the natural sciences.

Figure 2. Adaptation of the V diagram in school sciences for primary and secondary school students

We believe that this modified Uve serves as a support to sustain school science and will help students to reason with the facts they are conscious of, in relation to a given end (the investigable question), seeking to make their reason useful to meaningfully connect one group of facts with others, ideas with others and facts with ideas, and among themselves (Izquierdo, 1995).

Methodology

The methodology used in this investigation can be classified as a multiple case study (Stake, 1998). The phase that is presented corresponds to a descriptive study that seeks to characterize the learning obstacles and opportunities of five ST in their fourth year of Science Pedagogy,
specializing in Biology, Physics, or Chemistry, at the UBB-Chile, where (1) phenomena and (2) problems are analyzed through investigation and modeling with the V diagram during the Education and Evaluation Workshop course. The selection of this sample was conducted on the basis of convenience, since only the guiding professors of these five ST consented to participating in the monitoring during their pedagogic practice.

(4) Evaluation sessions were held with expert professors in the natural sciences fields, two for primary schooling and one for secondary schooling, for the validation of the instruments used in the study: the V diagram, the evaluation rubric, and learning activities (problems). After the process of intervention done with this innovation, the evaluators themselves participated in the revision of the V diagrams completed by the ST.

The results obtained by the future teachers in each didactic component of the diagram was expressed in the level of accomplishment (1 needs improvement, 2 good, or 3 excellent) according to the rubric that had already been validated. The values obtained were averaged, to deliver the representative level in reference to the understanding on the thinking, doing, and communicating sides of the V diagram with respect to the problem proposed.

At the end of each class, the ST recorded their reflections in the digital diary (Adecca Platform, UBB). The data of these reflections were transcribed and analyzed using the ATLASTI.v.5.2 program, applying the principles of grounded theory, in an open coding process, reviewed by two researchers to check the following emergent categories: learning obstacles, causes, usefulness in professional performance. Finally, the results obtained with both tools were triangulated in these categories of analysis.

Results

The selection of the learning activities or problems to be solved by the science ST implied the management of conceptual knowledge that was assumed as known after four years of training. Phenomenon 1: Which of these moves which: Soap, pepper, water? corresponds to an open investigation activity, after the ST observed a demonstration after placing a bar of soap in water, whose surface was covered with ground pepper. This activity was focused on thinking, with the goal of exploring and interpreting their conceptual models using drawings or representative schema. Problem 2: How can you help Teresa? prompted the ST to assume a research role, to construct their own experimental design with an emphasis on doing (TIMMS question S032562, 2011). Problem 3 was approached via a story about smoking tobacco, taken from the released question 24.3 PISA Assessments (OECD, 2009): nicotine patches, with the goal of understanding their integration in thinking and doing in order to communicate a conclusion with scientific arguments.

In the following section, we will present the results obtained by the case studies, grouped according to the level of performance obtained in each problem on the thinking, doing, and communicating sides of the V diagram, and then reflections will be shown referring to the learning obstacles and opportunities with the use of the strategy in their professional careers.
1. **Regarding the problem/phenomena performance obtained** with the proposal by ST.

Graphic 1: Level of performance obtained by Beginning Teachers in *thinking, doing, and communicating* from the V diagram in solving problems.

The results indicate that the highest level of accomplishment was obtained in the *doing* area (right side) of the V diagram, which include variables in the *thinking* area (left side) and *communicating arguments* area (center of diagram). The level of performance obtained in these activities by the ST fluctuates between *needs improvement* (1) and *good level* (2). In a comparison between the performance of the ST, cases 4 and 5 indicate a sustainable improvement over time, in cases 2 and 3 it is variable, and in case 1 it stays constant.

2. **Regarding the comprehension of the problem/phenomenon** with the proposal by ST

We have chosen the activity of learning, in which ST presented a regular level of performance with respect to phenomenon 1. In tables 1 and 2, two ST are presented as an example, case 3 which presents a comprehension of the Phenomenon at a *good level*, and case 5 which presents a *needs improvement level*, to characterize their learning obstacles in thinking, doing, and communicating.
Table 1: Comprehension of beginning teacher learning activity with V diagram for a *good performance*

<table>
<thead>
<tr>
<th>Case 3: Good achievement level</th>
<th>Thinking</th>
<th>Doing</th>
<th>Communicating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question formulated</td>
<td>Hypothesis proposed</td>
<td>Design of explanation model</td>
<td>Conclusion with arguments</td>
</tr>
<tr>
<td>Why does the pepper move out to the edges when soap is added?</td>
<td>The pepper moves out to the edges, since the soap breaks the <em>surface tension of the water.</em></td>
<td>Since it is a fat, the soap is non-polar, but it is a compound that also possesses a polar extreme as opposed to water which is only polar. Upon placing it in water it breaks the surface tension of its molecules, which means the cohesive force will be greater at the edges where the soap has not reached yet, making the pepper travel toward them.</td>
<td></td>
</tr>
</tbody>
</table>

Case 3 creates the investigation question and its hypotheses attributing the cause of the phenomenon observed to the soap and representing it in its model with an explanation in abstract language that relates to chemistry and microscopic elements (Galagovsky, 2014). In its conclusion, it relates the scientific concepts to argue for causes, while still lacking clarity in its composition.

Table 2: Comprehension of initial professor learning activity with V diagram for a *needs improvement performance*

<table>
<thead>
<tr>
<th>Case 5: accomplishment level <em>needs improvement</em></th>
<th>Thinking</th>
<th>Doing</th>
<th>Communication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question formulated</td>
<td>Hypothesis proposed</td>
<td>Design of explanation model</td>
<td>Conclusion with arguments</td>
</tr>
<tr>
<td>Why does the soap repel the pepper when it is submerged in water?</td>
<td>When the soap is submerged in the water, the <em>polarity of the soap</em> breaks the surface tension and the pepper is repelled</td>
<td>The hypothesis is proven true because the soap is non-polar; this allows it to dissolve in the water, and its particles are able to break the surface tension of the water, and the pepper is repelled.</td>
<td></td>
</tr>
</tbody>
</table>
Case 5 creates the investigation question and its hypothesis, attributing the cause of the observed phenomenon to the soap. However, the representation of its explanation model is given at a macroscopic and concrete level (Galagovsky, 2014). The conclusion shows conceptual errors in relating the non-polar nature of the soap with its dissolution in water.

3. **Regarding the learning obstacles for the** educational proposal by ST
The common obstacles in each of the cases analyzed during the investigation and modeling of a problem with a V diagram are detected in the *thinking side*, the area in which the ST are asked to relate their previous ideas, concepts, theoretical models and use their scientific thinking abilities (identifying variables, formulating hypotheses, theoretical modeling), because since they themselves indicate in their reflections that they are accustomed to memorizing concepts and laboratories, the process is reduced to following the steps of a “recipe”.

4. Regarding the opportunities in professional performance after learning to investigate and model with V diagrams by the ST.

The reflections of the ST on the opportunities given by the educational strategy were categorized in a conceptual network, based on each of the sides of the V diagram.
Beginning teachers on the *thinking* side of the V diagram positively assess the exploration of prior ideas, learning how to solve problems and awakening scientific curiosity. The *doing* side of the V diagram allows them to organize concepts and guide the design of their investigations, in order to develop the scientific investigation abilities (SIA) of their students.

During the development of activities using the proposed methodology, students teachers detected limitations were detected in terms of establishing conceptual relationships, explaining ideas in models and writing explanations using scientific arguments. In addition, they communicated their lines of questioning related to the training they received, given the lack of early practices in the classroom and with traditional classes focused on the concepts.

**Discussion**

The learning process experienced by the beginning science teachers using the V diagram as a support to investigate a phenomenon and contrast its explanation models was complex, as was reflected by the scarce levels of achievement obtained. This is because investigative activities
require teachers to possess a deep and well-structured knowledge base of the contents to be taught (Gess-Newsome 1999).

In the learning activities for this proposal, it is explicitly recognized that the students possess previously held ideas regarding the concepts that affect the questions they ask, and how these are interpreted to obtain empirical data (Driver et al. 1994). By this measure, distinct levels of understanding are revealed in their explanations of the phenomena/problems, in relating certain facts with others, ideas with others, and facts with ideas, among themselves. (Izquierdo, 1995).

Because of this, the training of future teachers requires incorporating authentic learning opportunities, which allow for reflection and questioning of their beliefs or teaching models, identifying their own obstacles. The ST recognized difficulties in forming hypotheses and creating investigation questions and questioned themselves, as in case 5, in terms of their future professional performance, “how am I going to be a science teacher, where my goal is to develop curiosity in children, experiences for children, if I don’t have scientific abilities?” Additionally, case 3 adds with respect to her experience as a complex process and remarks that “I’m not accustomed to thinking this way, in the beginning it was very difficult for me to understand variables, make hypotheses, but with practice these difficult areas improved.” Case 2, by contrast, indicated the usefulness as a classroom educational strategy the following: “you have many ideas and the diagram helps you to organize these concepts, the important ones to teach in the class and it’s useful for creating problems in the class and helping children to love science.”

Conclusions

The results obtained from our study indicate that, upon incorporating this training strategy, future teachers demonstrate a better performance in the procedural relationship with Doing, more so than in thinking and communicating. The case studies showed the complexity of learning in research and modeling with the V diagram. However, they could visualize not only the product (knowledge), but also, and most importantly, how to make the process (procedure); assuming an active role and taking responsibility of how they were teaching it, upon reflecting critically on their performance. They also assigned a “value” to the meaning of their learning, to use it at a later time with their students in the classroom.

We consider the proposed innovation to be a starting point in the “change” to be made to the initial training of science teachers, changing their “beliefs” about how to teach science. This is something that we were unable to affirm in this study, it has only been possible to generate lines of questioning and dilemmas with the traditional model in its training history from the reflections given. This gives teachers the desire to “rethink” how to teach school science, by bringing them this innovation at this time with their students during their practice, which we shall observe in our accompaniment of the following phase of the investigation currently in progress.

References


**Author Biography**

Edith Herrera is assistant professor in the Faculty of Education and Humanities at Bio Bio University, Chile (UBB-Chile). Herrera is currently performing an investigation in the education of experimental sciences and teacher training. Email eherrera@ubiobio.cl

**Acknowledgements**

This work is funded by PHD scholarship program **BECAS-CHILE, CONICYT**.

This work has been partially funded by the grant 2014SGR1492 from the AGAUR of the Catalan Government and the grant EDU2012-38022-CO2-02 from the Spanish Ministry of Economy and Competitivity.
TEACHER TRAINING IN THE USE OF DIGITAL TABLETS TO PROMOTE INCLUSION AND PARTICIPATION OF ALL STUDENTS

Maria Macià Golobardes
Generalitat of Catalonia, Ministry of Education

ABSTRACT

The inclusion of all students in mainstream schools is a priority for the Catalan Ministry of Education. For this reason, teacher training is fostered in several formats with the aim of spreading the knowledge of Universal design for learning (UDL) and develop teachers’ skills in the use of digital tools to respond to students’ diverse learning needs.

One of the actions carried out in this sense is a blended working group for teachers and other support professionals to advance in the use of digital tablets for promoting the inclusion of all students. This group is composed by 40 educational professionals who are trained in the use of tablets and later can borrow some devices to develop original experiences in their classroom. Once the practice has been developed in the classroom, the participants in the group meet in order to share the experiences. Finally, the practices developed are published in a collective blog (http://blocs.xtec.cat/mobilsperlainclusio) in order to share the accumulated knowledge with all the community. During the last three courses more than 30 experiences have been developed and disseminated. Surveys to the course participants, and qualitative and quantitative analysis of the teaching evidences developed by the teachers and professionals have provided us with valuable data to understand how teachers can advance in the knowledge of digital inclusion and professional development.

The results of the study have inspired a set of guidelines to develop courses which can foster the knowledge of methodologies and resources to successfully promote students’ learning and participation, reducing environment barriers and promoting opportunities for success.
TEACHER TRAINING IN THE USE OF DIGITAL TABLETS TO PROMOTE INCLUSION AND PARTICIPATION OF ALL STUDENTS

INTRODUCTION

The inclusion of all students in «a school for everybody» is a priority for the Catalan Ministry of Education (Generalitat de Catalunya, 2015). The principles that define «a school for everybody» are: i) the recognition of diversity as a universal fact; ii) the development of an inclusive educational system to attend all the students; iii) the personalization of learning for fostering all the students’ abilities; iv) the recognition of the right of all students to have an equitable education with expectations of success; v) the participation and commitment of all the students in their own learning processes; and vi) the teacher training to foster shared knowledge and projects. This last point is key for developing innovative practices in which the diversity of the students is recognized, the abilities are nurtured through the personalization of the learning environments and active participation of all students is promoted. To design more inclusive practices that include personalization and active participation teachers can use the Universal Design of Learning (CAST, 2011) as a guide to develop the curriculum.

The Universal Design of Learning (UDL from now) is a series of guidelines for the design of the curriculum elements (goals, methods, materials and assessment) that fit all the learners and reduce the barriers (CAST, 2011). The UDL guidelines address three main principles: i) provide multiple means of representation; ii) provide multiple means of action and expression and iii) provide multiple means of engagement. These three principles include guidelines to develop more open and flexible educational practices which can be enhanced through the use of technology.

The use of technology in the scholar practices furthers the personalization and participation processes, particularly in the case of mobile devices (UNESCO, 2013). The use of mobile phones and digital tablets can expand and enrich the learning environments, as well as, offer opportunities to access content and share information even in areas where resources are scarce.

The UDL guidelines and the use of digital tablets are the two main axes present in the teacher training object of this research.

Description of the research context

Participants in this research engage in a teacher training activity which is organized by the Department of Education in Catalonia. The training has been organized as a blended working group in which teachers have to apply the information and resources provided to create educational practices which involved the use of digital tablets. Once the practices are implemented and assessed, the teachers have to share them by publishing a brief description in a blog (http://blocs.xtec.cat/mobilsperlainclusio) and also by disseminating them in teacher seminars.

This group started in 2013 and since then some teachers have left the group and many others have joined. Every year the number of participants increases and in 2016 the group has doubled the
initial number of participants. All the participants are teachers in primary and secondary schools, teachers in special education needs (SEN) schools or support professionals as psychologists, speech therapists, blindness specialists (see Table 1).

Table 1. Number of participants in the training by profile

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary teacher</td>
<td>1</td>
<td>14</td>
<td>15</td>
</tr>
<tr>
<td>Secondary teacher</td>
<td>5</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>SEN teacher</td>
<td>5</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td>Psychologist, pedagogue</td>
<td>3</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Speech therapist</td>
<td>3</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Blindness specialist</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Trainer</td>
<td>3</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Other professionals</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>21</strong></td>
<td><strong>39</strong></td>
<td><strong>42</strong></td>
</tr>
</tbody>
</table>

When teachers enroll to the group, they compromise of attending the three face-to-face meetings held along the year course, developing a practice which incorporates the use of digital tablets to foster inclusion, writing a report for blog publication and disseminating the experience in other teacher seminars. Since the year 2014 there are 50 digital tablets available, provided by the mSchools program (http://xtec.gencat.cat/ca/projectes/mschools/), which can be borrowed by the participants. Participants must design and send the educational practice which they plan to develop before borrowing the tablets. Once the experience is validated they can have a set of 10 or 15 tablets during a period of a month. After the experience has been applied in the classroom, the teachers have to write a report of the experience and share it with the other members of the group through the blog and also have to explain it in other teacher seminars in order to disseminate the work.

**Research questions**

Research questions for this study are the following:

Is a blended working group a good strategy for teacher training in the use of digital tablets for inclusion?

Which kind of practices do teachers develop when they are trained in the use of digital tablets? Do these practices foster inclusion?
METHODOLOGY AND METHODS

The methodology used is qualitative consisting in participatory inquiry as well as action research. The researcher is part of the leading group that trains the teachers in the use of digital tablets for fostering the inclusion of all the students.

Data sources

Data sources used in this study are the questionnaires that teachers answered after participation in the group, the interactions held in a virtual learning environment (Moodle) and also the experiences shared in the blog http://blocs.xtec.cat/mobilsperlainclusio.

Data collection and analysis

Data has been collected directly form teachers at the end of every course in the case of the seminars and also from the posts published in the website of the group. The questionnaires have been analyzed through descriptive statistics and through coding and categorization of the open answers. The experiences published in the blog have also been analyzed through coding and categorization.

RESULTS

A blended working group as a teacher training strategy

Participation rate in the group (see Table 1) indicates that the interest in the group work increases every year as the participation has increased a 100% in three years. All the teachers working in Catalan schools can join every September in the group and many of them come because other teachers recommended them to join.

The questionnaires of the participants indicate that the participation in the working group leads to changes in the practices of the teachers. The questionnaire of the 2013 -2014 year was answered by 9 people (from a total of 21). All 9 people considered that they had introduced some kind of change in their classroom: 6 of them introduced methodological changes, 8 introduced new activities, 8 introduced new materials and 1 introduced changes in the classroom organization. 5 of the teachers considered that the introduced changes would benefit students learning and other 4 considered that changes would not improve students learning. 8 of the teachers considered that the group fostered collective learning and shared reflection.

The questionnaire of the 2014 -2015 year was changed, hence introducing a difficulty in the comparison of results. In this case 26 answers out of 39 participants were gathered. Teachers were asked if they considered that the course had positive repercussion in their classroom and if they considered that the contents presented in the group were suitable. In a scale ranging from 1 (I do not agree) to 10 (I agree) teachers rated an average of 8.1 the repercussion in the classroom, and 8.4 the convenience of the contents presented. In this questionnaire, there were three open questions which also provided useful information. One of the questions asked to the teachers about their experience participating in the course and answers are summarized in Table 2.
teachers value the course because they could know about new resources for their classroom, seven declared that the participation improved their digital competence and six highlighted the opportunity of borrowing tablets for experimentation in the classroom. Teachers also value the possibility of knowing others' practice, sharing ideas, incrementing motivation, knowing about inclusion and SEN or reflecting about own practice.

Table 2. Analysis of the questionnaire open answers

<table>
<thead>
<tr>
<th>Highlights of participating in the group</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Know new resources, activities, apps ...</td>
<td>12</td>
</tr>
<tr>
<td>Improve digital competence</td>
<td>7</td>
</tr>
<tr>
<td>Have the opportunity of experimenting new practices in the classroom</td>
<td>6</td>
</tr>
<tr>
<td>Know other teachers' practice</td>
<td>5</td>
</tr>
<tr>
<td>Share ideas and experiences with other teachers</td>
<td>5</td>
</tr>
<tr>
<td>Increment motivation of teachers and students</td>
<td>5</td>
</tr>
<tr>
<td>Know about inclusion and special needs education</td>
<td>5</td>
</tr>
<tr>
<td>Reflection about own practice</td>
<td>1</td>
</tr>
</tbody>
</table>

The questionnaire of 2015-2016 has not been sent yet as teachers are at this moment developing the practices in their classroom and disseminating them.

The working group has provided several reifications which are useful for the Administration in the development of other training courses. For example, the blog is a bank of well documented innovative experiences in the use of digital tablets. The experiences published have been used as examples in other teacher training such as generic courses about the use of mobile devices in education or digital inclusion seminars. The teachers who participate in the group are also considered as a group of advanced users of digital tablets, specialists in inclusion. Many of these teachers are willing to train other colleagues or participate in seminars explaining their experience.

Experiences developed with digital tablets

Until April 2016, 34 experiences have been developed and reported in the blog, mainly in Primary education and also in Secondary education (See Table 3).

Table 3. Context of the experiences

<table>
<thead>
<tr>
<th>Level</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Primary</td>
<td>2</td>
</tr>
<tr>
<td>Primary</td>
<td>19</td>
</tr>
<tr>
<td>Secondary</td>
<td>13</td>
</tr>
</tbody>
</table>

Regarding the collaboration of students in the activities, the 50% of the developed experiences
include activities in groups of students and the other 50% consist in individual activities (See Table 4). The activities are principally semi-open (N=19) which mean that the teacher settles the main characteristics of the activity and students have a certain degree of decision. An example of this kind of activity would be a narration in which the teacher defines the topic and the app whereas the student can decide the contents. Open activities in which students can decide the contents and also the tools are developed in 10 experiences. Finally, closed activities, completely defined by the teacher, are developed in 6 experiences. The experiences are mainly developed in the Linguistic Area and also in interdisciplinary way, and develop mostly the digital and the communicative competence (See Table 4).

Table 4. Kind of activities

<table>
<thead>
<tr>
<th>Grouping of students</th>
<th>Number of experiences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual</td>
<td>17</td>
</tr>
<tr>
<td>In groups</td>
<td>17</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Instructions</th>
<th>Number of experiences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open activity</td>
<td>10</td>
</tr>
<tr>
<td>Semi-open activity</td>
<td>19</td>
</tr>
<tr>
<td>Directed activity</td>
<td>6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Subject area</th>
<th>Number of experiences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interdisciplinary</td>
<td>13</td>
</tr>
<tr>
<td>Languages</td>
<td>15</td>
</tr>
<tr>
<td>Sciences</td>
<td>2</td>
</tr>
<tr>
<td>History</td>
<td>2</td>
</tr>
<tr>
<td>Maths</td>
<td>1</td>
</tr>
<tr>
<td>Arts</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Competencies</th>
<th>Number of experiences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital competence</td>
<td>33</td>
</tr>
<tr>
<td>Communicative competence</td>
<td>24</td>
</tr>
<tr>
<td>Artistic competence</td>
<td>10</td>
</tr>
<tr>
<td>Autonomy and personal initiative</td>
<td>7</td>
</tr>
<tr>
<td>Social competence</td>
<td>6</td>
</tr>
<tr>
<td>Learning to learn</td>
<td>4</td>
</tr>
<tr>
<td>Mathematic competence</td>
<td>2</td>
</tr>
</tbody>
</table>

Regarding the tools used in the developed experiences they are mainly apps for Android and/or IOS operating systems (See Table 5). The most used are creation apps which and be used as cross curricular tools. Many of the most popular apps include several formats (image, text or sound) and are user friendly.
Table 5. Apps used to develop the experiences

<table>
<thead>
<tr>
<th>Apps</th>
<th>Uses of the app</th>
<th>Number of experiences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pic Collage</td>
<td>Create posters with images and text.</td>
<td>5</td>
</tr>
<tr>
<td>Tellagami</td>
<td>Create talking avatars.</td>
<td>4</td>
</tr>
<tr>
<td>Comics Head</td>
<td>Create comics.</td>
<td>4</td>
</tr>
<tr>
<td>Book Creator</td>
<td>Create books with sound, images and text.</td>
<td>3</td>
</tr>
<tr>
<td>Story Creator</td>
<td>Create books with sound, images, drawings and text.</td>
<td>3</td>
</tr>
<tr>
<td>Thinklink</td>
<td>Create interactive points in images that include links, video, text, and other images.</td>
<td>3</td>
</tr>
<tr>
<td>Aurasma</td>
<td>Create augmented reality with photos.</td>
<td>2</td>
</tr>
<tr>
<td>Mindomo</td>
<td>Create mind maps.</td>
<td>2</td>
</tr>
<tr>
<td>Easy Voice Recorder</td>
<td>Record sound.</td>
<td>2</td>
</tr>
<tr>
<td>Boom Googles</td>
<td>Create animated videos by drawing.</td>
<td>1</td>
</tr>
<tr>
<td>Puppet Pals 2</td>
<td>Create stories with puppets.</td>
<td>1</td>
</tr>
<tr>
<td>Make it</td>
<td>Create and play interactive activities.</td>
<td>1</td>
</tr>
<tr>
<td>Google Keep</td>
<td>Record memo notes and set alarms.</td>
<td>1</td>
</tr>
<tr>
<td>CPA</td>
<td>Communicate through pictograms.</td>
<td>1</td>
</tr>
<tr>
<td>Lino</td>
<td>Create boards to share text, images and links.</td>
<td>1</td>
</tr>
<tr>
<td>Buddy Poke</td>
<td>Create avatars.</td>
<td>1</td>
</tr>
<tr>
<td>Wunderlist</td>
<td>Create memo lists.</td>
<td>1</td>
</tr>
<tr>
<td>Eraser</td>
<td>Photo editing.</td>
<td>1</td>
</tr>
<tr>
<td>Tiny Tap</td>
<td>Create and play interactive activities.</td>
<td>1</td>
</tr>
<tr>
<td>Anymobby</td>
<td>Create videos with sound and drawing (white board).</td>
<td>1</td>
</tr>
<tr>
<td>Verbalizer lite</td>
<td>Animate photos inserting a mouth that speak the recorded voice.</td>
<td>1</td>
</tr>
<tr>
<td>Animation Desk</td>
<td>Animate drawings.</td>
<td>1</td>
</tr>
<tr>
<td>Edmodo</td>
<td>Educational social networking site.</td>
<td>1</td>
</tr>
<tr>
<td>Pixel Art builder</td>
<td>Transform pictures to pixel images.</td>
<td>1</td>
</tr>
<tr>
<td>Youtube</td>
<td>Watch and upload videos.</td>
<td>1</td>
</tr>
<tr>
<td>Aixeeca castells</td>
<td>Content about a catalan tradition.</td>
<td>1</td>
</tr>
<tr>
<td>Recordable</td>
<td>Record the tablet screen.</td>
<td>1</td>
</tr>
<tr>
<td>Bits Board</td>
<td>Create and play interactive activities.</td>
<td>1</td>
</tr>
</tbody>
</table>
Presence of elements that foster inclusion in the developed experiences

In order to elucidate to what degree the experiences foster inclusion we have used the principles defined in the Universal Design for Learning (UDL). The experiences developed with tablets mainly provide multiple means of engagement by providing options for recruiting interest, for sustaining effort and persistence and for self-regulation (See Table 6). Tablets are attractive to students, and in the studied experiences, the introduction of this instrument is a novelty as the schools participating in project do not usually use them. Activities which can be arduous are more easily done with the tablets and are specially used for this purpose. Tablets also are used to promote students' communication and expression.

Table 6. Presence of Universal Design for Learning in the experiences.

<table>
<thead>
<tr>
<th>UDL Principles</th>
<th>Number of experiences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provide multiple means of engagement</td>
<td></td>
</tr>
<tr>
<td>Provide options for self-regulation</td>
<td>13</td>
</tr>
<tr>
<td>Provide options for sustaining effort and persistence</td>
<td>16</td>
</tr>
<tr>
<td>Provide options for recruiting interest</td>
<td>29</td>
</tr>
<tr>
<td>Provide multiple means of representation</td>
<td></td>
</tr>
<tr>
<td>Provide options for comprehension</td>
<td>11</td>
</tr>
<tr>
<td>Provide options for language, mathematical expressions, and symbols</td>
<td>2</td>
</tr>
<tr>
<td>Provide options for perception</td>
<td>1</td>
</tr>
<tr>
<td>Provide multiple means of action and expression</td>
<td></td>
</tr>
<tr>
<td>Provide options for executive functions</td>
<td>10</td>
</tr>
<tr>
<td>Provide options for expression and communication</td>
<td>32</td>
</tr>
<tr>
<td>Provide options for physical action</td>
<td>0</td>
</tr>
</tbody>
</table>

DISCUSSION

Is a blended working group a good strategy for teacher training in the use of digital tablets for inclusion?

Teacher professional development can be classified according to three models (Sprinthall, Reiman, & Thies-Sprinthall, 1996): the “craft” model states that teachers’ professional development is a result of experience acquired from classroom experiences; the “expert” model asserts that teacher professional development is the result of training by other expert teachers; finally, the “interactive” model states that teachers’ knowledge is built when external sources of information lead to new experiences in the classroom which, depending on the results, lead to new insights, thus generating professional development. The first and the second models are incomplete, as the “craft” model does not explain how new knowledge is incorporated into teacher practice, and the “expert” model views teachers in a passive role on and not responsible for their own training. The interactive model is the most
complete and takes into account several domains of the teaching situation (Clarke & Hollingsworth, 2002): i) the personal domain including teachers’ ideas, knowledge and beliefs; ii) the external domain represented by information or resources that teachers acquire while collaborating with other teachers or participating in training activities; iii) the domain of practice related to action research activities developed in the classroom context; iv) and the domain of consequence that includes students’ results and other consequences in the classroom climate or organization. According to the interactive model, an external source of information can generate changes in the teachers’ knowledge and foster new practices in their teaching. After experimenting in the classroom, the teacher can evaluate the processes applied and the student outcomes and, based on the results of this evaluation, make changes at a cognitive and behavioral level.

The working group as a teacher training activity can be considered as an effective measure to promote professional development in the area of digital inclusion. This training activity provide teachers with external information, which they can apply in the classroom and evaluate the results. The teachers participating in the group informed that they had included some changes in their classrooms. The most popular benefit of the group according to teachers is to know new resources, activities and improving digital competence. However, the main aim of the group, which is the experimentation with tablets is less popular. This perception can be due to the fact that teachers are used to training which follows the expert model and their expectations when they join a course are to receive new information.

Having new tools for experimenting is a challenging activity for teachers. In our case the opportunity of having digital tablets was an asset which helped teachers to develop the practices they had planned. In the case that tablets are not available it is possible to study the use of the model bring your own device (BYOD) in which every student comes to the classroom with their own mobile phone or tablet (French, Guo, and Shim, 2014).

The products created by the teachers are useful to have examples of good practices to disseminate and these teachers can also act as trainers in seminars or courses, as well as encourage, their colleagues to experiment with the digital tablets. The informal learning among peers is a powerful source of teacher professional development and can represent more than the 70% of the knowledge acquired at work (Eraut, 2011).

**Which kind of practices do teachers develop when they are trained in the use of digital tablets? Do these practices foster inclusion?**

The developed experiences have been mainly applied in Primary School and also in Secondary School. The activities proposed by teachers are in some cases in group and in other cases are individual. Research shows that the students like to use technologies to communicate and share photos and other media with their peers (Godwin-Jones, 2005). This opportunity can be used to promote learning and, as the UDL guidelines recommend, working with peers can help students to sustain effort and persist in the task (CAST, 2011). When collaboration is well structured, the opportunities of finding support increase as peers can be peer-tutors. CAST recommends that the groups should be flexible and students should have the opportunity of experimenting multiple roles in the group thus they have more opportunities of being successful.
The activities designed are mainly semi-open which means that the student can take limited decisions on how to solve the task. According to CAST (2011, p. 27) “offering learners choices can develop self-determination, pride in accomplishment, and increase the degree to which they feel connected to their learning”. It is important to design appropriately the tasks that students should solve for learning. For example, you can ask your student to draw a plant and write its parts or ask them which are the most suitable conditions to create a garden in the school court. Both activities include knowledge about plants, however the second one is more authentic and valuable for students.

Tablets are mainly used in Languages and also in interdisciplinary projects which tend to be more relevant to students. In real life, subject areas are not separated, therefore the projects in which several skills are required will be more engaging. Students need to know the utility of the knowledge they have to acquire and authentic and meaningful experiences, as mentioned above, will better catch their interest. The interdisciplinary projects also can foster the development of students’ competences. In the case of the studied experiences the communicative competence and the digital competence are developed in the majority of them. Other competences developed are the artistic competence, autonomy and personal initiative, social competence, learning to learn and mathematic competence.

Regarding the Universal Design for Learning guidelines, the use of digital tablets is advantageous in the case of providing multiple means of action and expression. Through the use of several cross curricular apps, students can create stories, posters, animations... These tools include several formats and are user friendly, so they are appropriate for all the students. Tablets are also engaging and can help students to sustain effort when doing arduous tasks such as speech therapy.

In our research tablets have scarcely been used to access content in several formats. Tablets can offer multiple formats and accessibility settings can be useful to students with impairments. The accessibility options have not been reported in the experiences. The reason could be that teachers do this task with other devices such as computers or that the teachers who use them do not describe them as these settings are used daily and do not consider them as innovative.

**CONCLUSION**

The conclusions of the research can be useful to develop courses which can foster the knowledge of methodologies and resources to successfully promote students’ learning and participation, reducing environment barriers and promoting opportunities for success. The conclusiona are the following:

- Digital tablets are a useful tool to promote students’ expression and participation. In the case that schools do not have these tools, it could be interesting to apply the model bring your own device.
- Activities planned to promote inclusion should include well-structured collaboration among peers in flexible groups with multiple roles to be developed. For this reason, it is important to show teachers how to successfully organize these kind of activities.
- It is important to offer appropriate strategies to teacher to design open activities and foster students competences.
Universal design for learning guidelines can be useful to teachers for designing more inclusive practices.

The use of tablets can provide options for expression and communication and also engage students in learning.

It is necessary to show teachers how to find and design contents in multiple formats adaptable to the different learning needs of the students.

Teachers should know the accessibility settings available in the digital tablets.

Mentoring teachers in the development of innovative experiences can provide useful material to disseminate professional development.

REFERENCES


AUTHOR NOTE

The described training was developed in collaboration of three sections in the Department of education: Àrea TAC, Servei d'atenció a la diversitat i inclusió and Servei de formació i innovació d'educació primària.

AUTHOR BIOGRAPHY

Maria Macià is psychologist and also secondary teacher. She is specialized in inclusion and the use of technology for improving learning and participation. Nowadays, she works in the Catalan Ministry of Education planning and developing teacher professional development activities about digital inclusion.
ONE INSTITUTION, THREE CURRICULA, 1600 LEARNING APPROACHES

Maria Teresa Sole Clavero, Josep G. Lluis Queralt
Institut Baix Camp School, Reus, Catalonia, Spain

ABSTRACT

One Institution, three Curricula, 1600 learning Approaches wants to provide our educational centre with a holistic organisation capable of fulfilling the needs and expectations of every member in our community. This main aim is basically achieved by the implementation of a number of projects and innovation plans, to allow an improvement of the academic results and a socially cohesive school. Through their own management software, the promotion of foreign languages, the introduction of recreational activities and the incorporation of new technologies in everyday work, INS Baix Camp School is prepared to focus on the individualization of learning.
ONE INSTITUTION, THREE CURRICULA, 1600 LEARNING APPROACHES

One Institution, three Curricula, 1600 learning Approaches seeks to provide our educational centre with a holistic organisation capable of fulfilling the needs and expectations of every member in our community. This main aim is basically achieved by the implementation of a number of projects and innovation plans, to allow an improvement of the academic results and a socially cohesive school. Through their own management software, the promotion of foreign languages, the introduction of recreational activities and the incorporation of new technologies in everyday work, INS Baix Camp School is prepared to focus on the individualization of learning.

We are a big state educational centre for Catalan/Spanish standards, which includes a compulsory Secondary School (ages 12-16); Baccalaureate students (Science and Technology, Economy and Humanities); and Vocational Education (Intermediate and Higher Vocational training Cycles) of Health, IT, Trade and Commerce and Administration. This mixture of curricula, different ages and diverse targets makes a grand total of more than 1600 learners. Back in the early 2000s, the school was neatly diversified and there was a need for reunification, shown by a deep study of the school which involved all sectors in different improvements actions. The analysis showed a totally divided school (academic/vocational students and teachers) and the severe need for a management system able to plan, act, evaluate. Moreover, there was a lack of clear, achievable goals as early school abandonment or a poor relationship between the school and its environment was a growing threat.

To be able to handle such a diverse school, we created a management software capable of planning, acting and evaluating every aspect of school management. It allows each member of the teaching, leading and administrative staff to have full control of every aspect concerning the 1600 learners. For example, roll call, individual and group information, interviews with parents, meeting minutes among others.

Being individual approaches our main concern, and the improvement of academic results and social cohesion our grand objectives, we built our educational project through the exhaustive understanding of our students. We do so with ongoing input/return information through a network of schools of origin, organizing joint activities and sharing areas of knowledge with them. We have a strong orientation plan and permanent student coaching and support. The school offers individual and personal curricula to our non-compulsory students, such as blended learning, educational advice and certification.

Materials, academic issues and human resources are used to meet the needs. The teacher training schedule is devoted to the use of new technologies, conflict resolution and mediation, and group dynamics. The participation in innovation projects provided the school with IT hardware and software, and the parent-teacher association funded the school with human resources such as an IT assistant, or a social integration assistant. A leading management board leads to proactive team work, and the technical knowledge of the vocational school teachers allows to forward knowledge to the business environment.
The main areas of action and the addition of human and material resources have resulted in a group of issues that cover, by means of projects, our main aims and areas of influence: here is a list of some of the current projects and actions in their area of interest:

- **Boost of foreign languages**: English, French, German and Russian; Cambridge English authorised exam centre; CLIL; language exchanges with France, Germany, Poland and England; Erasmus+ projects and work experience; Knowledge Building International Project.

- **IT competence**: implementations in every subject in compulsory education; high rate of Moodle users among teaching staff; own educational App: PICA’t.

- **Alliances**: Cambridge English; City Council; Rovira i Virgili University; Chamber of Commerce; Public library; enterprises and companies.

- **Learning and Service**: Dual learning for vocational students; entrepreneurship; international mobilities; labour traceability after school.

- **Coaching**: educational contracts; school-family contracts; emotional intelligence workshops; mindfulness workshops, coaching team; social integration assistant; personal support.

- **Tutorial Guidelines**: Different tutorial plans per different curricula; tutorial plans for pupils with special needs; annual revision of tutorial plans.

- **Teacher’s Teamwork**: unified programming and evaluation assets; checking on the subject contents; content harmonization; interdepartmental collaboration; newcomers planning and teachers coaching.

- **Curricular Adaptation**: individualization of learning and learners; subjects for gifted students; more than 70 annual curricular changes and adaptations.

All these areas of in school actions have a strong reaction on the environment through the sum of the three main interests: Students and Families (online diary; real-time SMS communication; ongoing School/Parents meetings; social networks); Teaching Staff (diversified teaching meetings; tutors coordination; teachers training à la carte; regular contact with management); Group Dynamics towards Cohesion (lipdub; flashmob; teachers theatrical group; social/NGP activities; labdoo project; project on cleaning and recycling). The result is a proactive educational community.

Although the methodology and objectives have remained the same in the last three school years, the gears are given little changes, little twists that allow our organisation to be faced with following results and achievements: ISO 9000-2008 with 0 non conformities; Yearly increase of alliances; Each educational department has one project; 0 school dropout; Growing benchmarking; 0 vacancies after official registration period; High satisfaction level of the educational community; External recognition by means of prizes; Improvement of basic language and maths competence; Quality and quantity increase on external evaluation results.

With the encouragement of these good results and achievements, our school has started the process of getting involved and recognised as a school of excellence in quality. The first part of the renewal process of the centre has resulted in a unified, well organised school which has not only internal but also external and institutional recognition. A second part is seeking new aims, as there is still plenty of room for improvement. The proactivity, the individualization of
learning and the interaction of the different groups of interest set up the foundation of our ongoing wish for improvement.

AUTHOR:

Maria Teresa Sole Clavero is a Teacher and part of the Management Board at Institut Baix Camp. E-mail is: msole236@xtec.cat