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**Technology Education in Chile after nine years of implementation**  
**From the paper to the classroom**

Francisca Elton  
Mineduc  
March 2005

**Abstract**

This paper is divided into three parts. The first part offers a critical overview of the process of installation of technology education as a compulsory subject in the school system in Chile. The second part refers to main concerns regarding the sustainability of the subject in the curriculum; and lastly, the third part describes a model for in-service teacher training in technology education.

**1. An overview of the state of arts of the subject in Chile**

Technology education in Chile, has since 1996, the same legal status in the curriculum of the traditional subjects such as math, language or science. It is a vertical subject, compulsory during the first 10 years of schooling for all students, optional for students of 11 and 12 grades.

During the last curriculum reform, educational policy was decisive in introducing technology education as a compulsory and independent subject for all the educational system. There was a firm conviction that the subject should be part of the educational experience of every child in the country as a response to the need for entrepreneurial citizens able to take responsible decisions in the use, consumption and development of technology bearing in mind its personal, social and environmental impacts.

However, there were no policies to ensure its implementation in the classroom such as inclusion of the subject in initial and in-service teacher training, development of relevant teaching materials and procedures for student assessment, research and monitoring of the implementation. This has had enormous costs on the teacher's motivations and performance, and on the quality of the student learning. Thus, despite there being an allocated two/three weekly hours of technology education in all schools, the effective time used for the subject is less. Most teachers (1<sup>st</sup> to 4<sup>th</sup> grades) use these hours for more math and language, handicrafts or other activities not related to the subject. The situation is different in the middle and upper school grades (5<sup>th</sup> to 10<sup>th</sup>) given that time allocated to technology (2 hours) is used for the subject, and most teachers plan their lesson based on the official syllabus. However, teachers' lack of knowledge of the subject makes their efforts meaningless. Although these teachers articulate the rhetoric about technology education, they do not comprehend the type of learning involved in the subject and they do not know how to go about teaching it.

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Initially, the teaching of technology was left to arts and crafts teachers. There were two reasons for this. The first one, was that simultaneously with the introduction of technology education handicrafts as a subject was removed from the curriculum and its teachers were charged with the teaching of technology. The second reason had to do with the focus of the first version of the technology curriculum that represented a slightly upgraded version of the handicrafts subject. This enabled teachers to accept their new role without protesting the removal of their old subject. Most of the handicraft teachers perceived technology education as a lease of life for their increasingly devalued subject in the context of the general education.

Until now, few teacher training institutions are including technology as a teacher specialization and are investing in research and professional development in the field. Most are not willing to do so unless they see government policies oriented to ensure the implementation of technology at the classroom level.

Industry, on the other hand, sees in technology education a possibility of developing knowledge and skills related to entrepreneurship, innovation and participation. Although from its experience there are advantages in developing these skills and capacities from a very early age, they have not stood up to ask for results of the implementation of the subject.

## **2. Main concerns**

The main concern at this point should be to know why we reached this point of stagnation within the development of technology education. It is obvious that one reason is that policy priorities are put on other aspects of the curriculum. But I firmly think that the problem has more to do with the body of the subject. In order to achieve social and political support, it is necessary to share a solid vision on the following aspects:

1. As long as there is no strong consensus over the main contribution of the subject to a student's education, technological education it will not be a priority for society. International tests, such as PISA, TIMSS and PIRLS, assess student learning in math, sciences, social sciences, language and civics, on the basis that there is agreement about what forms of learning are valued in these subjects. Why is it difficult to identify the knowledge and skills that technology contributes to the students' education? There may be two reasons for this: The first one is that there is not a body of knowledge that is exclusive to technology education. This would explain the variety of approaches that still coexist. A second reason is that in the process of defining technology education learning's we mix two elements of importance: the main knowledge objectives and the concrete contents we use in order to achieve those objectives. For example, in seeking to teach to identify the components of an object as well as the contribution of each of them to the fulfillment of its purpose, learning about an electrical circuit is just one of the many forms through which that greater learning purpose can be achieved. The greater the variety of versions about what is the focus of technology education, the greater the difficulty to muster support for the subject from people at social, political and economic levels. Additionally, the accumulation of evidence to assess

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the impact of this learning's on students' later professional performance, as well as on the social and economic development of the country, becomes more difficult.

2. Assuming that we share a clear understanding over the main contribution of the subject, there is a need to understand how such learning's are mobilized along the different school levels. In regard to the traditional subjects, there is collective knowledge about how it is to be learned. There are many curricular materials that specify routes to follow in order to achieve learning such as reading, writing, math operations, sciences, etc. And although they can have different positions, they move around a body of knowledge solidly constructed.

3. Given that we are able to map progress in technology education main learning's, teachers need to know how to recognize, from student work, how close or how far they are from achieving the learning, and how to help them to move along.

4. And last, if starting from today technological education disappears of the school curriculum, probably it would not be of news. If mathematics are eliminated, every media would have it in the front pages, and surely the decision would encounter a tremendous social opposition. That because exists a collective knowledge based on information, that math learning's are an essential part of students education. With technology education it is not the case, and urges to built a social knowledge of the subject, although as it is now, the dispersion of focuses that we have, can play against it.

### **3. A model for technology education in service teacher training**

A model for a in-service teacher training Program, that could be of a contribution on solving some of the problems sited above among teachers (A collective knowledge about the subject aims and contents; Knowledge about how to teach technology education; Awareness and comprehension of the learning's students should acquire; Comprehension of how students learn concepts, abilities and understandings with in technology education; Understanding of how the students progress on those learning's; Knowledge on what to look for when assessing student performance and how to report back to students and to the teaching plan; Knowledge on management and planning to move the class to rich the learning objectives) was developed and conducted by F.Elton within the unit of curriculum of the Ministry of Education, and was pilot with a fourth grade class during 2004. The expansion of the experience was undertook by the University of Concepción, with 40 teachers and 1.600 students from seven schools, starting on April of 2005.

The model at issue privileges the construction of knowledge on the basis of the teaching practice, by reflecting on the subject contents, the classroom experience and the evidence of the students work. It is also based on the accompaniment of teachers by the academics. During the teacher training process, school leadership capacities to assure the continuity of technology education without external support are worked through mentors.

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### *Program Structure*

The Program is structured so that the reflection over the practice serves as a platform to learn about Curriculum, Didactics and Evaluation. The working dynamics that it is used for the learning in each one of this topics has three components:

- knowledge acquisition on the subject (concepts, abilities and attitudes) and on the teaching of the subject
- reflection on the teaching practice on the basis of evidence from their and their students classroom work (how it is learned, is taught and assess in technology education), and
- teaching

### *Academic validation*

The program can get teachers to obtain:

Accreditation from CPEIP<sup>1</sup> (192 hours)

Associate Degree on Technology Education (256 hours)

Bachelor degree as Teacher on Technology Education (448 hours)

In order to access to the associate and bachelor degrees, the users must already count with a bachelor degree on education.

<b>Degree</b>	<b>Theory and reflection</b>	<b>Planning</b>	<b>Teaching</b>	<b>Thesis</b>
Accreditation from CPEIP	8 Monthly hrs. Total: 64 hrs.	2 weekly hrs. Total: 64 hrs.	2 weekly hrs. Total: 64 hrs.	
Associate Degree 2 terms	8 Monthly hrs. Total: 64 hrs.	4 weekly hrs. Total: 128 hrs.	2 weekly hrs. Total: 64 hrs.	
Bachelor Degree 3 terms	4 weekly hrs. Total: 128 hrs.	4 weekly hrs. Total: 128 hrs.	2 weekly hrs. Total: 64 hrs.	4 weekly hrs. Total: 128 hrs.

### *Blocks description*

#### Theory and reflection

2 terms

Technology education content specialist, and mentors, work with teacher's. Contents are worked on bases of the reflection over the teaching practice. These are:

- Technology education curriculum analysis (curriculum)
- Technology Education Syllabus analysis and contents learning: project development; technological system analysis; technology and society (curriculum)
- Analysis of technology education teaching process in based of classroom work evidence (didactics)
- Lesson planning (didactics)

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<sup>1</sup> Unit from the Ministry of Education in charge of promoting and certifying in service teacher training.

- Students work analysis (evaluation)

#### Planning

2 terms

Teachers work collaboratively with the assistance of the mentor. Activities are:

- Didactic material development for the lessons (didactics)
- Assessment material development for the lessons (assessment)

#### Teaching

2 terms

2 hours a week in front of the classroom in technology education.

#### Thesis

1 term

Requirement just for obtaining Bachelor degree

Investigation thesis in any of the following areas: curriculum development on technology education; didactics in technology education; student assessment on technology education.

#### *Evaluación*

##### Accreditation from CPEIP

Report and analysis of the teaching practice through a portfolio	50%
Curricular material development	20%
Written test	30%

##### Associate Degree on Technology Education

Report and analysis of the teaching practice through a portfolio	50%
Curricular material development	30%
Written test	20%

##### Bachelor degree as Teacher on Technology Education

Report and analysis of the teaching practice through a portfolio	35%
Curricular material development	20%
Written test	10%
Thesis	35%

#### *Web site*

The Program is reinforced by a web site. The purpose of this site is to give teachers access to successful teaching experiences and teaching materials. The site is structured as follow:

- School levels: it contain curricular documents as the Curriculum Frame Work and Syllabus.
- Lesson's plans: modules with activities for teachers and students, didactic materials, bibliography, assessment.
- Assessment: materials, students work examples; analysis of students work.

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- Didactic material: presentations; activities; literature; Internet directions; bibliography, etc.
  - Investigations: Students thesis work, and other papers related to the subject area.
  - Teacher contacts

### **Concluding remarks**

Technology education will struggle up until there is a solid version of its contribution in the curriculum, and install awareness on people of its importance by showing them evidence about how those learning's impact on students performance over other subjects, on there performance in superior studies and there performance in the job.

It is also necessary to bring teachers to reflect and learn about the subject contents and expectations form the classroom work. This can be done bringing teachers and academics working together. The information that can be withdrawn from that work is essential for the curriculum development and classroom implementation of the subject.