The challenge of building a program for the development of generic competencies: a case study

Rodolfo Schmal[1]
ORCID: 0000-0002-1516-7570
Sabino Rivero[1]
ORCID: 0000-0002-1162-501X
Cristian Vidal[2]
ORCID: 0000-0002-1600-3447

Abstract

Given its increasing importance, society nowadays requires from professionals not only the specific competencies in each discipline but also the universities are demanded to develop the so-called transversal or generic competencies. The objective of this work is to present the trajectory of a certain program intended to provide generic competencies in undergraduate careers in a state-owned Chilean institution, the University of Talca. This trajectory is over 10 years old since it started in 2006, and is expressed in three versions, where the latter is a possible bottom line example for other undergraduate careers and universities interested in adopting an educative model based on the development of competencies. The methodology utilized is a description research based on a review of the official documentation of the University of Talca, and the background collected by the authors in their condition of professors in a career of engineering. The results achieved so far show a process of continuous improvement and maturation characterized by a clarification of the concept of competency, a significant reduction in the size of PFF, and an effort to combine it with the competencies of basic and professional training (or in a discipline) of each career. Notwithstanding what is mentioned above, conclusion is that there is still room for significant improvements if the aspiration is to consolidate the program.

Keywords

Generic competence – undergraduate education – basic training.

Educ. Pesqui., São Paulo, v. 46, e217017, 2020.

1

Introduction

During the last decades in Chilean higher education, there has been a sustained increase in coverage, from less than 20% to more than 40% among young people of higher education age. In parallel, it has been in the presence of unprecedented scientific-technological progress, which is affecting both the productive and social interaction fields. Thus, it is moving from a society that demanded specific knowledge enduring over time to a culture that is raising demands that relate more to behavior than to expertise, in an unstable and changing world (VILLARROEL; BRUNA, 2014).

This work is part of a Chilean university, the University of Talca, of a state nature whose 90% of undergraduate tuition corresponds to students in the first three quintiles according to income distribution, whose parents are mostly non-professionals. In this context, the University of Talca assumed the responsibility of replacing the traditional educational model based on two components responsible for primary and disciplinary training, to an educational model oriented to the development of competencies designed based on three essential training components: a program of fundamental training (PFF), a basic training program (PFB) and a disciplinary training program (PFD). The first of them, the PFF, is intended to develop in students what in the literature are often called generic or transversal competencies, both instrumental for academic work, as well as personal and citizen. This decision involved all existing undergraduate teaching programs (careers) (MOYANO; VÁSQUEZ; FAÚNDEZ, 2012).

A classification of the curricular models based on the generic competences to be developed includes three categories: a) differentiated formative models, in which each career selects the most relevant generic competencies that its graduates must have and designs their training plan for the development of such competencies; b) integrated training models to develop generic competencies in the modules responsible for integrating them with the specific competencies that each professional career demands of its graduates; and c) parallel training models, where the development of generic competencies takes place in the same set of modules (subjects) regardless of the specific competencies (VILLARROEL; BRUNA, 2014; VILLARDÓN-GALLEGO, 2015).

The University of Talca opted for the latter model for all their careers for the following reasons: a) The relevance that society and companies are assigning to university professionals to generic skills. b) The need to meet the challenge of providing education to students who mostly come from socioeconomically vulnerable environments that require formation in generic skills that many of them lack. c) The interest of the University of Talca because all of its graduates are identified as having a common seal regardless of the career in which they have enrolled (MOYANO; VÁSQUEZ; FAÚNDEZ, 2012).

The object of study considered for the development of work is the PFF oriented to the development of generic skills included in all undergraduate programs taught in a public university such as the University of Talca. The main objective of this work is to identify the strengths and weaknesses observed in the evolution of the PFF in its design and implementation.

Given the nature of the object of inquiry and the objective pursued, a qualitative perspective is assumed. For its part, the methodology adopted - descriptive research - both for the collection of background, as well as for descriptive and critical analysis, was based on an analysis of official documents - university resolutions, agreements and minutes of Academic Councils -, the application of surveys of students who have already passed all the courses included in the PFF, and the experience of the authors as university professors.

In this way, it is expected to provide background information for those interested in the design and implementation of models for the development of generic skills in higher education. To achieve this objective, the antecedents that explain the installation of a generic skills training program at the University of Talca are disclosed; then, the characteristics of the PFF are presented in the three versions that have been implemented to date. Subsequently, the results of a comparative analysis between the different versions of PFF are released, to finally draw the conclusions and recommendations that emerge from the work developed. Consequently, this work is a descriptive investigation aimed at identifying the changes experienced, along with its foundations, by a generic skills development program from its.

Perspective

To face the present and future challenges, higher education and education, in general, undergo significant changes as a result of the turbulent times in a global and connected world (GUL et al., 2017; ALDOWAH et al., 2017). Hence its typical characteristics are under review, and most likely, they will continue for a long time. This is how, in the field of teaching, the competence approach arises.

Although the concept of competition has a utilitarian origin, of satisfying the demands of the market, of the business world, it also has a citizen, equity, and justice concept, which seeks to address those generic, soft or transversal competencies linked to the competences, among others, to work as a team, under pressure, results-oriented; to dialogue, express and communicate in writing, in graphic and oral form, to reflect (PÄIVIKKI et al., 2018). These competencies are strongly demanded not only by companies but by society as a whole.

The authors adhere to a competitive view that is not limited to a utilitarian approach oriented to the training of professionals demanded by companies but goes beyond the know-how and action in the organizations in which they work. Interested citizens with competencies not only to have a more productive society but more democratic, more tolerant, more critical, and more reflective (YANAZE; DE DEUS, 2014; LÓPEZ, 2016).

According to Climánt (2014), the competence-based approach arises in the US in the field of job training and internships to bring students closer to the real world of work. With the profound economic and technological changes that have been unleashed since the 1970s, the concept begins to gain relevance and go beyond technical-professional training. This educational model focuses on the performance of learning outcomes and is being promoted by various institutions, particularly by the International Board of Standard for Training and Performance Instruction (IBSTPI, 2005).

In Europe, the concept of competition gains strength under the Bologna process, conceived as a process aimed at establishing a European higher education space that essentially facilitates the mobility of workers through the recognition of qualifications, the establishment of equivalences, and transfer systems between different universities (RODRÍGUEZ, 2018). Under this framework, there is a tendency towards a university curricular design oriented towards the development of competences.

A concept of generalized and accepted competence is that of knowing how to do in a context where far from being understood as doing, it requires theoretical, practical or theoretical-practical knowledge, affectivity, commitment, cooperation, and compliance, all of which must be expressed and verified in performance (GONZÁLEZ; ESPINOZA, 2018).

According to López (2016), any competition is associated with an integral action capable of articulating, activating, integrating, synthesizing, mobilizing, and combining different knowledge (knowing, doing and being) to practice a profession, perform an activity or a task. Therefore, the concept of competence integrates knowledge, potential, skills, abilities, practices, and actions of various kinds (personal, collective, emotional, social, cultural) in different learning and performance scenarios. In Medeiros (2012) and Zapata (2015), competition is associated with action, with its implementation, with knowing how to act not only in defined work environments within organizations but beyond them, in society in that we develop.

At the University of Talca, the process of training a competent professional involves training a professional capable of "[...] knowing how to act in a particular context, putting into play personal and contextual resources (including networks) for the solution of a specific problem, with a process of reflection on what is being done "(UTALCA, 2007, p. 28).

Generic competencies are usually defined by contrast with specific competencies, and therefore, as those that exceed the limits of any discipline, necessary for effective and efficient performance, beyond a particular profession and relevant to perform in different contexts and to Lifelong learning (VILLARDÓN-GALLEGO, 2015). For this work, generic competences are those that allow us to act successfully in contexts: a) with insufficient information, where there are no clearly defined rules; b) with a dose of uncertainty in the consequences of decisions, likely to generate stress; c) with undefined time horizons (SAVANEVICIENE; RUTELIONE; CIUTIENE, 2014).

For the development of the competences, the University of Talca opted for a curricular structure: a) Organized based on modules valued in TCS (Transferable Credit System) credits equivalent to ECTS (European Credit Transfer System) credits, where each credit represents 27 chronological hours of a student's academic work; b) Planned based on courses or modules to be taught in an academic semester (18 weeks) or in an academic year (36 weeks); c) Formed on the basis of a maximum of thirty TCS per semester and sixty TCS per academic year; d) Structured based on three components: fundamental training, basic training, and vocational training, disciplinary or specific, where the first is intended to develop generic skills, also called transversal or social (MOYANO; VÁSQUEZ; FAÚNDEZ, 2012).

Fundametal Formation Program

The historical evolution of the Fundamental Training Program (PFF) responsible for the development of generic skills at the University of Talca is described below (SCHMAL, 2015; SCHMAL; RIVERO; VIDAL, 2017).

PFF 1.0

Since 2005, in the first two years of all the university's careers, a PFF began to be taught with eleven modules of four SCTs each, a set of an equal number of general competences, called fundamentals, grouped into three lines: instrumental, interpersonal and citizen (TALCA, 2005). The design of the PFF in its first version was structured as a parallel component to the basic and disciplinary training, independent of the specificities of each career and the profiles of the students entering each career. The latter because of the interest of the university that all its graduates are endowed with a seal in possession of generic competencies that the PFF undertook.

During 2010, after four years since the beginning of the first version of the PFF (PFF 1.0), changes were proposed both in its design and its implementation. In the field of design, it was proposed: a) To reduce the size of the PFF (44 SCT) in order to leave room for the contextualization of the competencies involved; b) To clarify the concept of competence, in particular, its level of complexity, breadth, and expected development; c) To contextualize generic competences to the requirements of each career, or groups of careers associated with the same discipline; d) To consider the income profile of the students that contemplate the level of development of the generic competencies they possess; e) To deconcentrate the PFF throughout the race of each career.

In the scope of the implementation of these improvements of the PFF 1.0, the following milestones were considered: a) To socialize the PFF between academics and students in a way that compromises them in their success; b) To gradually implement the PFF for the purpose of collecting good practices and correcting errors; c) To incorporate the professors responsible for the development of the competencies involved in the university's teaching staff; d) To create formal institutional mechanisms to operationalize, monitor, and evaluate the continuity of the development of the competencies involved in the PFF; e) To relate the institutional unit responsible for the development of the PFF with the schools responsible for the careers; f) To integrate the modules and objective competencies of the PFF into the basic and disciplinary training modules; g) To have clear leadership at the institutional level.

PFF 2.0

The new version of PFF (2011) contained in RU180 (TALCA, 2011), implied the following changes: a) replace the eleven fundamental competences with five essential competencies; b) reduce the PFF, from 44 SCT to 32 SCT; and c) redistribute the total of

the 32 SCTs from the first two years to the first four years in the training plans of all the careers contemplated by the PFF 1.0.

These changes show that a significant decrease in the incidence of the PFF in the training plans, opening space for contextualization of involved competencies in the scope of each career. On the other hand, as a result of the dispersion of the modules that make up the PFF, the weight of the PFF modules in the first year of each career decreases from 40% to 20% within the academic load of the students. To this is added a significant decrease in the number of competencies committed, a decrease that reflects a clarification of the competencies involved, in the sense that all competencies must be expressed in an easily understandable way. Also, this new version of the PFF revealed the impossibility of fully developing the eleven competencies involved in PFF 1.0 in just two years.

From a qualitative point of view, the PFF 2.0 opens space so that the development of the fundamental competencies is not only the responsibility of the PFF modules, but it is complemented by modules of other programs that make up the training plan (basic training and disciplinary training); and for the fundamental competences to be developed throughout the studies.

PFF 3.0

To move on to a consolidation and articulation phase of the skills-based training model, in 2013, the University of Talca analyzed the professional profiles demanded by employers, expressed in terms of competencies, together with an analysis of the conclusions emanating of a progress assessment report on core competencies (CANALES, 2013). This analysis allowed us to observe the need to integrate the fundamental competencies with the disciplines associated with the different professions. Thus, in 2014, PFF 2.0 is reformulated to give rise to PFF 3.0 (UTALCA, 2014a) characterized by a) focusing on the formation of three fundamental competencies: oral and written communication, integration into work teams, and discernment in different fields; b) being structured in eight modules with a total of twenty-four SCT; and c) eight SCTs are assigned to the schools responsible for the careers they teach in order to develop the fundamental competencies in the context of the corresponding major.

Although the generic competencies that companies and society as a whole are demanding go beyond these three competencies, the University decided that the PFF should concentrate on the formation of the three competencies indicated as an expression of its interest that all the graduates are distinguished by having a solid training in them. The preceding does not exclude the possibility that each major chooses to complement them with other generic competencies that they consider relevant for the professional practice of their graduates, whose training is integrated into either the basic training or disciplinary training components.

PFF 3.0 realizes that the formation of fundamental competencies was not properly contextualized in PFF 2.0, although the reduction of twelve SCTs of PFF 2.0 concerning PFF 1.0 pointed in that direction. Hence, this new version, currently in force within the different training plans of students at the University of Talca, essentially seeks to

articulate fundamental training with the different disciplines involved in careers. A survey was applied in 2018 to 34 students who were in the 4th and 5th year of the major of Business Informatics Engineering and enrolled in the subjects of Business Modeling and Computer Planning to gather the opinion of the students that to date have approved all the modules involved in PFF 3.0. This survey aimed to record the positive and negative aspects that they consider the PFF 3.0 has together with the improvements they suggest in light of the experience they have had with it. Each student had the option to propose up to three positive aspects, three negative aspects, and three suggested improvements.

Results

Comparing the PFF 3.0 to its previous versions, it is observed that: a) the total of credits (SCT) are decreased first from 44 to 32 SCT, and then to 24 SCT, which implies a reduction of almost 50% compared to the first version of the PFF; b) the weight of the PFF modules is deconcentrated from the first two years of each major to the first four years of all the majors; c) the number of competencies whose development compromised the PFF significantly decreases from eleven in its first version to five in the PFF 2.0, and then to three in the current version of the PFF 3.0; and, d) eight SCTs of the PFF 2.0 are transferred to the schools for the articulation of the competencies committed in the PFF within the framework of each major.

Four years after the implementation of the current version of the PFF, the results of the applied survey are condensed in tables 1, 2 and 3, where the first two include the positive and negative aspects that more than 10% of the students have highlighted of the PFF in its current version.

Table 1- Positive aspects of PFF 3.0

Positive aspects	N° of answers	% of the total of students
Complements vocational training facilitating the development of soft skills	19	56%
Existence of modules with students from different schools	13	38%
Stimulates teamwork and contributes to the interaction between work teams	5	15%
Strengthens the need for ethical and moral behavior	4	12%

Source: Self made.

Regarding the positive elements of the PFF, in table 1, it is highlighted that more than half of the students consider that their modules contribute to their personal development. Secondly, about 40% of the students consider it positive that in the modules that structure the PFF, the courses are made up of students from different careers, which allows them to interact with students who have other ways to observe and address the same problem. It is also valued that the PFF stimulates teamwork and contributes to the interaction between different work teams, thus anticipating a reality that they will face in their future work. Finally, it is emphasized that the PFF emphasizes the need to reinforce ethics and morals in the field of student decisions and actions.

Regarding the negative aspects of the PFF, in table 2, it is observed that more than 40% of the students consider that the modules require a lot of time for autonomous work, that is, for work outside the classroom. Along with this, almost 20% of students estimate that the PFF includes modules and / or unnecessary subjects - without specifying which ones. A similar figure estimates that the classes are not very dynamic, lacking appeal because they are eminently theoretical. 15% of the students surveyed object to the schedules of the PFF modules, both for their lack of flexibility and for their lack of consistency with the schedules of each career and / or student. A similar percentage questions the mandatory nature of the PFF.

Table 2- Negative aspects of PFF 3.0

Negative aspects	N° of answers	% of the total of students
Demand a lot of freelance work time	14	41%
Includes unnecessary modules/subjects	6	18%
It contains theoretical classes that make the classes less dynamic/attractive	6	18%
It has bad schedules	5	15%
It has a mandatory character when not necessarily all require it	5	15%

Source: Self made.

The aspects to be improved that are mentioned in table 3 by the students, for the most part, aim to reinforce the positive aspects of the PFF, or to reduce, limit or eliminate the negative aspects included in table 2.

Students believe that the excessive autonomous workload expressed as the demand for a time by the PFF modules can be overcome by integrating modules, reviewing their contents, or a more appropriately adjusted allocation of credits, or reviewing the contents of the modules, or improving the assignment of companies where students have to develop the projects.

On the other hand, to overcome a theoretical emphasis that students consider the PFF has, they propose to develop more practical activities than theoretical ones, and that the classes have a more playful sense.

Regarding bad schedules, they are explained by the need to reconcile the schedules that the different races have. To overcome this, students propose to make schedules more flexible to make them compatible with those they have in their respective careers.

The incorporation of elective modules in the PFF is associated with the interest: a) to eliminate the obligatory nature of all the modules that make it up, making it possible for them to be exempted by those who possess the competences committed from diagnostic tests; and b) for having the option to apply for modules closely linked to the interests and potential of the students.

Table 3- Aspects to improve of PFF 3.0

To integrate modules and/or reduce autonomous work times and/or to improve credit allocation.
To develop more practical activities than theoretical.
To have more appropriate schedules and / or make schedules more flexible.
To develop cases that implement ethics between colleagues and/or work in companies.
To make an initial diagnosis that allows students to exempt themselves in some PFF modules.
To develop more practical work in classes, which make them less theoretical and more playful.
To incorporate elective modules.
To improve the allocation of companies where to develop projects.

Source: Self made.

Discussion

A review of the documents generated from various internal instances of the university - teaching, school, faculty and academic advice - (UTALCA, 2007; UTALCA,

2010; UTALCA, 2014b) since the PFF was implemented allows verifying that it has existed A process of continuous improvement characterized by:

• reduction in the size of the PFF (44 SCT) to make room for the contextualization of the competences involved with those associated with basic training and/or disciplinary training;
• an articulation of the generic competences to the requirements of each career, or to groups of careers associated with the same discipline;
• deconcentration of the PFF throughout the races based on the level of maturity and the implementation requirements of the generic competencies involved;
• a clarification of the concept of competition, in particular, its level of complexity, breadth, and expected development.

Regarding the latter, although there is currently greater knowledge regarding the concept of competence than it had more than ten years ago, it would still be necessary to specify the level of complexity and breadth expected for each of the three generic competencies that PFF 3.0 aspires to develop. It should be noted that, to date, the graduation profiles of the different careers do not specify the level of development of the generic skills to be achieved. In this way, the university is implicitly leaving each career or school free of action so that they define the level of development they aspire to have their graduates in the three generic competences for which the PFF 3.0 is responsible. In this case, this would mean that the degree of development in the generic competencies that PFF 3.0 engages would be at a basic level that is necessary to define precisely.

Almost all of the negative aspects reported, among which the requirement of a lot of free work time and the inclusion of modules/subjects that they deem unnecessary, include students who value more the competencies included in the basic and disciplinary training, which those included in the PFF. It is clearly perceived that the relevance assigned by students to the development of skills in communication, teamwork, and discernment is well below that assigned by companies, society, and the university itself. In this sense, there is a challenge not less to ensure that students perceive more clearly than their future, in a context of scientific-technological development that tends to automation/robotization, not only depends on their basic and disciplinary training but that of possessing the generic competencies that differentiate us as people.

In general, although progress is observed more than a decade after the start of the PFF, it is not solidly socialized. On the other hand, although there is institutional support for the implementation of the PFF, it has suffered multiple avatars expressed in changes of dependence, authorities, and teachers of the program. Besides, even though 8 SCTs of the PFF are currently included in the basic and disciplinary training modules, this integration or articulation has not been without difficulties with dissimilar results in different careers. Difficulties focused on the availability of time by teachers to create work teams in the same module.

To the above is added the absence of clear institutional leadership in support of the implementation of the PFF, missing support from the highest university authorities that

are visualized as such by teachers and students. The support that is expressed not only at a discursive level, but also in concrete terms in terms of resources, particularly the time required for an educational model of this nature.

Conclusions

The problems that the PFF has experienced at the University of Talca are explained essentially because the current capacity and experience were not available.

The most relevant aspect of the current PFF (3.0) is that it significantly reduces and clarifies the competencies that it undertakes to develop, redistributes its modules within the curriculum, opening space for its articulation and contextualization by the academics of each career, maintaining the common identity that students aspire to have when they graduate. However, after more than ten years have elapsed since the beginning of the PFF implementation, students continue without visualizing the importance and usefulness of the modules that make it up and that are intended to provide the generic skills that modern society demands from its professionals. Hence, challenges remain to be solved, such as: a) carrying out diagnostic tests for students entering the university in order to lift the obligation to take all PFF modules to those who already possess the transversal competencies considered in it; b) make its content more flexible by incorporating modules of an elective nature so that students can develop those skills that are more similar to their interests and potentials; c) deepen the socialization between teachers and students of the benefits that a competency-based curriculum model reports; and d) strengthen the institutional support for the implementation of the model.

The process carried out since the beginning of the PFF has been of continuous improvement, introducing changes that, although they have not altered their essence, are implying a timid step from a parallel formative model towards one integrated with professional training. That is reflected in the transfer of eight SCTs from PFF 2.0 to PFF 3.0 by ensuring that part of the development of generic competencies takes place in modules responsible for the specific competencies that each career requires.

In the light of the evolution experienced by the PFF, the authors propose to apply a reengineering with the participation of the actors directly involved, in particular, students, professors, and graduates, to raise the possibility that the development of generic skills Insert into the basic and disciplinary training modules.

The evolution of the PFF demonstrates the complexities involved in the incorporation of generic skills in university training programs. The current demand for these competencies by society invites us to review different possibilities for adopting training plans in higher education houses that resolve to opt for this approach.

In this sense, this work presented the current version of the PFF at the University of Talca, as well as the trajectory followed since its inception, as a base that could be improved, both for educational institutions and their respective majors that are already entering (or are about to enter) in curricular models oriented to the development of competencies.

References

ALDOWAH, Hanan et al. Internet of things in higher education: a study on future learning. **Journal of Physics Conference Series**, Langkawi, v. 892, p. 12-17, 2017.

CANALES, Tatiana. **Informe de evaluación del progreso de la cohorte 2010**. Talca: Universidad de Talca, 2013.

CLIMÉNT, Juan. Supuestos básicos del enfoque de competencias en educación superior: la educación veterinaria como marco de análisis. **Revista Electrónica de Investigación Educativa**, Ensenada, v. 16, n. 1, p. 71-90, 2014.

GONZÁLEZ, Luis Eduardo; ESPINOZA, Oscar. Formación general universitaria en el pregrado: conceptos, implicaciones y perspectivas. In: SEMINARIO INTERNACIONAL CINDA - Currículo Universitario basado en Competencias, 2018, Barranquilla. **Actas…** Barranquilla: Universidad del Norte, 2018. p. 85-104.

GUL, Shahla et al. A survey on role of internet of things in education. **International Journal of Computer Science and Network Security**, v. 17, n. 5, p. 159-165, 2017. Disponible en: <https://pdfs.semanticscholar.org/ceff/85e69da67d0d41ca4dc41e1ba0e56122e4d0.pdf?_ga=2.222925019.1535775499.1578508749-406528722.1578508749>. Acceso en: 10 jul. 2018.

IBSTPI. Internacional Board of Standard for Training and Perfomance Instruction. **Competencies, international board of standards for training and perfomance instruction.** Michigan: Ibstpi, 2005. Disponible en: <www.ibstpi.org/competencies.htm>. Acceso en: 22 jul. 2018.

LÓPEZ, Ernesto. En torno al concepto de competencia: un análisis de fuentes. **Revista de Curriculum y Formación del Profesorado**, Granada, v. 20, n. 1, p. 311-322, 2016.

MEDEIROS, Mario. Competencia en educación: un abordaje en activo. **Revista Electrónica de Investigación Educativa**, Ensenada, v. 14, n. 2, p. 89-102, 2012.

MOYANO, Emilio; VÁSQUEZ, Marcela; FAÚNDEZ, Fabiola. **El modelo educativo de la Universidad de Talca**. Talca: Universidad de Talca, 2012.

PÄIVIKKI, Jääskelä; SEIJA, Nykänen; PÄIVI Tynjälä. Models for the development of generic skills in Finnish higher education. **Journal of Further and Higher Education**, v. 42, n. 1, p. 130-142, 2018. Disponible en: <https://www.semanticscholar.org/paper/Models-for-the-development-of-generic-skills-in-J%C3%A4%C3%A4skel%C3%A4-Nyk%C3%A4nen/0c15e277117c3536ac7c974d4f3238d6f350cefe>. Acceso en: 10 jul. 2018.

RODRÍGUEZ, Roberto. Dos décadas del Proceso de Bolonia. **Revista Mexicana de Investigación Educativa**, México, DF, v. 23, n. 76, p. 7-14, 2018.

SAVANEVICIENE, Asta; RUTELIONE, Ausra; CIUTIENE, Roseli. Crucial transversal competences in the changing environment: case of the European SMES Managers. **Economics and Management**, Lituania, v. 19, n. 1, p. 100-108, 2014.

SCHMAL, Rodolfo. Evolución de un programa de formación en competencias genéricas. **Formación Universitaria**, La Serena-Chile, v. 8, n. 6, p. 95-106, 2015.

SCHMAL, Rodolfo; RIVERO, Sabino; VIDAL, Cristian. The challenge of building a program to develop generic skills in an undergraduate program. In: INTERNATIONAL CONFERENCE OF THE CHILEAN COMPUTER SCIENCE SOCIETY (SCCC), 36., 2017, Arica., I**nternational…** Arica: Universidad de Tarapacá, 2017. p. 1-5.

UTALCA. Universidad de Talca. **Acuerdo n. 1614 del Consejo Académico del 13 de enero, 2014**. Talca: Utalca, 2014b.

UTALCA. Universidad de Talca. **Acuerdos n. 1206 y 1208 del Consejo Académico Extraordinario del 9 y 23 de noviembre, 2010**. Talca: Utalca, 2010.

UTALCA. Universidad de Talca. **El proceso de transformación curricular**. 2007. Vicerrectoría (Docencia de Pregrado) – Universidad de Talca, Talca, 2007.

UTALCA. Universidad de Talca. **RU082 - Resolución Universitaria 082**. Promulga Acuerdo n° 734 de la Junta Directiva que aprueba la propuesta del perfil genérico y la estructura curricular del grado de licenciado y del título profesional contenido en la Resolución Universidad de Talca. Resolución Universidad de Talca, Talca, n. 082, 18 ene. 2005.

UTALCA. Universidad de Talca. **RU180 - Resolución Universitaria 180**. Promulga Acuerdo N° 1151 de la Junta Directiva que aprueba la propuesta de cambios al Programa de Formación Fundamental contenido en la Resolución Universidad de Talca. Resolución Universidad de Talca, Talca, n. 180, 14 mar. 2011.

UTALCA. Universidad de Talca. **RU224 - Resolución Universitaria 224**. Promulga acuerdo n°1384 de la Junta Directiva que aprueba la propuesta de modificación del Programa de Formación Fundamental contenido en la Resolución Universidad de Talca. Resolución Universidad de Talca, Talca, n. 224, 28 feb. 2014a.

VILLARDÓN-GALLEGO, Lourdes. **Competencias genéricas en educación superior**. Madrid: Narcea, 2015.

VILLARROEL, Verónica; BRUNA, Daniela. Reflexiones en torno a las competencias genéricas en educación superior: Un desafío pendiente. **Psicoperspectivas**, Valparaíso, v. 13, n. 1, p. 23-34, 2014.

YANAZE, Leandro; DE DEUS, Roseli. Transversal competencies of electrical and computing engineers considering market demand. In: FRONTIERS IN EDUCATION CONFERENCE (FIE), 2014, Madrid. **Actas…** Madrid: IEEE, 2014. p. 1-4. Disponible en: <https://ieeexplore.ieee.org/document/7044169>. Acceso en: 10 jul. 2018.

ZAPATA, John. El modelo y enfoque de formación por competencias en la educación superior: apuntes sobre sus fortalezas y debilidades. **Revista Academia y Virtualidad**, Bogotá, v. 8, n. 2, p. 24-33, 2015.

Rodolfo Schmal is currently an hour professor of Industrial Civil Engineering of the Faculty of Engineering of the University of Talca. Master in Computer Science from the Polytechnic University of Madrid, Spain, and a bachelor's degree in Engineering Sciences and Industrial Civil Engineer from the University of Chile, Santiago, Chile. He has been a professor of the Master's Program in Educational Policy and Management of the Research and Development Institute of the University of Talca, Chile.

Sabino Rivero is a current professor and director of the Business Informatics Engineering degree at the Faculty of Economics and Business of the University of Talca, Talca, Chile. He is a Civil Computer Engineer from the Technical University Federico Santa María, Valparaíso, Chile (1991), and a Master in Business Administration from the University of Talca, Chile (2003).

Cristian Vidal is currently a professor and researcher of Information Engineering and Management Control at the Faculty of Economics and Administration of the Universidad Católica del Norte, Antofagasta, Chile. He is the first civil computer engineer at the Catholic University of Maule, Talca, Chile (2004), with a master's degree in Computer Science at the University of Concepción, Chile in 2007, and a master's degree in Science in Computer Science at Michigan State University, MI, USA in 2013 as a Fulbright Scholar.