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TOWARDS A FRAMEWORK TO IMPROVE THE QUALITY OF TEACHING AND LEARNING: CONSCIOUSNESS AND VALIDATION IN COMPUTER ENGINEERING SCIENCE, UCT

Marcos Lévano[1] and Andrea Albornoz[2]
[1]*Escuela de Ingeniería Informática*
[2]*Departamento de Lenguas*
Universidad Católica de Temuco
Av. Manuel Montt 56 Casilla 15-D, Temuco, Chile

ABSTRACT

This paper aims to propose a framework to improve the quality in teaching and learning in order to develop good practices to train professionals in the career of computer engineering science.
To demonstrate the progress and achievements, our work is based on two principles for the formation of professionals, one based on the model of learning skills and the second on the model of convergence in information technology and communication (ICT) (Bradley, 2005). In this paper, the results are the validation of the graduation profile as part of the process of self-assessment and the internal strategies of the learning community that allowed to achieve the career validation for five years (2015 - 2020).

KEYWORDS

Convergence model, learning and teaching, competences, learning community, ICT, validation

1. INTRODUCTION

A variety of current trends have boosted changes in the way teaching is done (Tobón, 2005; Tobón, 2007). Some of this trends are globalization, the rapid technological development (Crawley et. al., 2007); (Ischinger & Alba, 2009), the new organizational structures of companies, job organization, etc. A lot of international initiatives have resulted in new methodological models and practices that have been incorporated in higher education. The majority of these models are focused on education based on competences. A competence is a visible behavior, skill or aptitude that person shows in a specific context to function effectively and satisfactory (Yániz & Villardón, 2006); (Crawley et. al., 2007).

In order to improve the academic processes, Universidad Católica de Temuco (UCT), for some years, has been boosting a new educational model (Sánchez, 2008). Some of the actions that the university has been taking are to increase the learning results and competencies, supported by the Agreement of Curricular Performance and Harmonization (Convenio de Desempeño y Armonización Curricular or CDAC-UCT1202). The base of this educational model are competences, because it aims to respond to the necessities of the job market and to be on trend with educational models around the world. The university emphasizes an educational model based in generic competences, to give a distinctive feature to the students of the university.

The issue proposed is this paper can be adressed by the two following questions: How to achieve a meaningfull learning? And How to demonstrate that our educational model has quality in the context of IT and psychosocial life?.

The strategies used by teachers are based on innovation, which allows to expand the improvements in human resources for the job market. The university has made several studies concerning the enrollment and the period after graduation of students. The university has also made studies concerning the development of the professional graduated from the Computer Engineering program. We are also working on

self-assessments in the following aspects: i) graduation profile, ii) operational mechanism and, iii) self´-regulation of the program.

In the next part of this document the foundation of the educational model of UCT based on competences is showed. In the second section the model of convergence of IT and psychosocial environment. The next part we describe the self-evaluation process and the validation of the program, finally, we show the results and the discussion and the bibliography.

2. FUNDAMENTALS

2.1 Educational Model of UCT

Competence is defined by UCT as: "Knowing how to act, using our own and external resources to solve real problems effectively and ethically" (Sánchez, 2008); (UCT, 2008). There are two kind of competences, generic competences, which are shared among all the programs of the university, and specific competences, which are related to each professional area.

The educational model in our university (Sánchez, 2008) is based on five axes. Therefore, the Engineering Computer program is set in the same way (Herrera et. al., 2009); (Lévano & Herrera, 2012):

1) Model of education based on competences: we are committed to managing the quality of learning, so we have implemented four specific competences that are fundamental for the education and development of the students and ten generic competences stipulated by the university (Herrera et, al., 2009), (UCT, 2008).
2) Significant learning focused on students in cooperation with the ACM models (Lévano & Albornoz, 2016); (CE2008, 2008).
3) Ongoing education: we hope that our students keep studding after they graduate, in post graduate levels that develop and increase the complexity of the development of human resources among the students.
4) Information technologies in the process of learning and teaching: based on what is stipulated in the curriculum, we have intensively incorporated (Sánchez, 2008), (Mellado, Lévano & Herrera, 2015).
5) Humanistic and Christian education: our globalized society demands ethical professionals with robust knowledge about their specific area of study, ability to face problems from different perspectives, and a high capacity for handle a variety of competences or skills. This is done throughout the five years us study in ten generic competences.

These abilities are developed throughout the five years of study by the validation of the generic competences (Herrera et. al., 2009).

2.2 Convergence Model of IT

IT and all its possible applications are interacting with the environment, the functions and processes that can be modeled by the converging circles (Bradley, 2005; Bradley, 2006). The process of social and psychosocial change, as well as IT, and all the concepts and the relationship among them (Bradley, 2005) are critical characteristics of this model. Some examples are: virtual reality —it is the summarization concepts pictured by four circles marked with dotted lines where virtual worlds are globally illustrated— embedded systems (omnipresent or ubiquitous), online and virtual communities, virtual avatars. Also, virtual technologies play an important role for the society (Bradley, 2006). The effects on humans are represented by the circle in the middle part, the individual part is affected by the IT, life environment is affected by the three sub-environments, and the role of life is affected by the three sub-roles. Globalization is affected by its three components values, technology and labor market. However, the individual can also influence the technology, the environment, and his/her own roles and phenomena on the organizational and societal level and the new virtual reality (Bradley, 2006), (See figure 1).

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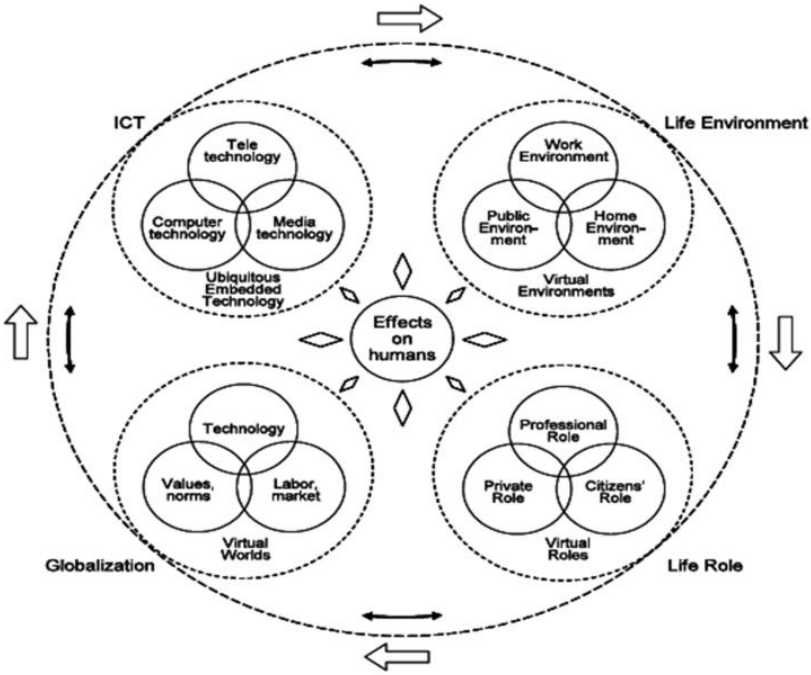

Figure 1. Convergence model on ICT and psychosocial life environment (Bradley, 2005; Bradley, 2006)

3. FRAMEWORK FOR SELF-ASSESSMENT AND VALIDATION

The foregoing process for validation began on march, 2014. We gather the information to make the self-assessment (Lévano et. al., 2014) concerning the graduation profile, and operation and regulation mechanisms. This work was completed in six months and then, the Directorate General of Institutional Management (in Spanish Dirección General de Gestión Institucional or DGGI) took three more months to make a review in figure 2. The stages of the process of self-assessment are showed. They include: induction, results of the application of surveys, self-assessment of the graduation profile, self-assessment of the application of the operation and regulation mechanisms, and development of improvement plan.

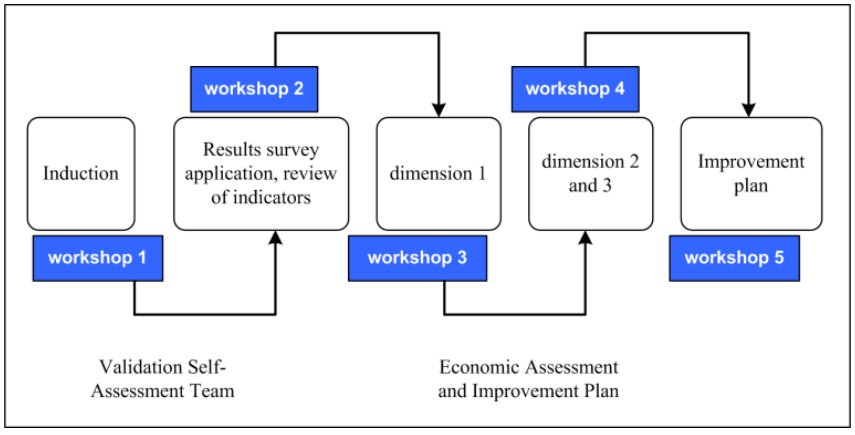

Figure 2. The stages of the process of self-assessment

Aspects influencing validation

- Creating a graduation profile based on the competences and the aspects stipulated by UCT.
- Amount of students graduated from the university currently working and employability rate of 90% after three months of graduation.
- Having a Learning Resource Center and an Innovation Center Teaching as key mechanisms in the management and support of the issue of competences.
- Having a portfolio of employees in the Araucanía and Santiago regions.
- Having good infrastructure for students.
- Having good organization of internal management.
- Having agreements with places in which students can do their professional practices.
- Recognize weaknesses with responsibility and commitment for an improvement plan.
- The way in which we teach some subjects like mathematics, physics, economy, etc.
- Evidence demonstrated at conferences on the progress of own educational model with rate results.
- The strong commitment of ex-students and employers testified the good work that is done by the university in our society.
- The university is attached to national and international academic institutions in order to be engaged to the work related to research in various areas of computer engineering

Academic principles for the development of the plan

We seek a systemic equilibrium based in long term work and the experience of teachers in recognizing and see reality, in order to project a sustainable development of professionals. We seek our professional to have a social impact in our region, concerning issues that are important in our time. Computer Engineering Science program follows the principles of the university, to have coordination, monitoring and harmonization in the curriculum.

Implications

- Improve internal processes in teaching and learning and recognizing that we work with results that lead us to have an identity seal and prestige.
- One of the results the university wants to achieve is the validation of the programs. Validation allows the university to give the students a good education in the diverse areas of their disciplinary training.
- The university is making an effort to improve the process of education, according to the education in Chile. We hope that students from our region can contribute to the development of the country.
- This work is done for the welfare and improvement in the quality of training of students and to improve all issues concerning the university.
- We recognize our weaknesses after the process of self-assessment. This allows us to generate changes that will allow us to improve our internal processes together with graduates, employers, teachers, and students.
- When we recognize our weaknesses we can assure that we are giving the best education, all according to the CNA-Chile (Law 20,129).

4. RESULTS AND DISCUSSION

The graduation profile has been evaluated by students, academics, graduated students, and possible employers. We have applied an assessment process given by the CNA. This evaluation gives us feedback and contributes to decision-making in relation to the monitoring and improvement of the graduation profile.

We made question to 20 employers, 80 graduated students, 155 students, and 18 teachers. We asked to teachers if they agreed or not with the graduation profile. 67% agreed and 33% strongly agreed. We also asked if the feel that they have had participation in the creation of the graduation profile. 17% agreed and 83% strongly agreed. 100% of the academics said that they do have participation in the creation of the graduation profile.

59% of the students agreed and 19% strongly agreed when they were asked if they knew the graduation profile of their program. That means that the 78% of the students knew the graduation profile.

31% of employers said that the graduation profile of the program is appropriate for the requirements of the job market. When the graduated students where asked if the requirements of the program (to get the degree of Engineer) were appropriate, 29% strongly agreed, 50% agreed, 13% disagreed, and 8% strongly disagreed.

4.1 Post-validation Challenges

Among the challenges that the validation brings are:

- Increase and develop strategies to boost research.
- Adjust and strengthen the force between employers and the environment.
- Permanent improvement in the formation process and the teaching and learning strategies to contribute to the country's development.
- Maintain short period each between each measurement cycle (2, 4 and 5 years).
- Maintain a constant method for the improvement of learning guides in order to innovate forms and learning styles.
- Support other programs so they can have their accreditations.

4.2 Learning Community

The development of the learning community is based on the principle of generating and sharing knowledge in order to generate interaction and collaboration networks between teachers and students. The work of teachers, students, collaborators, etc., is developed based on achievements and development of the learning results. We support learning with ICT and with the relationship between teachers and students.

4.2.1 Stage Domain

The executive committee of the faculty designs and plans the activities during the academic year. It is in charge of seek topics that will be important for the validations of competences. Each group is organized according to each subject. Each group has a coordinator.

Every group is led by the director of each faculty. Some of the tasks they develop are the review and proposal of new designs for learning guides, apply new ways of teaching, examine the environment, generate links between companies and university, workshops to show the vision of those companies, review the developments of the competences of the students, generate new ways of evaluation, and collaborative work among internal groups of the university.

Each group generates a network that allows the management of schemes, one is based on personal learning environment (PLE) (Dabbagh & Reo, 2011) and the other is based in personal learning network (PLN) (Werdmuller & Tosh, 2005). This is done by the teachers by using a platform called RSICE (Mellado et al., 2015) (https://rs.inf.uct.cl/) or social net of educational integration and collaboration concerning the subjects they are teaching. They can use ICT, as virtual classrooms, chat rooms, generation of surveys, shared documents, and module assignment of activities. On the other hand, they can also use a platform for community groups to develop the process of teaching and learning, is called Moodle (Ferreira & Cardoso, 2005), there they can have centralized management of the courses and subjects that they teach.

4.2.2 Collaborative Domain Stage

The groups of the community interact with other programs in order to give and receive support for the activities concerning the develop of the students. The idea is to maintain the axes present: humanist and Cristian formation, the competences, ICT, and ongoing education. In that way the community interacts with other communities related to basic sciences, in order to develop learning guides that will allow to validate diverse areas of study.

5. CONCLUSIONS

As teachers recognize our work and tasks in the field to improve the professional training we give to students, that leads us to be part of a whole arduous work of great responsibility in our society. We know that despite the work we say we do, we make mistakes that lead us to thoroughly review and reflect on how to give better education to students. Update our knowledge every day leads us to grow and be part of the future of our students in the job market.

The learning community of computer science has allowed a balance to the process of generating contexts to help exploit validation mechanisms in models of competency-based training programs built on learning outcomes.

The process of developing methodologies to achieve objective assessments that lead to states of achievable learning processes educational activities is a challenge that every day scholars, instructors, assistants face in order to deliver quality education.

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