Designing Environments for Collaborative Learning: Facilitating the Adoption of ICT in Small and Medium Sized Enterprises in Costa Rica

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Abstract: The poster describes the design and practical implementation of a collaborative project used to improve the collaborative learning among university, industry and government with aim to facilitate the process of the adoption of information and communication technologies in small and medium sized enterprises in Costa Rica. Learning activities and spaces have been designed to facilitate the interaction of the three sectors and foster critical thinking, collaboration, problem solving, and team work skills in the participants.

Introduction
In this work, we are going to look into arguments and strategies used to design a collaborative action learning project, within the triple helix framework, to support the adoption of information and communication technologies (ICT) small and medium size enterprises (SMEs) in Costa Rica. The project was designed under the premise that in order to achieve a significant and sustainable change in the SMEs sector it is necessary to implement initiatives based on experiential and social learning processes focused on reflective thinking in the organization as well as in individuals.

Triple Helix Development Model deals with a reciprocal relationship among university, government and industry in the process of knowledge capitalization. The first scope of the Triple Helix model is an internal transformation in each of the participants. The second is the influence of one participant upon another. The third dimension is the change in the interaction and relationship among the participants with the objective to produce new ideas and create new initiatives supported in high tech development. Therefore, the model explains what is expected from each sector, starting with the universities who are having the role of producing knowledge, being a motor of research and applying that outside of academia, and being the leader in the development process. This role of universities is very relevant in developing countries. The government is seen as a supplier of the appropriate regulatory framework to create environments of sustainable, dynamic and progressive growth; and finally, companies are the ones generating new business opportunities (Etzkowitz, 2008).

Under the umbrella of this model and in order to support the SMEs sector with sustainable strategies in a long run we suggest to develop collaborative action learning projects focus on the learning process among the actors, helping the people to learn to learn and to collaborate. These projects should address concrete problems of the SMEs, fostering companies and people's capacity to learn, and especially giving them tools to face the adoption of new technologies.

In our point of view, this kind of projects should create learning settings where:
- The actors - universities, government and industry- learn how to work together
- The enterprises develop learning capabilities, based on a collaborative learning and problem solving approach which provides skills to face the new economic scenario of the knowledge economy.

Action learning and Action Research Approach
We would define action learning as building learning environments around collaborative work (O'Neil & Marsick, 2007) where a group of people with different skills and experiences compromise to work together to analyze and solve real-world situations of everyday work (USOPM, 2006), trying to learn from their actions and from what happens to them and taking time to reflect and to insight about their practical things (Weinstein, 1999). The common elements of action learning include action learning set, problem or situation, set advisor, facilitator, and action learning meetings (Edmonstone, 2003).

The action learning approach (Revans, 1998) was taken as a point of the departure in order to develop skills of the participants regarding collaborative learning, problem solving, and critical thinking. Furthermore, it was found productive to use the approach of problem and project based learning (Dirckinck-Holmfeld, 2002) as a framework to deal with real work problems. Facilitator’s role of action learning theory was played by a group of professionals who come from a university, a governmental institution, a micro business and a researcher, this group was called facilitator group and they used action research approach to drive the action learning project and explore strategies to facilitate the triple helix interaction.

The action research is a participative cyclical process focuses on change, which brings together action and reflection, theory and practice with aim to find practical solutions for matters concerning people and their learning process (McNiff & Whitehead, 2006). In its most common expression action research uses a cyclical
process whereby alternating action and critical thinking, with steps of plan, act, observe, reflect and plan again (Carr & Kemmis, 1986). The facilitator group applied this cycle in each design meeting in order to understand what was happening in the project, to take decisions and plan future activities. Furthermore, the approach was to ensure to create collective knowledge with the interaction and feedback of all participants.

Designing the Collaborative Action Learning Project
This action learning project, implemented from June to December, 2008 in Costa Rica, is part of the empirical work of a research project. The aim of the action learning project was to create a learning setting in which practitioners from different sectors, fields, organizations come to work together in order to learn and share experiences, ideas and practices, solve real problems, develop new ideas, do things in different ways, and create new knowledge, regarding to implement ICT projects in the companies in order to improve their competitiveness.

The theoretical framework used to design the action learning project was supported by different learning approaches and assumptions. First, people learn better when they are actively involved in solving real problems, reflecting on the actions taken and learning from that, so when there are actions there are learning, and when there are leaning, there are actions (Revans, 1998). Second, we are social beings and learning is a matter of social participation. Participation is a process of leaning and knowing, a kind of action and a form of belonging (Wenger, 1998). Third, learning is a process of the reinterpretation and understanding of the past activities, and knowledge is created through the transformation of these experiences (Kolb, 1984).

Based on these approaches the design was focused in four aspects:

- To develop the participant’s capacity to use action learning to address problems, reflection on their own action and learn from them, so they use this new knowledge as a guide for future actions.
- To develop the companies’ skills to work in groups, and to develop capacities to participate productively in the networks who provide support to SMEs.
- To solve problems in collaborative way boundary of all the sectors which are involved in the problem: university, government and industry.
- To develop critical thinking to produce knowledge that can help to understand the triple helix interaction.

The project’s participants were two medium sized enterprises from the manufacturing sector, who are developing the information system with the university students; a public university in Costa Rica which has the role of creating knowledge and leading the project; a governmental institution, which is responsible of formulating specific policies for the promotion, development and strengthening of SMEs in Costa Rica; and a micro business consulting firm with a strong background in logistics and manufacturing, information technology management, process improvement, strategic planning and systems thinking.

The companies developed a real ICT project with the intervention of the facilitator group, which gave them the opportunity to investigate and find solution to some problems that they were facing in that moment. It did not only allow them to adopt technologies in their businesses, rather more it allowed them to foster more and deeper administrative competencies necessary to manage their business and to develop collaborative learning skill necessaries to play a better role in the knowledge based economy.

Activities of the Collaborative Action Learning Project
As a part of the project the participants were involved in different activities which were designed in order to support the participants in their process of to learn to learn, collaborate, work together and support the design, development and implementation of an ICT project in the enterprises. The activities carried out were:

- **Workshops**: were learning activities combining concepts of programmed knowledge (Zuber-Skerritt, 2001) and learning by doing. The workshops had a purpose of carrying out a rigorous diagnosis of the situation, identify the real problem and develop the project plan to resolve the situation that the companies were facing. Furthermore, these workshops were used as training sessions to prepare the participants to take a participative role in the action learning meetings.
- **Action Learning Meetings**: these communication spaces were held in order to strengthen the collaborative learning, the participants (students and companies) shared ideas, practice and experience, received feedback from colleagues, and identified action and implemented these.
- **Evaluation Workshop**: it was an exercise to reflect on the project about what went well/ not well, why yes, and why not. During this activity a dialogue among the all project participants took place in order to know the opinion, impressions, feedback, and recommendation from participants.

Lessons Learned
We are using action research as research methodology. The process was documented by audio and video recorded and each activity had careful description. This description was done using a template which has information relate to date, purpose and description of activities, methods and tools used, actors and reflections.
We also documented the experience of each company. We are now in the data analyze phase, so we have not done a more detached analysis of the intervention processes. However as part of the action learning process the facilitator group has on a systematic basis been dealing with the learning process of the individual as well as the groups and learning environments. Based on these observations we have identified some circumstantial conclusions:

- Action research approach allowed to orchestrate the setting where came together Government sector, University sector, research sector, and Productive sector to work with students and small companies to resolve real problems, among participants who were not used to worked together. The iterations were molding the group and changing it from a traditional group (individual responsibility of the work with the aim to complete a task) to a collaborative group (take group responsibility, share leadership and with the aim to learn and solve the problems).

- After few action learning meetings the participants became more aware of their purpose as a group, developed communication, listen and reflective skills, got empowerment, and were aware of how the individual performance affects the collective performance, it did possible to see a constructive solution of conflicts, there was more motivation and it was easier to achieve the objectives.

- The main challenge for the members of facilitator group was to change their individual behavior. The participants had a lot experience doing projects in their own way, they came to the project with their own organizational cultural, customs and assumptions, so was hard for them to learn to listen, reflect, ask, and learn together, from our point of view it could be homologated with the first scope of triple helix model, which is the transformation of each sphere. The experience gained in this project could provide a small scale vision about elements that could facilitate or difficult implementation of the triple helix model in a national context.

- This project has not used ICT as a mean to foster collaborative learning in the participants, however the implementation of the ICT for management and the training in collaborative learning have developed collaborative skills which will allow them to participate in learning process using technology, as e-learning and CSCL. The companies also are better prepared to participate in the National Network to Support SME.

- Related with the process of implementation of ICT the project confirms that the most important element was to identify the roots of the problems and to develop a detailed project plan. The link with the University provided the companies with new knowledge about ICT management. On the other hand the students (with the help of the supervisors) worked on real life ICT problems, and they learned to apply the theories and methods to the needs of the companies.

References