Using ict

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USING ICT: TRANSFORMING THE UNIVERSITY – DESIGNING FOR INNOVATIVE TEACHING AND LEARNING: PROBLEMS, VISIONS AND REALIZATION

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INTRODUCTION

Several studies (Bates 1999; Bates 2001; Dirckinck-Holmfeld & Lorentsen, 2003; PLS Rambøll Management 2004) underline the need for management leadership in the integration of ICT in university practices. The strategic study of virtual models of universities for the European Commission (PLS Rambøll Management 2004) finds that a majority of universities face an important challenge in promoting ICT integration and e-learning from a project level to a more strategic level. Furthermore, the report emphasizes, that in order to integrate ICT successfully, both top-down and bottom-up approaches are needed, and the existence of an ICT strategy is a significantly important driver in the ICT developmental process. Universities with an ICT strategy are more advanced in their integration of ICT in their own administration and organisation, as well as in their educational setting. Also, the existence of an ICT strategy is an indicator of increased networking co-operation in the area of ICT. By the same token, the absence of conspicuous support and priority allocated by the university management to ICT integration and e-learning is a critical obstacle at many EU universities. The study indicates that this is partly due to the fact that historically university managements have not been concerned with ICT and e-learning as it has not been regarded a core business area. In the years to come, ICT integration and e-learning will tend to evolve from project-based and experimental ventures into integrated features of the normal functioning of all university activities. Ensuring the further development and sustainability of ICT integration and e-learning is therefore a major future challenge for the university management (PLS Rambøll Management 2004 p. viii).

The ELAC project, European and Latin American Consortium for IST Enhanced Continued Education in Environmental Management and Planning, is targeting this challenge as a demonstration project. At one level, we are initiating educational experiments and a thorough capacitating programme, and at the other level, we are developing institutional strategies on ICT to align and sustain the initiatives at the participating Latin American universities.

The ELAC project aims to demonstrate the potential of the Information Society in the university environment and, through exposure of the methods and approaches applied, reveal the potential of extending the reach of higher education to all levels and aspects of society in Latin America. The project therefore targets the society as a whole with Latin American partners in Mexico, Nicaragua, and Costa Rica, particularly students and academics in higher education within the area of Environmental Management and Planning in these countries. The main activities of the project relate to implementing an Information Society based mechanism that enables the deployment and development of an innovative and multilingual virtual learning environment which provides access to application of appropriate, innovative and varying learning approaches and methods. Appropriate courses will be established and continued education facilities reinforced (ELAC 2003)

The ELAC project is a three-year project supported by the @LIS-programme within the European Union. It has eight partners, four partners in Latin America (Universidad Centroamericana in Nicaragua, Universidad Nacional Autonoma de Nicaragua; Universidad Nacional de Costa Rica, Universidad Autonoma Metropolitana de Mexico) and four partners in Europe (Aalborg University, Lancaster University, Barcelona University, and The Danish Technical University, who is heading the project (www.elac.dk).

As part of the ELAC project we have been applying participatory methods for developing institutional strategies for e-learning and e-capacity building in the Latin American universities (Dirckinck-Holmfeld et. al. 2005 a, b, c and Dirckinck-Holmfeld & Garrido 2005).

Based on the methodology of "Future Workshop" (Jungk and Müllert 1984), shared problem identification, vision work, and implementation strategies have been worked out. More than fifty problem areas have been identified at each university and turned into a vision and strategy for

change. The main themes concern the need for an overall institutional strategy for ICT, the need for e-capacitation at all levels, curriculum and pedagogical development and educational experiments, infrastructure and basal issues about access and costs of ICT.

TRANSFORMATION OF THE UNIVERSITY

In order to frame the transformation process towards innovative teaching and learning from a *theoretical point of view* and to contextualise the discussion of pedagogical and institutional change, we are drawing on activity theory and use the activity triangle developed by Engeström (1987). Engeströms model draws on central insights from the russian cultural historical tradition within psychology from 1930'ies (Vygotsky 1978, and later Leontjew 1977).

In activity theory the implementation of tools is part of the context. The unit of analysis is 'an activity', which is usually visualized by a single-triangle model (Engeström 1987). In this figure, we see that a subject (or a group of subjects) interacts with the world using tools (instruments/artefacts) in order to transform an object into an outcome. The object, or the purpose of the activity, is what people collectively or individually are working on and which is transformed into an outcome. The object of the activity can for example be to use ICT as a catalyst for developing innovative teaching and learning as in the case of the ELAC project.

The upper part of the triangle reflects the notion that human activity is always mediated by artefacts and that the psychological and cognitive processes are developed and transformed through these artefact-mediated activities (Vygotsky 1978). Technology *is not neutral* – the technology afford and constrains the cognitive and psychological processes, the design carries the meaning of certain pedagogical approaches, certain cultural approaches, certain understandings of how learning takes place, and certain human values. As so the technology mediates the meaning construction process and affords and constrains the practices taking place[1].

The lower part of the triangle originates from the further development of the theory by Leontjew, who stressed the collective nature of activity systems (Engeström, 1987), and it demonstrates that

[1] For an extended discussion of the concept of affordance please see the article by Jones, Dirckinck-Holmfeld et.al (in print).

activities take place in a community (e.g. a group of teachers, a university, or the society), that human activities are mediated by rules and norms, and reflect a certain division of labour.

Focussing on the activity system as the unite of analysis, underlines the transformation process as a unified process, but also as a negotiation process. Implementing and integrating new information and communication technology in teaching, research, and outreach of the universities, influence and change all the other elements in the organisation. It makes new learning process possible, but at the same time it will influence the formal as well as the informal rules, legislations, e.g. teaching norms, evaluation procedures etc. It will influence the division of work – new competences such as pedagogical designers, and technicians are needed to maintain the learning infrastructure - as well as it influences the community of the university, the community of teachers, learners, etc. .

A central notion within activity theory is that the driving force of development and change originates from contradictions within and between the nodes of the activities (Engeström, 1987). Contradictions and the resolution of these contradictions are the principle of the activity's self-movement and development. In our point of view, these contradictions are tensions among human actors and communities of practices negotiating the meaning, objectives, and perspectives of the transformation process when integrating ICT. As such, ICT may be viewed as a reason to negotiate the vision for the university, rethinking the pedagogical and educational processes and negotiating the organisational and cultural changes.

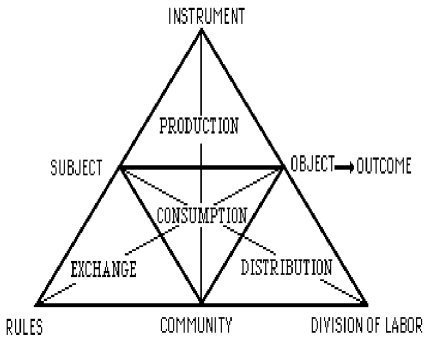


Fig. 1. The structure of human activity (after Engeström 1987)

More recent development of the Activity Theory has suggested that the unit of analysis is to be seen as two interacting activity systems (Figure 2) as a minimum. (Engeström1996)
This addition makes good sense in relation to our cases, in that we can conceive the work in the ELAC-project as co-configuration among activity systems. On the one hand, we have the universities' existing practice – primarily face-to-face teaching and learning – and on the other, we have the ELAC-project and the aim of developing new and appropriate pedagogical practices using ICT.

The shared object within the organisation is the aim of developing the innovative pedagogical practice, and the co-configuration is to figure out, what it is. Furthermore, it is a transformation process, which is going to transform the whole system, not only the teaching and learning, as it also influences the whole community, the division of work. However, if it is going to be understood as a truly co-configuration process, then we have to establish fora for dialogues, where the key actors within the organisation get an opportunity to discuss and sketch the future use of ICT in the organisation.

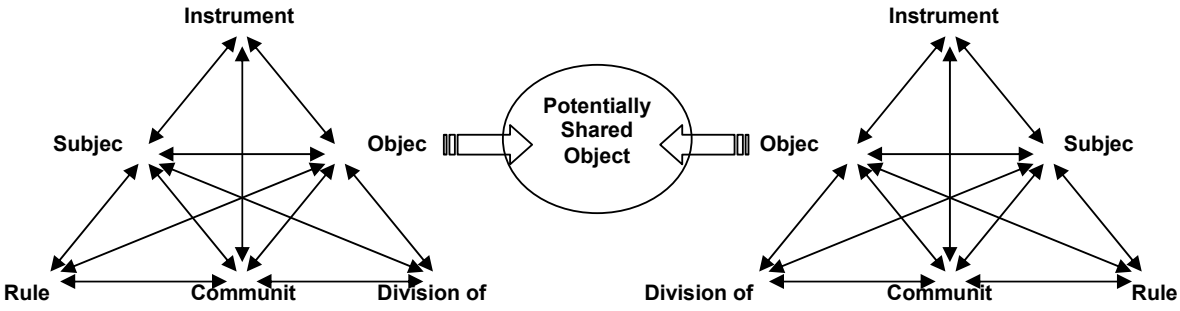


Fig. 2. Two interacting activity systems (after Engeström 1996)

The ELAC-project has provided different opportunities for the university members to gain insight into new opportunities using ICT. A comprehensive training program for teachers, pedagogical designers, technicians and managers is one among other activities worth mentioning. Furthermore each LA-university has established a number of pilot courses using ICT. One of the training activities, especially for the management level, was organized as a future workshop. The future workshop provided a dialogue forum for the university leaders – rector, deans, head of departments,

teachers - and provided an opportunity to discuss the problems and visions related to the implementation of ICT within each university.

FUTURE WORKSHOPS METHODOLOGY

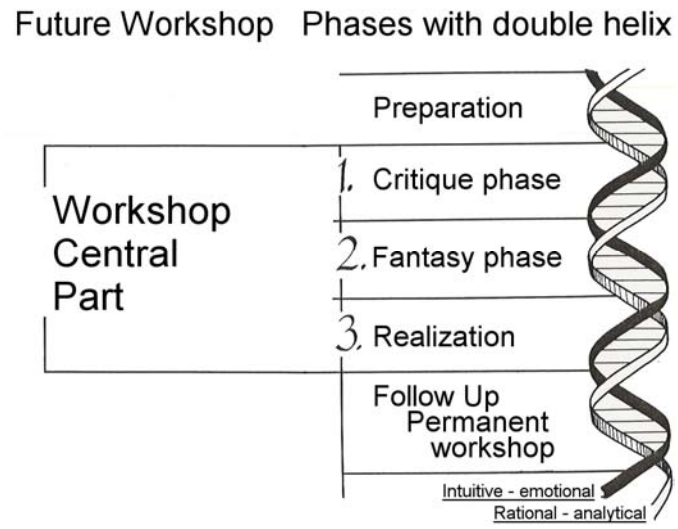


Fig. 3. Future Workshop Phases (after Jungk and Müllert 1984, translation Ian Semey)

Future Workshops originated in the 1960'ies as a response to experts´ future plans within industry, government, political parties, and military. Bringing young people, workers and other actors from civil society together in "future workshops" (*Zukunftswerkstätten),* was a method to produce counter visions for the future. The "future knowledge workshop" methodology is thoroughly, described in the book "Zukunftswerkstätten, Wege zur Wiederbelebung der Demokratie" [Future Workshops handbook in democracy, my translation] by Robert Jungk and Herbert Müllert, who teach at the Technical University in Berlin in future research respectively the social implications of computer sciences. Future Workshops are a methodology to organise a dialogue, to build on the experiences and ideas and creative visions of ordinary citizens in order to provide visions of the future as alternatives to visions produced by the actors and groups in power.

In a Danish context, Future Workshops have not only been reserved for civil society activities, however, the methodology has been used widely – within organisation development, systems design, product development, curricula design, etc., all kinds of activities preparing for the future.

The methodology has proved to be very effective in producing future visions and action plans.

- it provides situated insight into the problem areas. Solutions and visions are based on participant's experiences
- it helps to establish synergy among the participants
- the workshop provides space for creative dreams and steps to take.
- it provides a shared understanding and ownership to the problems across the organisation, and
- the resources of the group members are used very effectively, giving voices to all participants,

Based on experiences from facilitating many Future Workshop, it is, however, important to stress, that Future Workshops have to be integrated in a broader "transformation strategy" and followed up by other initiatives and concrete implementation activities.

FUTURE WORKSHOPS IN THE UNIVERSITIES

The Future Workshops were held at each LA-university. The workshops were targeting leaders, managers, members of study board (also students), and pedagogical designers. In each university 15 – 20 key actors from the university participated.

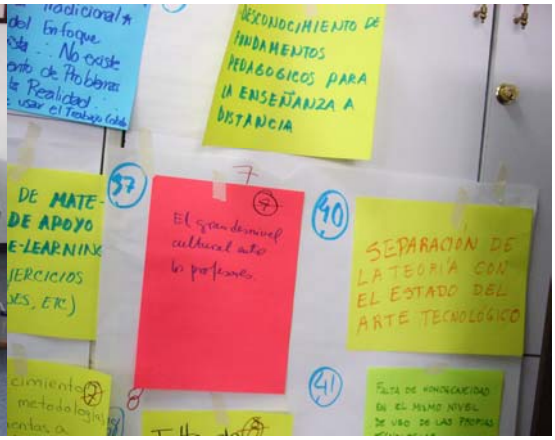
The theme for the workshop was "*Using ICT: the transition towards virtual universities and innovative teaching and learning"* The specific focus was the transition of the teaching and learning methodology towards student centered, collaborative, and problem-based learning using ICT, as well as the discussion of a strategy for on-campus as well as off-campus teaching and learning (continuous education).

The workshop was carried out as a "Future Workshop". The participants worked through the following phases:

- Critics
- Visions
- Realization

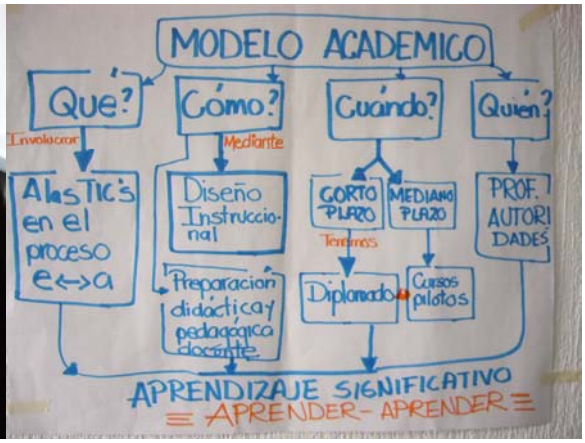
The critics phase was organised in plenum, while the visions and realization phases were organised in groups.

Phase of critics



Critic statements

Phase of Vision



Realization

Fig. 4 Future Workshop phases

The participants were beforehand asked to reflect some strategic questions on ICT: *"Why does a university want to support the education-learning programs with ICT? Which approaches and understandings do we have of ICT in these processes? How is ICT integrated in the development strategy for the university? How is ICT integrated in investigation, teaching, learning and dissemination? How to integrate teaching and learning based on ICT in the university? New initiatives, innovation in pedagogy, new student groups. What type of organizational structure supports the use of ICT for teaching and learning? How to adjust to it? Which are the strengths and weaknesses of university in relation to integration of ICT in education"?* Furthermore, we presented four possible scenarios for ICT in the universities based on the European report: PLS Rambøll Management (2004) The "*frontrunner university*" is characterised by an extensive use of ICT within teaching, learning, and

administration, a guiding vision for the university, very positive attitudes towards ICT among both management, teachers, and students, and strong collaboration with national and international actors. The "*co-operative university*" is characterised by lower use of ICT within teaching, learning, and administration compared to the frontrunners, however though, it has a high level of focus. In line with the frontrunner university, they have much focus on national as well as international collaboration. Two other clusters of universities are the "*self-sufficient universities*" and the "*sceptical universities*" – as the name indicates, they have less focus on ICT for administration, teaching and learning. The attitude towards ICT is sceptical especially among the teachers, and there is a low strategic co-operation, nationally and internationally. Especially, the sceptical university doesn't have a strategy for the integration of ICT

A Future Workshop may be organised in 2-3 days. In the case of the ELAC-project, the workshop was organised within the limitation of 5.5 hours due to the busy schedule of the participants.

The workshop was organised in collaboration between the LA-university and the European universities. The local organizer, a senior manager, was chair for the workshop, while the European organizer, a senior professor, was facilitating the workshop.

TRANSVERSE FINDINGS ON INSTITUTIONAL STRATEGY

Looking across the reports from the Future Workshop, these point to the following critical issues within the LA universities:

- Lack of an institutional strategy for the university and for the departments/schools regarding ICT, teaching, and learning
- Need for capacity building – both regarding human resources and ICT infrastructures
- Need for curriculum development and new pedagogy
- Infrastructure

Counting the votes[2] within each category across the materials, provides indication of priorities within the LA-universities as well as the differentiations among these:

[2] All participants were given 10 votes, which they could distribute among the critic statements in order to prioritize the problem areas. Based on these voting 3 – 4 overall themes were identified at each LA-university.

	UAM	UCA	UNA	UNAN	Total
Institutional strategy	88	84	63	35	270
Human resources and capacity development	33	68	51	66	218
Curriculum and new pedagogy	69	37	32	17	155
Infrastructure			36		36

Table1. Priorities of problems within LA-universities

1. For most of the universities (UAM, UCA, UNA), the lack of an institutional strategy get most attention.
2. Human resource and capacity development get second most attention all together (UCA, UNA and UNAN). At UNAN it has the highest priority,
3. Curriculum development and new pedagogy get the lowest attention (in UCA, UNA, UNAN), however second most attention in UAM.

And finally,

4. Infrastructure was only mentioned in UNA as an issue. Here it got the third level of attention (a little more than new pedagogy). At the other universities infrastructure was part of the other themes.

The table indicates high awareness of the need for an institutional strategy. A finding, which is very much in line with the recommendation from e.g. the EU report on Virtual Universities (PLS Rambøll Management, 2004) and the work done by Laurillard (2005)

Furthermore, the less focus on infrastructure is interesting. It might indicate that ICT as a technical phenomenon has been solved and prioritized in previous work at the universities. Another explanation is that the focus within the ELAC-project has been the use and capacitating perspective more than the technology per se. This is also the way technology has been discussed most of the

places. As so technology issues have been mentioned as integrated elements of capacity development, management planning, etc.

Overall seen, the table indicates a comprehensive and united view on ICT development pointing at the need for a shared vision for the integration of ICT – at the same time, the tables also provided insight into many concrete problems, which have to be solved in order to successfully use this opportunity of ICT to rethink the pedagogical practice, and to strengthen the capacity of the teachers as well as the institution.

MAIN BARRIERS

To give a flavor of the main barriers, we will present some of the statements from the participants. The 2-3 statements with most votes within each category from each university have been assembled in the tables presented below.

THE NEED FOR POLICY AND STRATEGY

29	The lack of institutionalization of the remote education (ICT)	12
5	Policies accompanied with real budgets	8
30	The institution does not have the use of ICT as national and international cooperation axis	5
6	Lack of strategy at institutional level that supports and directs the incorporation of ICT in the university	37
31	Excessive dependency on the international aid to develop the ICT	5
40	Disintegration of efforts or agents related to the ICT	3
48	Integration of an institutional project that formalizes the collaborations and orients the ample range of levels and incorporation of ICT	16
1	There is a need for a normative and legal framework for the incorporation of ICT in the processes of e-learning and continuous education	10

14	Development of the institutional frame for ICT	10
62	The university lacks a policy on ICT: academic registry, virtual programs, administrative work in networks	16
23	We need definition of policies that govern the development of ICT such as the Education of Future-project	11
24	Limited resources and high costs to acquire ICT	10

Table 2. Statements across institutions on policy and strategy

As already said, the need for an ICT strategy at university level was viewed as very important within all the universities. All universities stressed the importance of developing policies and strategies, which could guide the implementation work. The common understanding was that these strategies should reflect the relations between technical, pedagogical and organizational issues. In some universities, the wiring of the campus and the implementation of the technical infrastructure were not linked to an overall educational strategy. Furthermore the strategies and ICT should strengthen remote education – utilizing ICT to establish a learning infrastructure between the main campus and the rural campuses, and also to take a lead in providing lifelong education and continuing professional development. It was stressed, that a normative and legal framework has to be developed when incorporating ICT, e.g. examination rules, teaching norms, norms for presence – virtual activities, etc. The participants also focused on the request that new initiatives were followed up by real budgets, and in relation to this, projects and financial support from national and international collaboration were viewed as very important issues.

HUMAN CAPACITY DEVELOPMENT

35	Resistance of educational authorities and teachers to the change	8
23	Authorities not in line with technology, alienated to changes, do not impel them	17
18	Little capacity in the human resource (technical, pedagogical capacities and of design)	14
52	Little knowledge in the development of ICT	15
2	Lack of understanding of the possibilities in ICT for	6

	teaching and learning	
27	Resistance to the changes of methods in the educational process	12
38	Lack of support to the students (attendance) Who and how they teach the students	8
37	The great cultural inequality between the professors	7
60	Resistance in the teaching staff to modify its traditional role	11
27	Low level of dominion of ICT. Professor-students	12
2	Change of mentality in order to engage in ICT	12

Table 3. Statements across institutions on human capacity development

The problems raised regarding human capacity concern on one hand the resistance towards changes among educational authorities and teachers. Authorities are not in line with the technology, often they are not using the technology very much themselves and they lack understanding of the possibilities in ICT for teaching and learning, and they are therefore not impelling the technology in the universities. This resistance to change is linked to the lack of capacity and technical, pedagogical, and design competences among leaders, teachers, and students, lack of support and also cultural diversity and inequality among the teachers and professors. Some teachers find ICT challenging and a provider of new opportunities, while many teachers find it threatening, are not sure that ICT really contributes to the learning of the students, they find it very expensive, and a fashion without being sure, that the learning really will gain from it. Others find that the technology carries the meaning of alienation and control, and cultural domination. That mediated communication is taking over from face-to-face etc. Finally, there are also teachers and professors who resist to the changes of methods in the education processes, who are insecure about the new relation between themselves and the students, as some students know more about the tools, than they do.

CURRICULUM DEVELOPMENT

38	Fragmentation of initiatives within the organization	10
17	The curricular strategies do not require incorporation of	5

	ICT	
24	The ICTs do not constitute a fundamental axis of the curriculum	2
19	How to change the form of traditional face to face [courses] without collaborative approaches to mixed and participatory models with ICT?	9
57	How to transform contents and materials of a face to face environment to one mediated by ICT and more collaborative environments?	5
24	Difficulties of working in groups and little technical support	17
27	Resistance to the changes of methods in the educational process	12
9	Necessary to rupture the schemes' conception of education/learning	16
4	How to use ICT when still being in search of solutions to the problems of the traditional education	8
41	How does ICT contribute in the innovation process of the university and investigation?	6

Table 4. Statements across institutions on curriculum development

At the time of the Future Workshop, ICT has not been systematically integrated in the curriculum – either as a new tool, a new method or as a new topic. Some of the challenges faced by the partners are linked to the problem of how to transform contents, materials from face-to-face teaching, into mixed mode or hybrid models of learning. Moreover, most participants wanted to use the ICT to contribute to the innovation process of the teaching, learning, and research, focusing on the collaborative opportunities in ICT and socio constructivist approaches to learning.

VISIONS AND REALISATIONS

The participants used the models of virtual universities from the European report (frontrunners, co-operative, self-sufficient, sceptical universities) as inspiration for discussing what kind of university, they wanted to be, and they provided visions of the university strategy, training needs

for managers, teachers and students, and ideas and visions for curriculum and methodological development. Furthermore, they formulated concrete action plans.

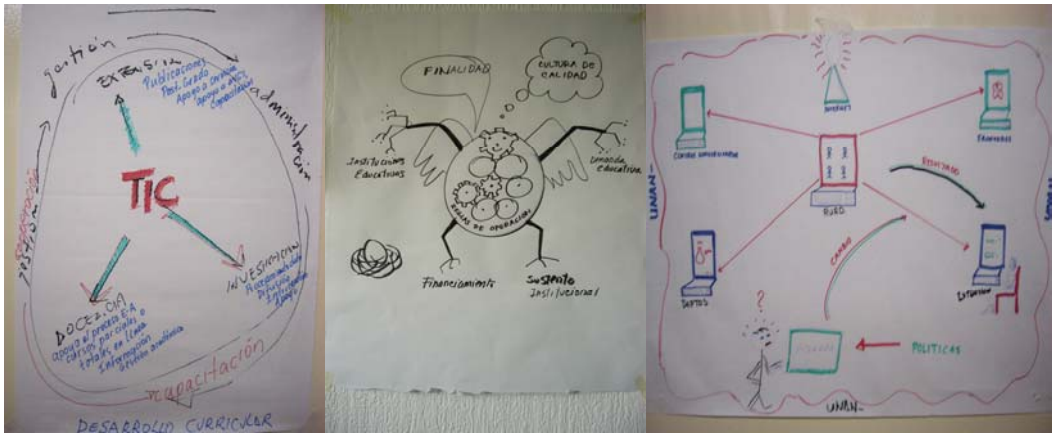


Fig. 5. Vision statements

SUMMING UP ON THE FINDINGS FROM THE FUTURE WORKSHOPS

In all universities ICT is viewed as having very important strategic implication and they all view the transformation process from a unified perspective focussing on an integrated view on pedagogical, organisational, and technical development. ICT is seen as a vehicle for further development and strengthening of the universities as the leading universities in their region, and for the strengthening of research, teaching and learning, and outreach in general. Especially the virtual and networked character of ICT gives new opportunities for reaching new target groups and to further development of the universities engagement and contribution providing up-to date teaching and learning to all.

In relation to the general purpose of the workshops, consideration of the following approach to ICT was suggested:

ICT is viewed as a means for change and development:

- to foster interaction and relation between academia and society in a lifelong learning perspective
- to support national, regional, and international cooperation within research and education

- to innovate teaching and learning, and more broadly to contribute to the development of a learning culture
- to make more effective administration procedures, e.g. online registration.

The following actions were planned:

- Development of an overall ICT-policy, strategy and implementation plan. The work should start at once and should have interdivisional representatives.
- Development of a comprehensive human capacity progress and implementation plan. This could build on the work already developed in the ELAC project. In some of the universities a diploma on ICT and learning has been developed within the ELAC project
- Pilot projects to investigate and develop new teaching and learning methods, as well as administrative procedures. The ELAC-project is serving as a demonstration project, however much more courses should be developed.

In general it was stressed, that it is important to strengthen the formal links between the sections dealing with the human capacity building, pedagogical design, and the development of innovative teaching and learning programs, and the unites, which are responsible for providing the technical infrastructure and support. Moreover, it would be helpful if a kind of action research could interact in the development process so experiences continuously feed back and inform the integration and implementation of ICT for learning.

SUMMING UP

The Future Workshop methodology seems to be an effective tool for facilitating the discussion on ICT and university development. More than fifty problems were thematized in each university as the starting point – and afterwards these were turned into visions and work plans for the integration process. The Future Workshops didn't provide the exact management plan or business plan, however, the workshops established the start of an increased awareness of the opportunities and challenges for the universities using ICT. Bringing the stakeholders together in new and surprising workshop formats helped them to think more freely about the possibilities and provided a base for synergy, shared understanding, and ownership among the participants, as well as creative dreams and steps to take forward.

The workshops supported the views:

- that ICT in itself doesn't ensure innovative teaching and learning approaches, however, ICT can be used as a catalyst for rethinking pedagogical approaches, developing new services, e.g. continuing professional development, lifelong learning, and in general increase the universities leading role in the regions.
- integration of ICT for change, influences the whole university system, the strategy should therefore be based on discussions and dialogues between the different activity systems and actors in the organization. The institutional strategies should lead the transformation process, however, these strategies should be responsive to experiences from professors and students, and pilot projects testing out new teaching and learning methodologies.
- the transformation process has to be unified and comprehensive integrating ICT, organisational development, and learning.

The findings from the workshops are in line with the lessons learned in the European study on virtual universities (PLS Rambøll Management, 2004) and indicate

- that the possession of an ICT strategy is a key driver for ICT integration. Universities are recommended either to develop a specific ICT strategy or to integrate ICT into their general university strategy.
- there is no ideal 'one size fits all' e-learning and ICT integration model. The integration of ICT and e-learning must correspond to the goals of the university and support them accordingly. A holistic view of the university's goals and challenges is recommended, combined with the consideration of which of their aspects ICT is capable of supporting. ICT should be seen as a tool for meeting challenges, not as a problem area.
- pilot projects are important, but it is recommended that universities should start focusing on integrating ICT into their normal operation and finding sustainable models for doing so.
- the involvement of management is crucial to ensure that the integration of ICT is implemented across the university's operations in their entirety and not simply remain stuck at the project level.
- the dissemination of good practice and experience with ICT pedagogy and content development is recommended at university level, as is participation in national and trans-national networks.

- an effective and efficient ICT organisation and support structure can be a driver for ICT integration and e-learning and is a precondition for the successful application of ICT in all aspects of a university's activities. An organisational structure encompassing professional support for the integration of ICT alongside room for local initiative is recommended for ensuring both professional development and grounding.
- for many years, dedicated enthusiasts have been of key value in integrating ICT. In order to support the integration of ICT into the overall operations and activities of the university, the stimulation of the intermediate group of faculties and teachers is recommended, as they are the principal entities, which will be crucial for expanding and anchoring the development of ICT integration.
- the chief barriers to the integration of ICT are negative attitudes towards ICT, coupled with inadequate ICT knowledge and ICT skills. It is recommended to: 1) provide incentives to involve the university as a whole and the university staff in particular in the development of ICT integration. Teachers need to be rewarded for good teaching. The career development structure for teachers should be developed further and ICT competences should be an element in this. This should also be linked to the payment structure; 2) ensure training in the technical, and even more importantly, also the pedagogical use of ICT; 3) provide both technical and administrative support to the teachers; and 4) resolve the issue of how professors and teachers should be paid for the development of content.
- quality assurance and assessment procedures for e-learning must be developed in order to support e-learning and virtual mobility. The same applies to accreditation, certification and student authentication. These issues are generally handled at university level, but participation in trans-national initiatives is encouraged in order to facilitate trans-national mobility.
- the lack of high-quality learning material is a key barrier. The universities are encouraged to develop learning resources and share them with other universities. (Open source, LDH!)
- The use of common standards for metadata is considered to be of key importance for the future development and sharing of digital learning resources. The universities are encouraged to apply metadata standards, as well as to participate in trans-national initiatives concerning the setting of common European standards (ibid, op. cit. p. 164 pp).

It's our understanding that the Latin American universities are ready to take a big step forward. The engagement and concerted action among leaders and the intermediate group of faculties and teachers provide a solid basis for the changes. The integrated vision and understanding uniting the ICT, the organisational development, and learning establish a unique situation for aligning the ICT to the services of the university.

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