Factors Influencing Implementation of ICT in Higher Education

Working Group 3.2

Chair: Matti Sinko (FI)

Rapporteur: Peter J. Dekker (NL)

Participants: Palle Bendsen (DK), Jan Cern (CA), Bas Cordewener (NL), Halfdan Eika (DK), Ulla Klimt (DK), Rolf Larsen (NO), Jane Murmann (DK), Pia Thomsen (DK)

Keywords: implementation, higher education, scaling up, support, standardisation

Abstract: This report describes first the factors, which have an influence on the implementation of ICT in higher education (HE). We clustered them in four groups: global challenges, technological promises and imperatives; pedagogical and subject specific factors; obstacles and restrictions of using ICT; and motivational and political issues. Then we identified five means to implement ICT. These are: demystification of ICT, its role and benefits in education; project management issues; standardisation; institutional commitment and support; and scaling up new enhanced ICT supported practices developed in pilot projects or in research experiments.

1. FACTORS THAT INFLUENCE IMPLEMENTATION

It is a challenge for HE to make teaching and learning meet the growing demands that are placed by global as well as local developments. There is the challenge in meeting the needs, desires and aspirations of our students to be able to educate themselves to become professionals capable of facing the challenges of tomorrow's world. There are also justified needs identified and policies developed by national authorities, education institutions to provide more effective, efficient, and appropriate education based on new research findings and developments. We strongly believe that new technologies will open new avenues to better learning, necessary for overcoming these

challenges. But we also recognise that it is an unsurpassed call for our professional communities to develop concepts, models and applications that will fully exploit these potentials.

In the group introductory notes, from Matti Sinko and Petra Fisser, a number of factors were listed that may impact on the use of ICT in HE (Sinko and Lehtinen 1999, Sinko 2001).

1.1 Global challenges, technological promises and imperatives

There are a number of global factors, which go beyond any single institute or university to influence. Global trends underpin and influence the strategic choices all HE institutions are currently facing. These may also be used as arguments to pursue other agendas. Nevertheless global developments cannot or should not be overlooked when analysing the factors influencing the uptake of new technologies in HE.

The following issues among others were addressed when discussing and designing successful implementation of ICT in HE education. These were: increasing complexity of issues HE is facing; the need for improved pedagogy enhanced with the use of ICT to cope with the complex learning challenges; increased demands of efficiency and effectiveness; the need to serve a larger number of students with varying needs; the general impact of proliferation and penetration of ICT throughout society; and the potential and problems of improved access to education resources for enhancing democracy, strengthening sound social fabric and ethical conduct in increasingly complex societies.

Undoubtedly new technologies themselves bring enormous challenges to HE in providing new exciting opportunities to address in new ways pertinent challenges of teaching and learning. Technology in itself poses a tremendous challenge to educational institutions in how to learn to master and develop the technological domain itself. We should pay attention to issues like: the role of ICT literacy in the curriculum; the role of new technologies in the strategies and policies of HE institutions; and the commitments of HE institutions in providing ICT literate graduates in general and in teacher education in particular.

1.2 Motivational and political issues

Motivational issues need to be looked at from a number of viewpoints of various interest groups. The motives of institutions include: economic factors; striving for excellence, improved competitiveness and better service

for students; changing political demands, policy requirements, new agendas and preferences expressed by various external stakeholders; improving collaboration and networking with working life and the surrounding community for the institutional needs as well as for student carriers enhancement; and internal expectations of students and staff. The motives of staff to start using ICT include: a desire for professional development, to perform better, and for better instructional environment; institutional policy decisions from management; requests from students; encouragement and support by or pressures from colleagues; and fears of becoming unpopular or even redundant. The motives of students include; improved employability; increased value to learning processes; added value to competence; a need for flexibility and efficiency; and a desire for getting the cutting edge education.

1.3 Pedagogical and subject specific factors

Choosing technologies to support teaching and learning should be determined by their appropriateness, which may vary according to the needs of teachers, learners and the subjects respectively. We have to consider carefully why, when, where and how to put ICT in place; to analyse, what is proper ICT support in each subject domain in each historic situation; to analyse and understand customer needs e.g. on going virtual, providing courses at distance; and to understand the impact of intensified use of ICT in research on the increased need for using ICT in teaching and learning of those areas of research.

1.4 Obstacles and restrictions of using ICT

Here are listed some of the obstacles making the use of ICT difficult or inappropriate: a lack of support to staff or students, of time (of staff and students), of competence among staff, of appropriate technology, hardware and software, lack of funding, and of collaboration among staff and between departments. Further obstacles include:: reluctance of staff or students towards using ICT; fear of increasing workload; inappropriate physical surroundings for new uses; legal restrictions, e.g. in applying new pedagogically more relevant types of assessing student performance; unsolved copyrights; text-based ICT compared to more familiar oral communication; and poorly implemented accountability towards society, policy makers and students.

2. MEANS TO INFLUENCE IMPLEMENTATION

Five means that could be beneficial to take into account, when implementing ICT in HE were identified.

2.1 Demystifying ICT

Putting ICT in place in any organisation means always uncertainty or crisis within the organisation. Thus there are often unjustified promises. Educational institutions are no exception. ICT is supposed to make teaching or learning easier and more effective. There is however little evidence that applications of ICT are easy solutions for learning, or that using them would lead to lighter workloads for staff or students.

Many projects fail because staff have not been properly prepared to accept changes. Careful attention needs to be paid to 'selling' new ICT based systems and practices to staff. The argument often used, increased efficiency, is seldom true in a short run. Another expectation is greater effectiveness, which also may be true only in the longer term. Users may be easily misled to anticipate unjustified short-term benefits such as their work made easier, quicker, and more attractive. Much effort is put in implementing ICT because it is generally – and rightly so – believed that education can be improved through elaborated use of educational ICT tools. This means that the underlying rationale in implementing ICT should have focus on making teaching and learning more effective.

Suggestions:

- Promises should be realistic and truthful – do not feed the myth that ICT makes teaching or learning easier or cheaper.
- Efforts (time, energy, money) invested are probably not validated by rapidly improved results, but the alternative (doing nothing) might cost even more, if the competitive edge will be lost.
- The idea is that ICT in education makes the students – and for that matter the teachers as well – more employable.

2.2 Project management

Projects are perhaps the most typical way of implementing change in education. There is a rich literature on project management issues. Yet we felt it useful to emphasise the importance of good project management as a success factor in either designing new applications or implementing new practices. There is some evidence that neither teaching staff nor managerial people of an educational institution are best to implement ICT development. Teachers have little project managerial expertise. And project management

has to be clearly separated from normal institutional management. This is difficult to achieve, if the stakeholders are running the project. Stakeholders should some say in developing their own working environment, but it calls for a clear definition of responsibilities and roles.

Suggestions:

- The project manager should not personally be a stakeholder or have potentially conflicting interests with the possible outcomes of the project. The project manager should be accountable for the professional project management only.
- The educational and technical expertise for running faculty projects should be separated from the project management role.
- The success criteria for the project should from the first include a sustainability model and an exploitation plan ensuring scaling up the results.
- Top-down approach has its strengths, one being the commitment of the policymakers, and the management level. It works if everyone from the beginning shares the need for change.
- Bottom-up approach, however, often yields better results in capitalising the personal motivation of all involved and thus resulting in better commitment in results as well.
- Most probably mixing both approaches is necessary. Furthermore using a network-based collaborative approach does not limit the resources to existing organisational hierarchies.
- Put effort into project visibility with good publicity. This makes participants proud of participating, with a positive impact on the project, their self-esteem and professional development.

2.3 Standardisation

Networking is both a means for development and implementation as well as for normal, daily operational procedures. One hindrance of fully capitalising the potential of networking is the lack of standards enabling smooth flow and use of resources accumulated in the nodes and niches of the net. The education sector in general and academia in particular has been reluctant to respond positively to addressing the complex issues of standardisation. If the academic community does not commit itself on all levels in harmonising its way of describing, defining and presenting data, it will exclude itself from fully exploiting the potential of networking.

There is some consensus on standards on hardware and networks. Standardisation of presenting data, including indexing educational content, needs more attention. One problem is their rapidly becoming outdated and needing to be updated before they have been consolidated.

Suggestions:

- More resources and higher priority for standardisation in educational policy making on national and on institutional level, and in professional communities, like IFIP TC3.
- Stimulate and encourage organisations to use and comply with the standards when ever available.
- Designers of ICT-based learning materials should commit to comply with standards.
- When working on innovative projects, encourage such projects to keep in mind the need standardisation for a successful scaling-up.

2.4 Institutional commitment and support

When implementing ICT, organising the support of the people who are going to use ICT is important. Implementing ICT is in a way organising the support. And this support has to be functioning during the implementation period, and afterwards when the implementation has been incorporated into normal life. Without sufficient support it is likely that the use of ICT will decrease. Two areas are important: the support itself and the organisation of the support.

The organisation should provide a certain level of technical support for teachers using ICT; teachers are not technicians, and lack of technical support will diminish their confidence with the hardware.

Suggestions:

- The management has to allocate sufficient time for project participants. Projects should not be done on extra hours; the results become dependent on the efforts of only enthusiastic staff.
- The management has to provide technical and methodological support, at initial and in-depth levels. Resource allocation between institutional level and departmental level should be balanced.
- Teachers need training in using ICT. Training should be differentiated according to the needs and skills level of users.
- When offering training, the staff development policy of the institution should be kept in mind. Training should be supported by incentives and should be part of a personal development plan.
- Using a top-down approach (everyone has to meet the formulated goal) is an effective form of implementation. Resistance is likely to occur. But there is growing support for the top-down approach because of the need for strong leadership; sometimes things have to be changed in spite of the feelings of the people involved.

2.5 Scaling up new enhanced ICT supported practice

Consolidating and scaling up new enhanced ICT supported practices developed in pilot projects or in research experiments has a growing importance as it has become clear that the record of successful educational ICT projects is not outstanding. Indeed few projects can be considered successful if evaluated by criteria measuring consolidation and measuring the success of being disseminated to other institutions. ICT implementations often have an impact on many processes within the organisation. Therefore changes in all the processes should be anticipated and incorporated in the implementation plan. ICT projects have the tendency to gradually or drastically change the culture of an organisation.

Conditions for scaling up are better if ICT projects are undertaken in collaboration with other organisations. Problems and solutions may be shared in the network of collaborative partners, sharing already being part of scaling up process itself. Workshops, presentations etc. are an often-used ways of scaling up the results of project (teachers telling each other their experiences). There is, however, experience that the effect of this type of scaling up will level out. It is also agreed that is difficult to transfer project findings from one situation to another. But this should not be as big a problem for projects that focus on developing content that can be used independently. It is found, however, that adopting new practices developed elsewhere is not easy, because of the 'not-invented-here' syndrome. This could be an indication that running projects should not be the only way of trying to implement ICT.

Collis and Moonen (2001) have developed a model which describes factors that predict whether an individual teacher will start using ICT in a new situation. The so-called *4-E model* hypothesises that an individual likelihood of using application can be described by four variables.

- Environment: the institution's profile with respect to technology use
- Education effectiveness: gaining from the technology use
- Ease of use: ease of difficulty in making use of technology
- Engagement: personal engagement about technology use for learning-related purposes.

According to the model these features are expressed as vectors. The sum of these vectors – education effectiveness, ease of use, and engagement – can be interpreted as the likelihood-of-use vector. When this hypothetical vector sum is high enough, then the individual is likely to make use of the network application in his or her own situation. The height of the threshold is critical; environmental conditions can lower it.

Suggestions:

- Collaboration only starts when all parties involved need to have the means and the reasons to collaborate. To share content is not enough of a reason.
- For scaling up successfully all suggestions mentioned earlier (regarding project management, standardisation, institutional commitment) apply. Scaling up adds complexity to both co-ordination and collaboration by implementation process partners.
- Consider establishing an umbrella organisation on a national level, steered by, and working for, all HE institutes, aiming at successful ICT infrastructure and implementation of ICT. This organisation should encourage collaboration, standardisation and managerial professionalism. It may be positioned as a catalysing force for knowledge sharing and innovation on a super-institutional level.

REFERENCES

- Collis, B. and Moonen, J. (2001) *Flexible learning in a digital world: Experiences and expectations*. Kogan Page Limited, London.
- Sinko, M. (2001) Implications of 'going virtual' to higher education. In *Desafios 2001. Actas da II conferência internacional de technologies da informação e comunicação na educação*. Centro de competência nónio século XXI da Universidade do Minho, Portugal, pp. 87-94.
- Sinko, M. and Lehtinen, E. (1999) *The Challenges of ICT in Finnish Education*. Atena Kustannus, Juva. [http://www.sitra.fi/english/index_publications.html].