TECHNOLOGY-ENHANCED LEARNING

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Abstract

The aim of the paper is, firstly, to deal with the reasons for the sudden increase in interest in the use of technology in higher education. The main focus of the paper will be on 18 issues that must be taken into account in successfully integrating technology into the curriculum. These include, among others, the impact of pedagogy on the integration of technology and the needs of the learners. The limitations of certain forms of technology in the South African situation will be discussed.

A few recommendations will also be made, specifically relating to the South African situation.

1. INTRODUCTION

Information and communication technology (ICT) presents the higher education institution with both opportunities and challenges. By using ICT, the higher education institution can provide increased flexibility to learners. In the distance education environment it is also possible to use technology to support the learners over a distance. However, it is important that institutions develop and apply appropriate policies and that they effectively plan and manage the integration of ICT into the teaching and learning strategy. Mostert (2004:14) indicates that the integration of technology should form part of the curriculum design process and should not be seen as an activity that is planned and managed separately.

According to Taylor (2003:1), the rapidly changing external environment will force universities to change from rigid, formula-driven entities into more flexible organisations. Universities will have to learn to adapt faster to the changes in the external environment.

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A few recommendations will also be made, specifically relating to the South African situation.

2. GLOBAL TENDENCIES IN HIGHER EDUCATION

It is important to take note of global tendencies in higher education that have necessitated a review of the use of technology in higher education.

2.1. Globalisation

According to Hernes (2003:7), globalisation poses the following education challenges:

- Reducing the inequalities, marginalisation and exclusion. As in South Africa, in most countries the pressure on the system increases the participation rate in higher education.

- Establishing better links between education and the local economy, and between education and the globalisation of work.

- Preventing the growing role of market-driven research and education from widening the technology and knowledge gaps between industrialised and developing countries.

- Ensuring that the research requirements of developing countries receive the necessary attention and can be addressed by their own researchers.

- Curbing the impact of the brain drain on developing countries.

- Addressing the impact of market principles and the changing role of the state on education and their bearing on the planning and management of education.

- Using the education system itself not just to transmit the general body of science that can be used in all places but also to preserve variety and the richness of world heritage languages, artistic expressions and lifestyles in a world becoming more homogeneous.

2.2 Knowledge growth

The development and dissemination of new science-based knowledge is one of the most important drivers for change in the current millennium. ICT activities are transforming the way all activities operate.

The Internet has contributed to an exponential growth in available information. However, Hernes (2003:8) highlights the fact that information is not the same as knowledge. It takes knowledge not just to provide all the new information but also to apply it usefully and imaginatively.

The move from an industrial to a knowledge society has the following impact on higher education (Hernes, 2003:8):

- The challenge to bridge the digital divide. Mason (2003:5) indicates that nearly 90% of the world's Internet users are in developed countries, which together comprise only 16% of the world's higher education population. Africa and the Arab States represent only 1% of people in the world with Internet access. The majority of people in Africa are still living in the pre-information age. Mostert (2003) has indicated the negative impact of the digital divide on the economic development of Africa.

- Making access to learning and educational resources via the Internet more equal among countries and also making more equal the capacity to supply such education.

- Matching the expanding possibilities for new applications of knowledge with ethical reflection and restraint. Some institutions see ICT only as a means of making more profit, not taking the quality of the learning experience into account.

- Fostering economic and technological transformations, which at the same time are compatible with sustainable development and human fulfillment.

Other impacts include the following:

- The changing role of the lecturer in the learning process. In the knowledge age the focus is more on the facilitation of knowledge than being the source of knowledge.

- Learners need to be trained in knowledge management skills to be able to use the information available on the Internet and in the information centres on campuses.

- Questions have also been raised about the effectiveness of technology-enhanced learning versus the traditional face-to-face mode of education. The Commonwealth of Learning (2004:6) highlights the fact that the results of e-learning fall short of expectations. It also mentions that several attempts to created new institutions based solely on e-learning have failed. Examples are the NYU Online project of New York University and the e-Universities project in the United Kingdom.

2.3 Access and government funding

A general tendency in most countries is the declining ability of governments to fund higher education. As in South Africa, funding of learners will depend on extending access to under-represented populations and the disabled (Mason,

2003:7). Higher education institutions in the developing world also face increasing competition from the virtual universities of developed countries. Taking the drivers of change in higher education into account, the following issues need to be considered when integrating technology into the curriculum.

3. ISSUES TO CONSIDER WHEN INTEGRATING TECHNOLOGY INTO THE CURRICULUM

Special curriculum development practices need to be taken into account in integrating technology into the curriculum. Naidoo and Isaacs (2004:6) state that it is necessary to prepare all education sectors to understand the value of technology investment in order to make a success of the implementation of ICT in education.

The Penn State University (2004a:1) highlights the following 18 considerations in deciding on which technology to include in the curriculum:

3.1 Think pedagogy first, technology second

According to Penn State University, the academic lecturer must try to avoid the common mistake of allowing technology to be the driver in the curriculum development process.

According to the Commonwealth of Learning (2003:6), online teaching and learning should meet the outcomes of the subject and the target learner group. Technology is supposed to support face-to-face instruction, not replace it.

A suggestion is to think first about the activity that you want the learner to do and then to find the technology that will support the proposed activity.

3.2 Analyse your course to determine your needs

Penn State University (2004a:1) suggests that the course be divided into three sections, namely content presentation, assignments and activities, and assessment and evaluation. The technology that will support each one of these activities must then be implemented.

3.3 Consider all your technology options

Do not assume that the whole course should be web-based. Print is still one of the technology options available. According to the Commonwealth of Learning (2004:3), it is still more effective to provide study material in hard copy and to use the Internet mainly for communication with learners through email, discussion groups, assignment submission and feedback.

Depending on the media selection matrix, the different parts of a course could be provided in low technology, medium technology and high technology options.

Naidoo and Isaacs (2004:7) indicate that any institutional ICT learning application and infrastructure improvements should keep pace with developments in ICT.

3.4 Think about learner access to technology

Penn State University (2004b:1) states that the choice of technology should be based primarily on learners' anticipated access to and familiarity with distance education technologies.

One of the biggest challenges for higher education institutions is to provide access to the relevant technology. Taylor (2003:2) gives an overview of the five generations of distance education. According to Taylor, the cost of providing online delivery in the second generation of distance education has increased proportionally with fluctuations in activity. Fifth-generation distance education[i] has the potential to significantly decrease the costs associated with providing access to institutional processes and online tuition.

In South Africa it is also crucial to take the low bandwidth of the Internet into account. It might be more effective to use a CD-ROM to provide information with graphics rather than providing the information on a website.

3.5 Be practical

The technology that is available to the learner should be taken into account. A learner may rightfully object to waiting a few minutes to download a full colour graph from the Internet (Penn State University, 2004:2). Another example is to produce a costly CD-ROM with information that is going to change during the next academic year, such as the tax laws in South Africa.

Another consideration that should be taken into account is the computer specifications needed to run a program or CD-ROM. The specifications include the amount of RAM or hard-drive space that is needed to open a program.

3.6 Plan for learner learning curves

The use of technology can increase or decrease the speed of learning. Penn State University (2004) also suggests that an orientation week be arranged to train learners to get used to the technology that is going to be used. It should also be taken into account that many high school learner might already be computer-literate.

The different levels of computer skills of the learners entering CUT pose a serious challenge in this regard.

3.7 Consider the impact on the overall study time available

The activities must be planned so that they do not take too much of the study time of the learners. A solution might be to give more information to the learners than originally intended, to get them to real learning sooner than anticipated.

3.8 Be sure the technology fits your instructional goals

Is the technology really needed? Is it not possible to achieve the same impact with a lower level of technology?

3.9 Determine the technology fit with your class

Will the learners be prepared to learn new software?. Younger school leavers are generally more computer-literate than older learners and more prepared to learn new computer programs.

3.10 Beware of too much on-screen text

Studies have shown that learners read more slowly and with less comprehension on screen than on paper (Penn State University, 2004).

3.11 Plan for alternative media where possible

The learner must be given an alternative option in terms of media available. For example, a learner who misses a videoconferencing class could watch the video after the session. Learners at UNISA are informed about contact sessions via SMS and email but still receive a letter when registering.

Plan for the situation that would arise if the technology were to fail.

3.12 Provide a clear, well-organised structure and good directions

Provide the learners with screen shots to guide them through the process. Websites must have a good navigational scheme and user-friendly interface.

3.13 Prepare yourself to teach with this medium

The lecturer must first be comfortable with the technology to be used. Planning can then be done on how the technology should be utilised. Do a dummy lesson before the time to test the technology.

The lecturers must also be trained in basic equipment troubleshooting, maintenance and repairs (Naidoo & Isaacs, 2004:7).

If the lecturer is not familiar with the technology, this will hamper the learners' adoption of the use of new forms of technology.

3.14 Estimate conservatively the development time needed

Consider, for example, the production of a HELP video. You have to shoot for three hours, upload the video on the editing bank for three hours, edit the tape, master for three hours and then reproduce the copies. It is thus much more time-intensive than initially anticipated. The studio time is also a cost factor.

It is also important to note that the implementation of technology can be more time-intensive than normal face-to-face classes.

3.15 Count the direct and indirect cost to the learner

Indirect cost includes the software needed, staff costs, etc. These costs must be factored into the class fees of the learners. Direct cost is Internet time for account of learners and possible software costs.

3.16 Will you require external co-ordination and facilitation?

In the case of videoconferencing, for example, you would need to book studio time and staff as well as the regional co-ordinators to solve possible problems at the remote sites.

3.17 Arrange for copyright clearance if you want to use materials that are not your own

The issue of copyright in technology enhanced learning is an interesting debate. Some institutions in the developed countries like MIT, with their open source courseware project, have decided to make the courseware available without copyright limitations.

As a normal business practice with would be required from lecturers to get copyright clearance from the original authors of material that is to be utilized online.

This can have a cost implication that has to be taken into account when delivering online.

3.18 Be sure to license any software you distribute

Some software, like Acrobat reader and Netscape, is available free of charge. Other programs need site licenses or user licenses.

3.19 Evaluation of ICT delivery

Naidoo and Isaacs (2004:7) suggest that ongoing curriculum support is also a critical element for the successful use of ICT in education. Staff should be encouraged to provide proactive feedback and suggestions on the use of ICT for different subjects, to increase and improve overall ICT use. According to the (2003:9), the evaluation of technology-enhanced learning should also be evaluated to determine learning effectiveness and to compare it with the face-to-face situation.

Strategic partnerships between schools, communities, key government role players, donor agencies and the private sector are needed to sustain the use of ICT in the long term.

4. CONCLUSION

From the discussion of the forces of change in higher education, it is clear that higher education institutions no longer have a choice of whether to integrate technology into the teaching and learning design. The question is rather how technology should be integrated into the teaching and learning process.

Before technology can be integrated into the curriculum it is crucial that impact of globalisation tendencies in Higher Education should be taken into account.

Globalisation can assist to bridge the technology and knowledge gaps between developing and developed countries. In the process of integration technology care should however be taken to also preserve the variety and the richness of world heritage languages, artistic expressions and lifestyles in a world becoming more homogeneous.

The impact of the knowledge economy should also be taken into account. The integration of technology into the curriculum design can facilitate the transfer of the large volumes of new knowledge that is being created. It is also important that the learners be equipped with the knowledge management skills to be able to use the information available on the Internet and in the information centres on campuses.

It is also clear that the integration of technology into the teaching and learning design should be carefully planned and managed. It is also important that the technology implemented should adhere to the principle of fitness for purpose. In the choice between different forms of technology the lowest form of technology that will fit the purpose should be implemented.

The use of technology in the learning design should be contextualised and integrated. It is not possible to just transfer practices from Europe and America

and apply it in the local situation. In view of problems with the availability and cost of bandwidth in South Africa, care should be taken in utilising the appropriate technology for the local situation. The availability of different technologies in South Africa should also be taken into account.

The use of technology should also form an integrated part of the curriculum design process and should not be seen as an issue that can be finalized after the course have been curriculated.

It should also be ensured that the project should be affordable and sustainable. In many instances this will require continued government funding support in the form of subsidies. Learners will also have to make a contribution to the development and running cost of technology.

The use of technology should add value to the learning experience of the learner. Technology should not be introduced for the sake of using technology, but should be evaluated to ensure that it add value to the learning experience of the learner.

5. BIBLIOGRAPHY

Commonwealth of Learning.
2003. *Designing online learning*. Knowledge series. Vancouver.

Commonwealth of Learning.
2004. *Instructional design for self-learning in distance education*. Knowledge series. Vancouver.

Hernes, G.
2003. The new century: Societal paradoxes and major trends. In D'Antoni, S. *The virtual university: Models and message: Lessons from case studies*. International Institute for Educational Planning, Unesco.

Mason, R.
2003. The university: Current challenges and opportunities. In D'Antoni, S. *The virtual university: Models and message: Lessons from case studies*. International Institute for Educational Planning, Unesco.

Mostert, J.W.
2003. *The impact of globalization on developing countries* Paper delivered at the International Conference of the Economic Society of South Africa at Somerset West.

Mostert, J.W.
2004. *Integrated curriculum design*. Paper delivered at the RDF conference at Ormonde.

Naidoo, V. & Isaacs, S.
2004. Schoolnets: Enhancing education through ICT. *Connections* (9)1:6-7. Commonwealth of Learning.

Penn State University.
2004(a). *18 things to consider when choosing technology.* Accessed online at http://www.worldcampus.psu.edu/facdev101/course/authless5 /tech2.html (31 March 2004).

Penn State University.
2004(b). *Media selection matrix.* Accessed online at http://www.outreach.psu.edu/de/id&d/media_selection_matrix.html (31 March 2004).

Taylor, J.C.
2003. *Fifth generation distance education*. Accessed online at http://www.icde.org.