

**Technology and Infrastructure Report**  
**(a subcommittee of the Strategic Planning Advisory Committee)**

**MEMBERS**

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**I. CLOSING THE LOOP**

The 2006 Technology and Infrastructure report focused on four topics:

- the need for assessment of the GCC network,
- changes in learning environments,
- training and support issues, and
- a need for sharing resources.

These issues are current and will continue to be important in the future.

Some progress has been seen in these four areas of concern.

- A President's Technology Advisement Team is currently meeting to implement changes recommended by both an outside consultant and a local advisory assessment committee.
- Changes in learning environments include the creation of "black box" classrooms such as HU-111. A faculty member has been granted release time to function as Director of Online and Hybrid Learning. Bandwidth issues are being addressed within the District.
- Training and support issues are being addressed through both the TED Center and the newly formed Faculty Connection Center.
- Sharing of resources is a continued recommendation.

**II. CURRENT TRENDS**

This year (2007) will be the fifth year for Arizona economy growth, but it is expected to slow but without a recession. Job growth remains positive, and Arizona will experience the fastest job growth in the nation. Expected wage increases will continue, although more modest than in the previous two years. E-learning has had significant growth in student numbers since 1996, continuing a trend noted in last year's report.

Emerging technology trends that will affect GCC are:

- The predicted growth in the next five years of nanotechnology products and nanotools in the areas of electronics and biomedical applications.
- The predicted growth in the next five years of the biotechnology industry in the Phoenix area.
- The predicted growth in the next five years of the use of immersive worlds and simulations in the educational environment.

**III. PROJECTIONS**

**Nanotechnology**

Nanotechnology products will grow rapidly from an estimated global market of \$10.5 billion in 2006 to about \$25.2 billion by 2011, an average annual growth rate of 19.1% between 2006 and 2011. The emerging growing applications are biomedical nanolithographic tools and nanoscale electronic memory. Electronics and biomedical applications have much greater projected growth rates than other applications over the next five years. As a result, the electronics share of the nanotechnology market is projected to grow to over 50% by 2011, and biomedical applications' share to 8%.

## **Biotechnology**

Arizona has a vision of positioning itself to be a major Bioscience hub within the next decade, with collaborations between the private and public sector building a basis for a new economy built around Biotechnology, an industry that is currently experiencing annual revenues in excess of \$50 billion. The industry locally, as measured on a number of different indices, is growing at a rate of approximately 10% a year.

## **Immersive Worlds and Simulations**

One trend emerging in educational technology is the use of immersive worlds and simulations. These worlds employ three-dimensional graphics to create environments that mimic or surpass our traditional environment. Driven by wider use of game technology in the home, these applications shift the focus from entertainment to education and training. Educators can leverage this familiarity within their students to provide cost-effective, safe learning environments. Although these worlds can be delivered in a variety of formats, they all offer the student a place to explore, collaborate and experiment with different outcomes and situations. A variety of simulated scenarios can be created, modified and delivered within this digital environment that facilitate assessment and improve student motivation.

## **IV. IMPLICATIONS FOR GCC**

Nanotechnology applications are growing in momentum, especially in Electronics and the biomedical industry. To respond to this trend and better prepare our technology students for the workplace, we recommend that GCC develop an introductory nanotechnology course. Additionally, we need to work with local industries to identify their training needs with follow-up of intermediate courses in the long term.

An appropriately skilled workforce is imperative to meet the growth of the biotechnology industry. A number of recently published workforce development studies of the area's Bioscience needs have clearly documented the urgent local need for employees equipped with modern biotechnological skills. GCC has seen this shortfall as an opportunity and committed to providing this workforce. GCC has made a substantial commitment to Biotechnology with their support for the Biotechnology Program. A dedicated fully functional Biotechnology laboratory has been built, and an allocation of space for a dedicated Biotechnology laboratory is central to the plans for the new Life Science building. As this industry grows, one of the most relevant challenges faced by the Biotechnology program is that of staying current and relevant in a rapidly evolving industry. We hope to have positioned ourselves, mainly through our advisory committee contacts and business partnerships, to be directly responsive to industry feedback so that we can co-evolve with local industry.

New evidence is pointing to the effectiveness of immersive worlds and simulations in distance-learning environments that currently lack a bodily presence. Students tend to engage more when they have a presence in a class. They also tend to share more and feel able to talk about difficult subjects when protected by a certain amount of anonymity. Some applications of this technology include: distance education, exhibits/displays, environmental and 3D models, process models, experiential simulations and virtual study abroad. Technology resources necessary for this trend are mid-to-high end graphics cards and increased bandwidth, both wired and wireless.

These trends in technology are driving both full-time and part-time faculty towards learning technical skills that will enhance the knowledge of both faculty and students. Our previous approach to faculty development has been voluntary and optional regarding technology. This will

change as faculty will be expected to learn to use technology as an integral part of their teaching. Technology literacy will soon be considered a necessity rather than an option for all teachers and students. Technology will no longer be relegated to business and computing classes, but used by faculty across the curriculum to improve teaching and learning. This means that we will have to change our approach and methods of delivering technology training to faculty to meet these needs. This has implications for those who administer budgets, provide training, and the faculty members, themselves. This learning must be supported by increased training and resources. A trend towards more personalization and choice creates the need for various methods of training that fit instructors' schedules, the college budget, and the software and hardware available. Technology itself and ever more creative methods may be used to carve out time for professional development for faculty.

Taking into consideration the demands for accountability and the rising costs of technology, assessment of technology use is an imperative. Standards and criteria that define technology literacy are being created as well as assessments to determine what teachers and students know and can do with technology.

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