

# Serving the Nation

OPPORTUNITIES AND CHALLENGES IN THE USE OF INFORMATION  
TECHNOLOGY AT MINORITY-SERVING COLLEGES AND UNIVERSITIES

A REPORT FROM

**The Alliance for Equity in Higher Education**

PREPARED BY

**The Institute for Higher Education Policy**



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FEBRUARY 2004

# About the Alliance for Equity in Higher Education

The Alliance for Equity in Higher Education promotes greater collaboration and cooperation among colleges and universities that serve large numbers of students of color in order to enhance the nation's economic competitiveness, social stability, and cultural richness. The Alliance was founded by the American Indian Higher Education Consortium (AIHEC), the Hispanic Association of Colleges and Universities (HACU), and the National Association for Equal Opportunity in Higher Education (NAFEO), with support from the W.K. Kellogg Foundation and the Charles Stewart Mott Foundation.

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The Institute for Higher Education Policy is a non-profit, non-partisan organization whose mission is to foster access and success in postsecondary education through public policy research and other activities that inform and influence the policymaking process. These activities include policy reports and studies, seminars and meetings, and capacity building activities such as strategic planning. The primary audiences of the Institute are those who make or inform decisions about higher education: government policymakers, senior institutional leaders, researchers, funders, the media, and private sector leaders.

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# Foreword

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Since joining forces in 1999 as the Alliance for Equity in Higher Education, the American Indian Higher Education Consortium (AIHEC), the Hispanic Association of Colleges and Universities (HACU), and the National Association for Equal Opportunity in Higher Education (NAFEO) have made alleviating the technological disenfranchisement of the underserved communities we represent a top priority. This report represents an important milestone in the Alliance's efforts to educate the nation and policymakers on the digital divide that still exists among minority communities and minority-serving institutions (MSIs). The study represents a first of its kind effort to collect consistent information across all Alliance member MSIs on the application of information technology at these institutions. Findings clearly demonstrate the critical role that MSIs must play in order to eliminate the technological divide.

The nation's economic stability and growth are increasingly dependent on a growing portion of

the workforce possessing technological skills. Because the approximately 340 Alliance member MSIs educate nearly one-third of all students of color in the nation, MSIs will be critical players in educating the future generation of technologically savvy workers. Consequently, the vitality of the national economy will be linked to the nation's willingness to invest in the capabilities of these institutions to prepare their students in the latest information and communication technology systems.

We hope that this report provides insight into the critical issues that face the nation in terms of the technological knowledge of its citizenry and sheds light on the solution that MSIs have the potential and desire to offer. We believe that providing equal technological opportunities to all Americans will have not only a profound impact on the U.S. education system, but also will have far reaching consequences for the nation's economic competitiveness, social stability, cultural richness, and homeland security.

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# Executive summary

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The nation's minority-serving institutions are in an unrivaled position to remedy the technological disenfranchisement of underserved groups.

Despite efforts during the last decade to close the “digital divide,” substantial segments of the population—including minority, low-income, rural, and educationally disadvantaged populations—still lag behind the nation as a whole in the use of the most basic information technology (IT) resources, such as computers, email, and the Internet. These racial and income disparities pose a national threat. They threaten the economic prospects of underserved groups as well as the nation at large because of the integral role that information technology now plays in many aspects of society. The Internet has become one of the most effective tools for social, political, and economic mobility and advancement. Users can find everything online, including higher paying jobs and expanded educational opportunities through online courses.

Higher education institutions are obliged to prepare students to enter a workforce that increasingly expects employees to have skills and knowledge of information technology in a growing number of fields. Many institutions are motivated to stay on the cutting-edge of technology both to compete for students and to best serve their students' educational and job preparation needs. Yet this task is complicated by quickly changing information technology resources. The use of technology for virtually all campus functions, including the teaching and learning process itself, has become as prevalent at colleges and universities as it is in other areas of society. Though technology has made many

positive impacts on higher education, institutions face several challenges as well. Those challenges include resource allocation, strategic planning, and faculty training.

The nation's minority-serving institutions (MSIs)—including Tribal Colleges and Universities (TCUs), Hispanic-Serving Institutions (HSIs), and Historically Black Colleges and Universities (HBCUs)—are in an unrivaled position to remedy the technological disenfranchisement of underserved groups but remain limited by a lack of financial resources. In Fall 2000, the Alliance for Equity in Higher Education member institutions—including the American Indian Higher Education Consortium TCUs, the Hispanic Association of Colleges and Universities HSIs, and the National Association for Equal Opportunity in Higher Education HBCUs—enrolled 31 percent of the 3.6 million Black, Hispanic, and American Indian students in postsecondary education (NCES, 2001a). Because many of the students served by Alliance-member MSIs are financially disadvantaged, these institutions strive to keep tuitions low. Average in-state, full-time undergraduate tuition at Alliance-member MSIs was \$3,216 in 1999-2000—51 percent lower than the average tuition at all institutions (NCES, 2000). However, despite low tuitions, nearly half of all students enrolled at MSIs received Pell Grants in academic year 2001-2002, compared to only 28 percent of all students, an indication of the severe financial need MSI students face (USDE, 2002).<sup>1</sup>

<sup>1</sup> Enrollment and finance data were calculated for Alliance-member MSIs using various U.S. Department of Education data sources by Alliance staff members. Further information on Alliance institutions can be found at the Alliance website, [www.msi-alliance.org](http://www.msi-alliance.org).

The Alliance for Equity in Higher Education prepared this study to assess the status of IT applications at MSIs. A survey of more than 320 Alliance-member MSIs<sup>2</sup> was conducted in order to better understand what IT-related experiences these institutions are providing for their underserved populations and what challenges they face in creating and expanding opportunity. Specifically, the survey collected information on institutional issues such as organization and planning; basic IT services and support, and administrative applications; faculty training and use of IT; and student requirements and IT-supported services. Data from the National Center for Education Statistics' Integrated Postsecondary Education Data System (IPEDS) also were used to describe selected general institutional characteristics, including enrollment and financial characteristics. Given the limited amount of previous research, both the Alliance survey and the analysis of IPEDS data in this manner represent the first-ever national effort to collect and analyze data about technology use at all MSIs.

In addition to the Alliance survey and analysis of national data, this study also included campus visits conducted for six exemplary institutions in order to gather more detailed information and to highlight successful approaches. The six institutions include: Salish Kootenai College, Fond du Lac Tribal and Community College, the University of Texas at El Paso, Miami Dade College, Tennessee State University, and Johnson C. Smith University.

In general, the results of the study indicate that while MSIs have impressive accomplishments in the use of technology despite limited funds, there is an urgent need to invest in future capacities and enable these institutions to educate the nation's emerging majority populations.<sup>3</sup>

## Key findings

Results of the survey indicate that most institutions have a solid foundation of information technology on their campuses and that IT is being used to enhance a variety of administrative and student service functions. For example, in most cases MSIs have been able to dedicate one person to IT and to build campus-wide networks. MSIs also have proven successful in providing email and Internet access as well as IT support services to most, if not all, faculty, students, and staff. In addition, MSIs have sophisticated library resources and networked computers for faculty.

However, MSIs need improvement in several areas. Although the percentage of MSIs that have strategic plans is comparable to that of mainstream institutions, it is critical that all MSIs have a strategic plan for IT in order to maximize limited resources. In addition, MSIs lag behind other institutions in student computer ownership and online student services, including online admissions applications. Only half provide direct Internet access in residence halls, and faculty use of email/Internet is very low despite efforts by some schools to provide incentives and rewards.

Specifically, the vast majority of institutions (86 percent) reported that one person was responsible for all aspects of IT on campus. Nearly all MSIs (98 percent) had a campus wide network. However, only 65 percent of respondents had an IT strategic plan, and even fewer (36 percent) had a process for assessing the effectiveness of IT application. More than 40 percent of institutions were part of a state network and/or shared computing resources with other campuses. A majority of institutions also operated some Enterprise Resource Planning (ERP) applications. These applications allow

<sup>2</sup> The number of surveyed institutions was smaller than the total number of Alliance-member MSIs for methodological reasons. See the Methodology section for more information.

<sup>3</sup> The proportion of the total U.S. population comprised of people of color is expected to grow from 28 percent in the year 2000 to 36 percent in 2020 and 47 percent in 2050 (Census, 2002).

institutions to integrate information systems for various administrative, management, and student service functions. For example, 79 percent had a financial management system (FMS), 76 percent had a student information system (SIS), and 60 percent had a human resources system (HRS). In addition, 65 percent of MSIs had online admissions applications. In contrast, the Campus Computing Project, a sample survey of public and private two-year and four-year institutions, found that 92 percent of institutions had online admissions applications (Green, 2003).<sup>4</sup>

Nearly all institutions provided Internet access and email for faculty, students, and staff, with the exception of student email accounts, which were provided by only 71 percent of institutions. In addition, the vast majority of institutions provided most types of IT support for both students and faculty, including a computing center, telephone help, scheduled on-site assistance, on-call on-site assistance, person-to-person email assistance, online tutorials, and in-person training workshops. With the exception of the computing center, each type of support was more likely to be provided for faculty than for students. All types of support were provided for students and faculty by 28 percent and 48 percent of institutions, respectively. In addition, more than half (56 percent) of institutions provided at least one Internet course, but only 15 percent provided at least one Internet degree.

Results from faculty-related questions indicated that although a variety of support and incentives were available to encourage the use of email and Internet, many faculty members have not moved beyond basic uses such as email communication with students. For example, more than 90 percent of faculty had networked computers in their offices. In addition, almost all institutions provided at least informal IT training for faculty, with 78 percent providing formal IT workshops.

More than half reported that they provided formal incentive programs to encourage faculty to use IT in teaching. However, the vast majority of institutions had less than half of faculty using email and/or Internet as teaching and learning tools, with the exception of access to the instructor for questions.

Data collected on student-related issues indicated that MSIs as a group need further investment to increase student computer ownership, residence hall Internet access, and availability of online services. MSIs reported that on average, less than half (45 percent) of their students owned computers, compared to 80 percent of students at all institutions, according to the Campus Computing Project survey (Green, 2003).<sup>5</sup> Only about one-quarter of MSIs either recommended or required student computer ownership or provided financial assistance for students to acquire computers. In contrast, the Campus Computing Project found that 44 percent of all institutions required or recommended computer ownership (Green, 2003). However, 76 percent of MSIs did provide student orientation to campus computing resources. Although 55 percent of institutions reported all residence halls were wired, about one-quarter reported that no residence halls were wired. More than half of the institutions provided online registration and access to grades, more than 40 percent provided online access to financial statements and advising, and about one-third provided online bill payment. Thirty-seven percent provided all of these online student services. For comparison, 77 percent of all institutions in the Campus Computing Project survey offered online course registration (Green, 2003).

An analysis of the relationship between institutional characteristics and the existence of various IT-related student and faculty services, training, and support resulted in the following findings:<sup>6</sup>

<sup>4</sup> The 2003 Campus Computing Project survey was conducted from June to October, 2003.

<sup>5</sup> The Campus Computing Project survey asked about computer or PDA/Handheld ownership.

<sup>6</sup> The following relationships were determined by examining crosstabulations of the descriptive survey results and merged IPEDS data.

- ▷ **Institutions that collaborated with other campuses, developed IT strategic planning and/or assessment processes, or had greater financial and human resources were more likely to provide a variety of IT services and support.**

For example, sharing computing resources and/or being part of a statewide network and having a strategic plan and/or having an assessment process for IT were associated with having a number of services. These included email for all faculty, students, and staff; a high percentage of residence halls wired; ERP applications; online submission of admissions applications and questions; a higher percentage of faculty using email/Internet for teaching functions; formal incentives for faculty to use IT; and each online student service. Being part of a statewide network was related to offering both Internet courses and Internet degrees.

In addition, both the amount of financial resources and the prevalence of IT staff on campus were associated with having a number of IT services and support.<sup>7</sup> Low ratios of total enrollment to IT staff and high financial resources were associated with email accounts for all faculty, students, and staff; various IT support services for students; online submission of admissions applications and questions; a high percentage of residence halls wired; and higher percentages of students using campus IT resources. *High* ratios of total enrollment to total IT staff were related to smaller percentages of residence halls wired.

Low ratios of total faculty to total IT staff and higher financial resources were both associated with higher percentages of faculty using email/Internet for teaching functions. Financial resources were related to providing formal incentives for faculty to use IT in teaching, providing all types of faculty IT training,

and offering financial aid for students to purchase computers.

- ▷ **Smaller institutions appeared to be most in need of expanding their IT resources.**

Enrollment size (being a small school) was associated with having a smaller percentage of residence halls wired, a lack of ERP systems, *not* providing online admissions applications and questions, and *not* offering all types of faculty IT training or formal incentives for faculty to use IT.

- ▷ **Institutions that offered the most advanced degrees were more likely to provide a variety of IT services and support.**

Offering a doctoral or first professional degree was related to many of the services and support that were included in the survey. For example, institutions that offered advanced degrees were more likely to provide email for all faculty, students, and staff; have all student IT support services; provide online submission of admissions applications and questions; provide all types of faculty IT training; offer Internet courses and degrees; require or recommend computer ownership; and provide each of the online student services.

- ▷ **Institutions with the highest percentage of Pell Grant recipients were using available resources to provide the most basic IT support and access.**

Institutions with the highest percentage of Pell Grant recipients were more likely to provide various student IT support services and to require students to participate in orientation to campus computing resources. Students at these institutions were more likely to utilize campus IT resources available at libraries and computer labs. However, institutions with the highest percentages of Pell Grant recipients were less likely to have other

<sup>7</sup> It is important to note that low ratios of total enrollment to total IT staff and low ratios of total faculty to total IT staff were both related to higher institutional financial resources as measured by instructional expenditures/FTE, total expenditures/FTE, and total current fund revenues/FTE. In addition, relationships involving financial characteristics are restricted to public institutions only due to different accounting standards and a smaller number of private institutions in the sample.

services, including a high percentage of residence halls wired, Internet courses, or various online student services.

Information gathered from the institutional profiles supports and expands upon the survey results. Specifically, there were certain priorities, best practices, and challenges that all or most institutions had in common. Common priorities included using information technology in ways that were consistent with institutional missions and goals and expanding access for historically disadvantaged students. Many of the institutions that were profiled pursued activities to expand IT access to the local community, as well as to their students. In addition, most institutions were developing at least some specialized programs to address local economic needs, with the goal of providing students the types of training and credentials that would lead to employment after graduation. Finally, all institutions that were visited emphasized the importance of maintaining and expanding faculty training to integrate technology into the teaching and learning process. Although most schools had some type of training and/or formal grant incentives, concern was still expressed that many faculty lag behind their students in technology usage.

Institutional personnel at all levels mentioned the importance of having a commitment to information technology from the senior-level leadership in order to maintain a sophisticated technology presence on campus. In addition, all institutions highlighted the importance of strategic planning for technology needs, particularly the necessity of integrating the IT plan with the overall campus strategic plans. However, following through on this commitment sometimes presented challenges because of the rapid change of technology and lack of stable funding sources. Whenever possible, institutions have attempted to establish a stable source of funding for information technology resources, including hardware, software, and human resource training. They also have undertaken various means to maximize resources. They

have standardized their hardware and software systems in order to enable IT staffs to be trained and to function more efficiently. They also were using student employees as part of their IT support staffs. Furthermore, the MSIs were focused on exploring the newest technologies rather than simply catching up to mainstream institutions. For example, many institutions were pursuing wireless technologies and some were developing their own administrative and/or course management systems in order to reduce their reliance on corporate vendors and to address their specific institutional needs.

All institutions highlighted a lack of financial resources as the main reason that they were sometimes unable to meet upgrade and staffing goals or cannot move forward with desired projects. The rapid pace at which new technologies become available today presents a particular challenge for MSIs to expand their IT capacity without depleting the limited core funding that enables them to serve educationally and economically disadvantaged students. Consequently, it is imperative that MSIs have highly qualified Chief Information Officers or IT Directors with the expertise to make smart decisions about what systems are purchased, and when and how those systems are upgraded. In addition, many of the impressive IT-related initiatives operated by this group of institutions were supported solely or largely by grant funding. While grant funding is appreciated as an invaluable resource for program development, the process of renewal is particularly challenging for low-resource MSIs. The process also jeopardizes the long-term stability of MSI programs.

## **Conclusions and recommendations**

The technological disenfranchisement that still exists among minority, low-income, and rural groups and the demonstrated success of MSIs despite their limited financial resources present a strong case for further investment in these institutions. As drivers of the engine of educational advancement for minorities, MSIs

have clearly demonstrated their ability to use limited financial and human resources effectively in order to provide their students, staff, and faculty with many IT-related services. Moreover, MSIs manage to create innovative programs for incorporating IT education into all academic fields. As a group, they are critical to preparing the nation's future minority leaders for the information technology sector.

Unfortunately, many of the programs MSIs have created remain vulnerable because of two fundamental threats: they rely upon outside funding sources that are inherently unpredictable; and staff turnover is high in this competitive market that is short on well-trained IT professionals. These findings support previous research that emphasized the importance of financial resources and adequate IT staffing to an institution's success in meeting its IT goals. Continued financial investment in MSIs will ensure that they can maintain the hard won progress they have achieved and expand the educational opportunities they provide. This investment will prove essential to closing the gaps in information technology access and remedying the underrepresentation of minorities in science, technology, engineering, and math fields.

Based on these findings, the Alliance urges action on the following recommendations:

- ▷ **Enact and fund the “Digital and Wireless Network Technology Program Act of 2003,” an unprecedented legislative effort to address the variety and scope of the nation’s minority-serving institutions’ information technology needs.**

The Digital and Wireless Network Technology Program Act is a bold effort to address the issue of technological disenfranchisement in minority communities on two levels—infrastructure and application—and recognizes that MSIs are the ideal vehicle to confront these problems impacting people of color. The components of the legislation address the array of needs

at MSIs by providing for both equipment and training, as well as allowing MSIs that are more advanced in their use of technology to partner with and mentor their peers. Provisions of the act also allow MSIs to strengthen their capacity to provide technology instruction to faculty and students, as well as future teachers and librarians, and provide them with the building blocks to reach new levels of technology application.

- ▷ **Create new sections in the Higher Education Act (HEA) under Titles III and V that provide new funding for technology maintenance and enhancements at HBCUs, HSIs, and TCUs.**

Financial support provided under Titles III and V of the HEA help developing institutions and those that serve large numbers of minority, low-income, and first-generation students to maintain administrative stability and build core operational capacity without detracting from their missions to enroll underserved students. Today, information technology plays a major role in all aspects of institutional operations, including administrative, student services, and teaching and learning. In addition, acquiring and maintaining IT equipment and training students and staff are costly endeavors. Consequently, the Alliance recommends the creation of new subparts under Titles III and V that would provide additional funding for MSIs to maintain and enhance information technology on their campuses, including infrastructure, Internet connectivity, and applications.

- ▷ **Create a new subpart under the Minority Science and Engineering Improvement Program (MSEIP) during the reauthorization of HEA to encourage improvements in the infrastructure and application of information technology at MSIs.**

MSEIP was created to effect long-range improvement in science and engineering education at predominantly minority institutions and to increase the participation of underrepresented ethnic minorities, particularly minority women, in scientific and technological

careers. In order to achieve the goals of MSEIP, investments must be made in both technology infrastructure and application at MSIs through the creation and funding of a new subpart under the MSEIP program.

- ▷ **Increase access for MSIs to new and existing federal programs that assist in the development of science and technology at higher education institutions and provide MSIs with opportunity parity to participate in the latest technological advancements.**

In addition to increasing the number and scope of programs that are designed specifically to address the needs of the nation's minority-serving institutions, it is imperative that all resources be distributed more equitably. Increased access is needed for the largest federal programs that target science, technology, engineering, and math (STEM) initiatives and research and development activities. MSIs are severely underrepresented in the allocation of federal research and development dollars as well as in specific programs, such as the NSF Computer Science, Engineering, and Mathematics Scholarships (CSEMS) program.

- ▷ **Ensure that MSIs can participate fully in the National Science Foundation's (NSF) proposed Advanced Cyberinfrastructure Program (ACP).**

The emerging cyberinfrastructure program, given its potential to revolutionize science and engineering research, has the unfortunate negative potential to leave MSIs behind. The Alliance supports the NSF Blue-Ribbon Advisory Panel on Cyberinfrastructure's recommendation that NSF set aside \$1 billion in funding per year to establish a program that would "create, deploy, and apply cyberinfrastructure in ways that radically empower all scientific and engineering research and allied education." The Alliance also supports the panel's goal to more effectively include MSIs by supporting strategic IT planning for underserved communities and improvements in network connectivity at MSIs (Atkins et al., 2003).

- ▷ **Develop new graduate level opportunities to enhance the capacity of MSIs to train future faculty and senior institutional leaders.**

A major concern is the significant underrepresentation of minorities in many advanced degree fields, including science, technology, engineering, and math fields. The need for educational experiences and credentials beyond the BA continues to grow in the workplace. Though there is a need for more minority fellowships in general at higher education institutions, MSIs in particular lack both programs and funding to provide the necessary graduate and professional level training needed by minority students. The limited graduate level opportunities available to MSI graduates and other minorities can be enhanced through policies that support the infrastructure of post-baccalaureate education at MSIs. These could include Ph.D. programs for schools currently offering master's degrees, recruitment and retention of minority professors, and financial resources necessary to attain an advanced degree, including fellowships.

- ▷ **Continue and expand funding for the U.S. Department of Education's Preparing Tomorrow's Teachers to Use Technology (PT3) program.**

The Department of Education's PT3 program was created in 1999 to provide grants to higher education consortia for the purpose of improving the ability of postsecondary institutions to prepare future K-12 teachers to use information technology in their curricula. An important component of addressing the technological disenfranchisement of low-income and minority groups will be increasing exposure to technology in many arenas, including elementary and secondary schools. Therefore, it is imperative that K-12 teachers be experts in incorporating information technology into their curricula. Furthermore, as shown in the Alliance's *Educating the Emerging Majority* report, Alliance-member MSIs prepare nearly half of all Blacks, Hispanics, and

American Indians who graduate with teacher education degrees (Alliance, 2000). These teacher candidates have the potential to serve as instructors and role models for the very populations who are less technologically savvy. Therefore, the Alliance recommends that the PT3 program be continued, that funding be expanded, and that efforts be made to ensure that MSIs have an opportunity to succeed in the competitive grant process.

- ▷ **Create a Hispanic-Serving Institutions Program (HSIP) within the National Science Foundation (NSF) similar to the Tribal Colleges and Universities Program (TCUP) and the Historically Black Colleges and Universities Undergraduate Program (HBCU-UP) to build the information technology capacity of HSIs in the STEM fields.**

The HBCU-UP and the TCUP programs have been excellent vehicles for HBCUs and tribal colleges to enhance their uses of technology for undergraduate teaching, learning, and research. They also have been good ways for NSF to be engaged with TCUs and HBCUs. A similar program for HSIs would help to build the technology capacity of HSIs to educate and train the more than 50 percent of Hispanic undergraduates they enroll.

- ▷ **Target specific state funds to MSIs for expanding information technology capacity.**

Although the nation's public minority-serving institutions currently receive funding from their respective states, MSIs often receive fewer state dollars in comparison to the flagship and

research institutions. Further, private MSIs and most Tribal Colleges and Universities do not receive regular allocations from the state. In addition to statewide networks and networking services, states where MSIs are located should target specific funding to MSIs to build their IT capacity in general and to train students in IT-related areas that would support statewide and local economic development initiatives.

- ▷ **Expand industry contributions to MSIs for information technology capacity and innovation.**

Information technology industries have a clear role to play in developing the IT capacity of MSIs and fostering innovative IT solutions at their campuses and communities. Because MSIs are training the future minority workforce and leaders for these industries, partnerships benefit both parties. Industry has the potential to contribute in many areas, including providing direct funding or equipment and software donations, as well as lending personnel expertise for activities such as staff training, curriculum development, and strategic planning.

In these times of increasing concern about homeland security, global competitiveness, and national economic growth, investing in the application of technology at MSIs represents a critical pathway to achieving the goals of prosperity, security, and harmony for all Americans. Investment in the policies and programs outlined above will speak not only to the needs of MSIs and their students, but also to all those who see access to a quality higher education as critical to achieving the American dream.

# Introduction

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As institutions that play a major role in educating the nation's emerging majority populations, HBCUs, HSIs, and TCUs are integral to the country's potential and promise.

**T**he Alliance for Equity in Higher Education—a collaboration of the nation's minority-serving institutions (MSIs) represented by the American Indian Higher Education Consortium (AIHEC), the Hispanic Association of Colleges and Universities (HACU), and the National Association for Equal Opportunity in Higher Education (NAFEO)—conducted this study to assess the status of information technology (IT) application at MSIs. Specifically, the study was prepared in order to better understand what IT-related experiences these institutions are providing for underserved populations and what challenges they face in creating and expanding opportunity. Since the focus of many previous studies has been on technology infrastructure at MSIs, this study takes a new direction and focuses mainly on how MSIs apply IT resources, particularly for the purposes of teaching and learning and student services.

The Alliance gathered information through an institutional survey administered to more than 320 Alliance-member MSIs.<sup>8</sup> Information also was gathered through a series of six campus visits to exemplary institutions that are profiled in detail in the report. The survey represents the Alliance's first attempt to collect consistent information on the use of IT across all MSIs, including Hispanic-Serving Institutions (HSIs), Historically Black Colleges and Universities (HBCUs) and other predominantly Black institutions, and Tribal Colleges and Universities

(TCUs). As the first survey of its kind, it is intended to provide baseline information on the status of IT application at MSIs. Specifically, the survey collected information on institutional issues, such as organization and planning, basic IT services and support, and administrative applications; faculty training and use of IT; and student requirements and IT-supported services. Data from the National Center for Education Statistics' Integrated Postsecondary Education Data System (IPEDS) also were used to describe selected general institutional characteristics, including enrollment and financial characteristics.

Because the nation's MSIs were established to provide postsecondary education opportunities for students who traditionally have been denied access to adequately funded K-12 schools, especially low-income, educationally disadvantaged students, they are in an unrivaled position to remedy the technological disenfranchisement of underserved groups. Alliance-member MSIs enrolled 31 percent of the 3.6 million Black, Hispanic, and American Indian students in postsecondary education in Fall 2000 (NCES 2001a). Unfortunately, these institutions remain limited by a lack of financial resources for investment in technology on their campuses. Moreover, these institutions strive to keep tuitions low because many of the students served by Alliance-member MSIs are financially disadvantaged. Average in-state full-time undergraduate tuition at Alliance-member MSIs

<sup>8</sup> The number of surveyed institutions was smaller than the total number of Alliance member MSIs for methodological reasons. See the Methodology section for more information.

was \$3,216 in 1999-2000—51 percent lower than the average tuition at all institutions (NCES, 2000). Even with low tuitions, students still required help. Nearly half of all students enrolled at MSIs received Pell Grants in academic year 2001-2002 compared to only 28 percent of all students, an indication of the severe financial need MSI students face (USDE, 2002).<sup>9</sup>

Results of the study show that many impressive accomplishments have been

achieved by MSIs in the use of technology despite limited funds. Nevertheless, there is an urgent need to invest in the future capacities of these institutions. As institutions that play a major role in educating the nation's emerging majority populations, HBCUs, HSIs, and TCUs are integral to the country's potential and promise. That potential and promise can be fulfilled in part by making the needed investments now for the economic and social security of the nation over the long-term.

## **Defining the universe:** Alliance-member institutions

The Alliance for Equity in Higher Education was created in 1999 as a means of promoting greater collaboration and cooperation among colleges and universities that serve large numbers of students of color. AIHEC, HACU, and NAFEO member institutions include:

**Historically Black Colleges and Universities and other predominantly Black colleges and universities:** HBCUs are federally designated colleges that began operating in the nineteenth-century to serve African Americans who were prohibited from attending predominantly White institutions (O'Brien and Zudak, 1998). HBCUs and Other Predominantly Black Colleges and Universities in the Alliance total 118 in number.

**Hispanic-Serving Institutions:** Federal statute defines HSIs as institutions that have at least a 25 percent Hispanic undergraduate full-time-equivalent (FTE) enrollment with at least 50 percent of its Hispanic students coming from low-income backgrounds *and* being the first generation in their family to attend college and an additional 25 percent being low-income *or* first generation (Benítez, 1998). Currently, 188 HSIs are represented in the Alliance.<sup>10</sup>

**Tribal Colleges and Universities:** The majority of these institutions are colleges that were chartered by one or more American Indian tribes and are based on reservations or in communities with large American Indian populations. Most of these colleges are two-year institutions that are less than 35 years old and have relatively small student bodies. (Boyer, 1997; Cunningham and Parker, 1998). Thirty-four TCUs are included in the Alliance.<sup>11</sup>

In addition to providing a quality education, MSIs foster cultural values and traditions, promote civic and community responsibility, and produce citizens who are exceptionally attuned to the increasingly diverse nature of American society.

<sup>9</sup> Enrollment and finance data were calculated for Alliance-member MSIs using various U.S. Department of Education data sources by Alliance staff members. Further information on Alliance institutions can be found at the Alliance website, [www.msi-alliance.org](http://www.msi-alliance.org).

<sup>10</sup> The number of HSIs can vary depending on the definition used. For an HSI to become a member of HACU, 25 percent of the total enrollment (part-time or full-time, undergraduate or graduate) must be Hispanic. Neither income nor first-generation status is a factor in determining HACU membership.

<sup>11</sup> AIHEC member institutions total 35, but only 34 are represented in the Alliance. The 35th is located in Canada.

# Background

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Information technology plays an ever increasing role in the nation's economic growth and provides individual users with opportunities that the non-user can only imagine.

The importance of investing in the IT capacity of the nation's MSIs cannot be appreciated without an understanding of the broader role that IT plays in today's society. In the last 40 years, the use of information technology resources has rapidly expanded and drastically altered the way that information is gathered, exchanged, and distributed. The sophistication of information technology resources continues to grow at a rapid pace, and the use of information technology resources in all fields continues to expand. As a result, IT plays an ever increasing role in the nation's economic growth and provides individual users with opportunities that the non-user can only imagine. Despite efforts during the last decade to close the "digital divide," substantial segments of the population still lag behind the nation as a whole in the use of the most basic IT resources, such as computers, email, and the Internet. The persistence of these gaps threatens to undermine the nation's future social and economic development.

## **Status of the digital divide: Disparities in access to information technology resources**

Since the late 1980s, experts have noted wide disparities among segments of the American population in access to and usage of electronic resources. Although declining prices, increased availability in schools and libraries, and wider applications in many occupations have since

combined to reduce inequality in both computer and Internet use,<sup>12</sup> generations of social and economic inequalities have resulted in large technological gaps among various groups. Gaps remain according to certain demographic characteristics, including race, income, and educational level. For example, as of September 2001, 71 percent of Asian Americans/Pacific Islanders and 70 percent of Whites used computers compared to 56 percent of Blacks and 49 percent of Hispanics. In terms of income, 37 percent of those earning less than \$15,000 reported using computers in 2001 compared to 58 percent of those earning \$25,000 to \$34,999 and 88 percent of those earning \$75,000 or more. Forty-seven percent of those with a high school diploma or GED reported computer usage, compared to 70 percent with some college, and 85 percent with a bachelor's degree (USDC, 2002).<sup>13</sup>

Rates of Internet usage were lower than computer usage overall, but similar gaps existed. Although Blacks and Hispanics had the highest growth rate from 2000 to 2001, as of September 2001, only 40 percent of Blacks and 32 percent of Hispanics reported using the Internet compared to 60 percent of both Asian American/Pacific Islanders and Whites. Gaps in Internet usage by income level and educational attainment also existed. One-quarter of those earning less than \$15,000 reported Internet usage compared to 44 percent of those earning between \$25,000 and \$34,999 and 79 percent of those earning \$75,000 and above. Similarly,

<sup>12</sup> The following data from USDC, 2002 refer to computer and Internet use from any location.

<sup>13</sup> All USDC, 2002 percentages refer to individuals age 25 and older. In addition White refers to White, non-Hispanic, and Black refers to Black, non-Hispanic.

**TABLE 1.** How Internet access has changed from 2000 to 2002 by race/ethnicity

RACE / ETHNICITY	2000	2002
White, non-Hispanic	50%	60%
Black, non-Hispanic	34%	45%
Hispanic	43%	54%

SOURCE: Pew Internet & American Life Project Tracking Survey, April 2000 and March - May 2002.

NOTE: For April 2000 survey, N = 2,503 and margin of error is +/- 2.5%. For March-May 2002 survey, N = 3,553 and margin of error is +/- 2%. The 2000 numbers are based on the March, April, and May-June 2000 data sets, total N = 10,642, margin of error +/- 1%.

the higher a person’s level of education, the more likely he or she will be an Internet user. Forty percent of those with a high school diploma or GED reported Internet usage compared to 62 percent of those with some college and 81 percent of those with a bachelor’s degree. While a correlation between income and education level does exist, people who have low educational attainment but high incomes are less likely to use the Internet than those who have high educational attainment but moderate income levels (USDC, 2002).

The most recent study on Internet usage, from the Pew Internet and American Life Project, examines usage by race as well as income and educational attainment within racial groups. The results indicate that as of May 2002, 42 percent of the overall population did not use the Internet and that the demographic composition of the non-user population had not changed significantly since the 2000 study. The five demographic factors where gaps remained included race, income, educational attainment, community type (rural, suburban, urban), and age. As shown in Table 1, Internet access has increased among Whites, Blacks, and Hispanics since 2000; however, some gaps remained, particularly between Whites and Blacks. Sixty percent of Whites reported Internet usage compared to 54 percent of Hispanics, and 45

**TABLE 2.** Percentage using the Internet by race/ethnicity and income: 2002

RACE/ETHNICITY BY INCOME	GO ONLINE
White, non-Hispanic	
Less than \$20,000	32%
\$20,000 to \$50,000	57%
More than \$50,000	82%
Black, non-Hispanic	
Less than \$20,000	25%
\$20,000 to \$50,000	55%
More than \$50,000	65%
Hispanic	
Less than \$20,000	28%
\$20,000 to \$50,000	60%
More than \$50,000	82%

SOURCE: Pew Internet & American Life Project, March - May 2002.

NOTE: Survey N = 3,553. Margin of error is +/- 2%.

percent of Blacks. Table 2 shows that even at higher income levels—more than \$50,000—a sizable gap existed between Whites and Hispanics, who both reported Internet usage of 82 percent, and Blacks, who reported Internet usage of only 65 percent. Among lower income groups, gaps were smaller or did not exist. As shown in Table 3, some gaps in Internet usage also existed among racial groups by educational level. Among those who have less than a high school education, both Whites and Hispanics reported higher Internet usage compared to Blacks (Lenhart et al., 2003).<sup>14</sup>

***Focus on American Indian communities***

The major studies of computer and Internet usage discussed in the previous section do not include American Indians. Consequently, other resources must be used in order to understand how the disparities in access to information technology affect this group.

Although many American Indians live in large urban communities, lack of access to

<sup>14</sup> The survey for this study was conducted in English only; therefore non-English speaking Hispanics were not included. For this study, White refers to White, non-Hispanic, and Black refers to Black, non-Hispanic.

**TABLE 3: Percentage using the Internet by race/ethnicity and education: 2002**

RACE / ETHNICITY BY EDUCATION		GO ONLINE
White, non-Hispanic		
Less than high school		24%
High school		46%
Some college		73%
College +		83%
Black, non-Hispanic		
Less than high school		15%
High school		40%
Some college		61%
College +		76%
Hispanic		
Less than high school		26%
High school		42%
Some college		71%
College +		87%
SOURCE: Pew Internet & American Life Project, March - May 2002. NOTE: Survey N = 3,553. Margin of error is +/- 2%		

information technology is more pronounced and complex for those who live in rural areas. Data from the 1999 Commerce Department “Falling Through the Net” study clearly indicate that the greatest obstacle to connecting rural American Indian communities to computers and the Internet is the lack of infrastructure and equipment resulting from geographic isolation and poverty. Rural Native communities lag behind non-Native communities in basic infrastructure, such as roads, utilities, and housing. Consequently, rural Native American households had a telephone penetration rate of only 76 percent, computer ownership of 27 percent, and Internet usage of 13 percent compared to national averages of 94 percent, 42 percent, and 26 percent respectively. It also appears that rural American Indians lack more infrastructure than other rural populations. About three-quarters of rural households with incomes under \$5,000 had telephone access, but only 46 percent of those living in this income bracket who

lived on tribal lands had telephones. On some reservations, the telephone penetration rate was only 18 percent (USDC, 1999).

***Role of public schools in addressing disparities in IT access***

The nation’s public elementary and secondary schools serve as one venue for addressing the racial and income disparities in IT access. Unfortunately, previous research indicates that the public school system does not appear to provide a complete solution to narrowing the access gap. Although the overall percentage of public school instructional rooms<sup>15</sup> with Internet access rose from 3 percent to 77 percent between 1994 and 2000, certain schools lagged behind. In schools with higher poverty (75 percent or more students eligible to receive free or reduced price lunch) or high minority enrollment (50 percent or more), only 60 and 64 percent, respectively, of the instructional rooms had Internet capabilities in 2000. The percentage of schools that made Internet available to students outside of regular schools hours was higher among schools with larger minority enrollment—61 percent of schools with 50 percent or higher minority enrollment compared to 46 percent with less than 6 percent minority enrollment (NCES, 2001b).

Native Americans are more likely than any other racial or ethnic group to access Internet resources at community institutions, including public schools, health clinics, and libraries. For example, almost 90 percent of schools and libraries on tribal lands had computer and Internet access in 1999 (Anderson, 1999). As of 2001, the Department of the Interior connected 41 percent of 185 Bureau of Indian Affairs (BIA) schools to their Internet service. An additional 104 schools were ready to be connected once equipment became available (Davis and Trebian, 2001).

<sup>15</sup> Instructional rooms include classrooms, computer labs, libraries, and any other rooms used for instruction.

Evidence also suggests that programs providing Internet access in K-12 schools do not close the experience gap if children lack access at home. This is because most students spend an hour or less on the Internet per week at school (Gartner, 2000), leaving those without home access at a serious disadvantage to their peers with home Internet access. In fact, Internet savvy students reported an academic advantage over their peers with limited access (Arafeh and Levin, 2002).

### *The cost of persistent disparities in IT access*

Because minority and low-income groups have historically lagged behind in IT access, individual members of economically and historically disadvantaged groups who have recently gained access have significantly less experience with these resources. As of 1999, 80 percent of high-income households were connected to the Internet, whereas only 53 percent of low-income households had access by that time. In addition, 70 percent of Whites compared to 63 percent of Blacks were connected by 1999 (Gartner, 2000). A 2001 report indicated that 24 percent of Hispanic users had less than one year of experience, and 14 percent had less than 6 months of experience. Many Native American households and communities are still not connected or have only come online in the past two years (Dorr and Akeroyd, 2001). It is also more likely that a large number of Blacks, Hispanics, and Native Americans gained this access to the Internet in locations outside of the home, which also results in less experience (USDC, 2002).

Once online, these underserved communities face additional barriers. Low literacy rates, language barriers, and lack of cultural diversity online all prevent disadvantaged users from accessing the full potential of the Internet (The Children's Partnership, 2000). Those who do not have strong experience face challenges in using search engines quickly and effectively, and it may be difficult to select credible websites and sources (Arafeh and Levin, 2002; The Children's Partnership, 2000). In addition, the English-

dominant resources of the Internet put those with limited English proficiency and non-English speakers—often from low-income and minority households—at a serious disadvantage (Arafeh and Levin, 2002; The Children's Partnership, 2000). The Children's Partnership reports that low-income and underserved Americans are most interested in local information, job listings, information at basic literacy levels, as well as non-English resources for cultural, political, and health matters.

Furthermore, students who grow up in homes without access to computers and the Internet are at a disadvantage in the education system as both K-12 classrooms and college level research increasingly rely upon online resources (Kelly, 2003). The Pew Internet and American Life Project found that Internet-savvy students use the Internet in a multitude of ways. Savvy students find sources for papers and reports; receive additional clarification about the material that interests or confuses them; complete schoolwork more quickly; collaborate online with classmates or study for tests and quizzes; and search for information about colleges, careers, and outside interests (Arafeh and Levin, 2002).

### **Implications of the digital divide: Prevalence of IT in society and the workforce**

#### *The information technology society*

The racial and income disparities described above threaten the economic prospects of underserved groups as well as the nation at large because of the indispensable role that information technology now plays in many aspects of society. In the last decade, with the advent of the Internet and increased use of personal computers, the use of information technology resources in many sectors has grown tremendously. In "A Nation Online," the U.S. Department of Commerce states that since 1997, computer use has grown at a rate of 5.3 percent per year. Internet use has grown at

a rate of 20 percent per year since 1998 (USDC, 2002). The USDC also estimates that there are two million new Internet users per month. Large sectors of the population use computers on a daily basis, either at home or at work. In September 2001, 57 percent of U.S. households had computers in their home, and 88 percent of those with home computers also had Internet connections (USDC, 2002). Not surprisingly, the U.S. Department of Commerce study finds that it is more likely that a person will have the Internet at home if he or she is exposed to the Internet at work. In fact, 37 percent of the 65 million employed adults who used a computer at work also used one at home (USDC, 2002). Use of the Internet affords people ready and quick access to a wealth of valuable information and services, in addition to serving as a communication tool and source of entertainment. The top six reported activities among Internet users in 2001 were email, product and service information searches, reading the news, playing online games, product and service purchases, and health services searches. Searching for government services, completing school assignments, watching or listening to streamed media, online chats, and online banking were also popular activities. According to the study, 78 percent of respondents who were enrolled in school used the Internet to complete assignments (USDC, 2002).<sup>16</sup>

### *Information technology in the workforce*

Nowhere has the use of information technologies, including computers, email, and the Internet become more prevalent than in the workplace. The IT industry itself continues to represent a major sector of the workforce, and the use of IT resources is growing rapidly in a wide range of unrelated fields.

The Information Technology Association of America (ITAA) estimates approximately 10

million IT workers in the U.S. workforce as of early 2002. However, they also project a shortage in the supply of IT workers due to an unqualified IT labor pool (ITAA, 2002). In a more recent study, the ITAA found that “the proliferation of digital technologies in the American economy has created robust demand for workers who can create, apply, and use information technology...” but that a large portion of the workforce needs proper training (ITAA, 2003). Despite this need, minorities earned few of the computer science and engineering degrees awarded in 2000. African Americans earned only 7 percent, Hispanics 5 percent, and Native Americans 1 percent (ITAA, 2003). Likewise, in 2002, African Americans comprised only 8 percent, Hispanics 6 percent, and Native Americans less than one percent of all IT workers (ITAA, 2003). Overall, minorities earn only one-tenth as many science and engineering doctoral degrees as Whites (Colwell, 2003).

Even for non-technical jobs, typically requiring at least some college education, a level of computer proficiency is expected and often required. As of September 2001, approximately 65 million of the 115 million employed adults reported using a computer at work. Eighty-one percent of people in managerial and professional occupations and 71 percent of people in technical, sales, and administrative positions used a computer (USDC, 2002). In the 13 months prior to September 2001, the percentage of employed adults using the Internet at work increased from 26 percent to 42 percent, a 54 percent annual growth rate. Common uses of a computer at work were Internet and email, word processing and desktop publishing, spreadsheets and databases, and scheduling (USDC, 2002).<sup>17</sup>

Use of a computer at work is more prevalent in occupations in which workers have higher educational achievement and higher average incomes. Among operators, fabricators, laborers,

<sup>16</sup> In the study, health services, government services, and online banking were asked only of participants age 15 or older. Otherwise, participants were age three and older.

<sup>17</sup> Employed adults in this study were limited to those age 25 and older.

and agricultural workers, who typically attain only high school diplomas, only about one in five workers use a computer. However, even in non-computer-dominated industries, there has been growth in Internet usage since 1998. Farming, forestry, and fishing reported a jump from 2 to 15 percent, while production, craft, and repair industries reported an increase from 9 to 19 percent (USDC, 2002). The need for a technologically literate workforce is predicted to increase. Recent estimates report that up to 30 percent of the workforce must have computer and information technology skills, and projections indicate that close to 50 percent of the workforce will need these skills in the next five years (Davis and Trebian, 2001).

Educational, commercial, civil, and political activity already has been strongly affected by the growth of the Internet. Digital communications transmit sounds, symbols, and images over great distances. Activities previously confined by physical space are now available to anyone with an online connection. Users can find higher paying jobs, local political action groups, online communities, local community events, and wider educational opportunities through online courses. In sum, the Internet has become one of the most important tools for social, political, and economic mobility and advancement (Cooper, 2002).

### **Training tomorrow's leaders: Information technology in higher education**

The role of information technology in higher education is complex and multifaceted. The use of technology for virtually all campus functions has become as prevalent at higher education institutions as it has in other workforce environments. Consequently, higher education institutions need a minimal level of technological sophistication to operate with the same efficiency as other sectors. Colleges also must prepare students to enter a workforce that increasingly

expects employees to have skills and knowledge in information technology in a growing number of fields and in the general workplace as the economy becomes more knowledge based. Because most sectors of the youth population are more technologically savvy than their older counterparts, students are in tune with these societal changes, and many demand that their college of choice provide a high level of access to and sophistication in information technology resources. Consequently, higher education institutions are motivated to stay on the cutting-edge of technology both to compete for students and to best serve the students' educational and job preparation needs. This task is complicated by quickly changing information technology resources. Although the influx of information technology into higher education has afforded a wealth of opportunities, it also has presented a multitude of challenges.

In the last decade, the expansion of information technology resources has radically altered many campus operations, including admissions and student services. For example, in admissions and the competitive market, many institutions use the web as a central tool for reaching prospective students. Admissions websites often offer still images, virtual tours, and other interactive features that allow prospective students to virtually visit a campus. Institutions also offer a vast number of student services online, including applications, course registration, bill payment, and online support and assistance. In fact, as of 2003, 77 percent of all colleges and universities offered online course registration, and 28 percent reported single/initial sign-on campus portals for access to grades and other personalized information (Green, 2003). In 2003, 54 percent could process credit card payments online, an increase from 40 percent in 2002 (Green, 2003).

Information technology also has had a dramatic effect on the teaching and learning process itself. Studies indicate that youth who have grown up in the technology age actually work and think differently. The Internet has changed the way

many students approach learning. In order to accommodate different learning styles, teachers and professors must change their approach to teaching (Frand, 2000). This requires pedagogical changes inside the classroom—such as technology-enhanced classrooms in which faculty use multimedia and Internet resources—as well as outside interaction and dialogue through such means as personal email, web discussion groups, and chats. In addition, distance education and web-enhanced course offerings constitute a major shift in teaching, and new instructional approaches are surfacing each year to improve this area as well (Frand, 2000; Oblinger, Barone, and Hawkins, 2001).

Information technology also provides opportunities to enhance collegial relations and professional networks for administrators and faculty by allowing them to convey information, solve problems, and work collaboratively without the restrictions of time, money, and shared space. This enhanced collaborative ability also extends the possibilities for conducting research. Colleges and universities can offer students and faculty the web resources to remotely collect, share, and analyze data and prepare research results. Indeed, such professional networking and involvement now occurs on national and international levels. Furthermore, interschool library consortiums provide fast and easy book loans, article requests, and database sharing. In addition, the increasing number of recognized professional publications available online increases access to academic journals. To a large extent, higher education is becoming free of geographic restrictions. Students can access courses at other institutions, faculty can collaborate with colleagues across the globe for research and teaching, and isolated areas of the country have gained opportunities that once were unimaginable (Forest, 2000).

Though technology has had a positive influence on higher education, institutions face several challenges as well, including but not limited

to resource allocation, strategic planning, and faculty training. The cost to maintain and upgrade various categories of infrastructure places high financial resource demands on institutions. In order to remain competitive, schools must constantly invest in building infrastructure, such as pathways for cables and electrical wiring; systems infrastructure, including computer networks, networking software, network hardware, memory and disk storage capacity, wireless connectivity, and data/voice/video/multimedia systems; and personnel infrastructure—the human resources to operate networks and provide technical assistance to students, faculty, and staff (Phipps and Wellman, 2001). The rapid rate of growth and change in technology and communications infrastructure makes this a costly investment. Thus, many campuses have developed new sources of revenue to finance technology demands. In fact, the prevalence of information technology at higher education institutions has led to some diversifying of resources, including partnerships with the private IT sector, user fees, and e-commerce. It is not surprising that institutional financial resources often are associated with the disparities among campus infrastructures (Phipps and Wellman, 2001).

Strategic planning for technology, of which finance is only one aspect, also challenges higher education institutions. In order to remain competitive, campuses must outline strategies and timelines to upgrade and install new technology. Institutions also must investigate, plan, and implement new applications; design and evaluate general IT policies; create or amend ethical guidelines; and maintain quality control. Because new IT products are constantly becoming available, campuses must make difficult decisions related to these issues, which requires personnel with a high level of expertise and specialization. According to a 2003 survey, 71 percent of institutions reported having a strategic plan for information technology, but only 60 percent reported that their financial plan of action recognized the need to “acquire

and retire aging equipment and software” (Green, 2003).

As technology plays a larger role in higher education, postsecondary institutions also are challenged with understanding and adapting to swift changes in the very nature of learning and research brought about by these innovations (Frاند, 2000). Consequently, institutions need personnel with expertise in pedagogically appropriate ways to integrate technology into instruction as well as leadership to direct the manner and degree to which an institution incorporates information technology into its teaching and learning mission. Integration of information technology into instruction also requires faculty training and student orientation. In fact, in a 2003 survey, institutions across all sectors of higher education identified “assisting faculty to integrate technology into instruction” as the single most important IT issue confronting their campus “over the next two to three years” (Green, 2003).

### **Key to closing the divide: The role of minority-serving institutions**

The influx of information technology into the higher education sector has provided minority-serving institutions with the same opportunities and raised the same challenges as for other institutions. However, the unique role that MSIs play in higher education presents them with an additional set of challenges in taking full advantage of the benefits that information technology has to offer. Most MSIs suffer from chronic underfunding in comparison to their majority-serving counterparts, which makes financing expensive information technology resources particularly challenging. The state of chronic underfunding also makes MSIs particularly vulnerable to budget cuts. However, it is critical that MSIs be able to provide their students with the same exposure to sophisticated information technology resources

because many of the students they serve—low-income, first-generation, and minority—are more likely than those at majority institutions to begin college with little prior experience with these resources. MSIs are in an unrivaled position to remedy the experience gap that still exists after secondary education. Thus MSI students can enter the workforce or graduate and professional schools on even footing with their peers from other institutions.

A report from the Tomás Rivera Policy Institute states that HSIs also have the unique mission of developing Hispanic leaders in IT fields. These leaders can promote a technological vision for their communities that would increase information technology opportunities. Increasing the numbers of Hispanics (or minorities) with expert knowledge of IT resources will increase the amount of culturally relevant Internet content by changing the composition of the workforce that creates it (TRPI, 2002).

### ***Status of IT at TCUs, HBCUs, and HSIs: Results of previous studies***

Several previous studies have provided information on the status of IT at one or more groups of MSIs. Although the studies vary in their relative emphasis on infrastructure versus application, most of the previous studies focused primarily on infrastructure and/or institutional priorities.

Experts in information technology at TCUs have long identified the main barriers to tribal use of IT as lack of infrastructure and lack of trained American Indian IT professionals, insight that is supported by U.S. Department of Commerce data presented earlier. In support, Salish Kootenai College collected data from 551 tribes on the status of their technology and interest in distance education. Preliminary data reported in *The Renaissance of American Indian Higher Education* supported a lack of basic IT infrastructure. Only 146 tribes reported owning a computer, 121 reported having a computer

lab, and only 91 reported Internet access for the tribe. Despite this lack of infrastructure, much interest was expressed in both bachelor's and associate's degree programs delivered via the Internet. Bachelor's degree programs in environmental science, tribal human services, nursing, education, and business were selected by 281 tribes, and 249 tribes selected associate's degree programs in 17 different areas (O'Donnell et al., 2003).

A technology needs assessment of HBCUs was conducted by NAFEO in 2000 for the U.S. Department of Commerce. The study assessed the status of computing resources, networking, and connectivity at the 118 historically and predominantly Black colleges and universities that were members of NAFEO at the time of the survey.<sup>18</sup> In terms of institutional expectations and access, more than half of HBCUs surveyed (55 percent) required some level of computer competency for students. However, only 15 percent of HBCUs surveyed recommended computer ownership, and none required it. In addition, only 3 percent indicated they provided financial assistance for students to purchase computers. About three-quarters of HBCU students did not own their own computer and relied on institutional computer ownership for access (NAFEO, 2000).

The results from the connectivity, capacity, and facilities section indicated that 95 percent of HBCUs had campus networks, and 41 percent indicated that all faculty offices were wired. Access to the campus backbone was available in 88 percent of central administrative offices, and more than half of HBCUs had updated their building wiring, including dormitories. However, only 45 percent of dormitory common areas provided computer access. Therefore, the majority of students who did not own computers

were limited to workstations in libraries and computer labs. In addition, 88 percent of HBCUs had only the minimum standard of connectivity (defined as T-1 for this study), indicating that most HBCUs were not taking advantage of high-speed connections available in their communities (NAFEO, 2000).

When asked about integrating information technology into teaching, HBCUs also showed mixed results. Responses indicated that although the library, computer science, and technology units were most effective, no departments were extremely effective at utilizing the Internet in the classroom. The average response was "somewhat effective" (NAFEO, 2000). A 2000 study of the sophistication of campus IT usage<sup>19</sup> at the 46 public HBCUs that participate in the Thurgood Marshall Scholarship Fund<sup>20</sup> reported that half of institutions had informal teaching effectiveness or academic computing groups, and 62 percent reported formal faculty technology education advocacy groups. However, almost half did not provide significant formal incentives for students and faculty to use IT, and very few reported a large percentage of faculty and students using email/Internet as part of the teaching, learning, and research process (Booz Allen & Hamilton, 2000).

The NAFEO study indicated that more than half (52 percent) of HBCUs surveyed had developed a strategic plan, and 42 percent reported being in the process of developing one. However, of those institutions with a plan, only 65 percent had an evaluation process in place. A large majority of HBCUs identified the following seven issues as extremely important for their institutions in the next five years: providing universal access to the Internet, providing adequate user support, assisting faculty with integrating technology into instruction, financing the replacement of aging hardware/software, expanding/enhancing the

<sup>18</sup> Thirty-eight institutions did not respond to the survey.

<sup>19</sup> Based on questionnaire responses, campuses were determined to be at a Stage I, II, or III level of sophistication in six areas related to IT usage: strategy, organization, finance, technology infrastructure, teaching, and training. Stages of sophistication were based upon a comparison to a set of model, best practice institutions.

<sup>20</sup> Forty-three institutions participated in the study.

campus network, using IT effectively in distance education, and enhancing library access to databases and other institutions (NAFEO, 2000). In addition, employing and training a sufficient number of IT staff were among the most cited challenges related to IT in the 2000 study of public HBCUs (Booz Allen & Hamilton, 2000). The report found that the organization of the IT staff at 40 percent of institutions was at the lowest level of sophistication, primarily because there are few IT support staff members.

Unfortunately, the most recent assessment of technology utilization at HSIs was conducted in academic year 1995-1996. At the time, 125 HSIs were surveyed, and 93 responded. The survey results indicated that less than one-half of students at HSIs had Internet access in the 1995-1996 academic year. A majority of HSIs prioritized providing this access to administrators, followed by faculty, then students. The most widely available service for all campus constituents was email. The study also found that, with the exception of computer science departments, the Internet was used very little by faculty for

teaching. The major needs identified during the study included funding to improve individual access to the Internet and to provide regular training and support for faculty to use technology in the classroom (Rodriguez et al., 1996).

In a recent study conducted by the U.S. General Accounting Office (GAO), 50 percent of MSIs identified lack of IT support staff as a particular limitation for advanced technology on their campuses. More than 80 percent of each group cited limited funding as the primary reason for not meeting their technological goals. All MSIs responding to the survey indicated that their highest priority was providing more training for faculty in using information technology in the classroom. For HSIs and HBCUs, distance education ranked lowest in relation to other goals such as improvements in network infrastructure and increased student access to computers. However, tribal colleges tended to rank providing distance education and training faculty in distance education higher, due mostly to the challenges of serving a broad geographical area (GAO, 2003).

### **Current programmatic solutions:** Goals and status

The Advanced Networking with Minority-Serving Institutions (AN-MSI) project, which began in 1999, is funded by a four-year, \$6 million grant from the National Science Foundation (NSF) to EDUCAUSE. The goal of the project is to help close the digital divide by providing resources, information, and a collaborative forum for MSIs to develop advanced networking solutions for their community goals (AN-MSI, 2002a). The first participating cohort includes 103 institutions: 36 HBCUs, 35 HSIs, and 32 TCUs. The project has helped MSIs with executive awareness of the importance of IT, resource development, network technology, Internet connectivity, and IT applications. Specific services that participating campuses can receive include campus IT assessments, curriculum and faculty development, assistance with distance learning, online training for campus personnel, strategic planning, and technical assistance (Artze, 2002; Staudt, 2001). Various collaborative programs are now underway through the AN-MSI project. Five California HSIs worked in collaboration and received a \$3.1 million Title V grant from the Department of Education to address network security architecture, software, and training. Innovative wireless solutions are in process at three tribal colleges. An HBCU participant is testing a remote technical support service to determine its value for other MSIs (AN-MSI, 2002b).

# Status of IT application at MSIs: Survey results

Almost all respondents reported that they had a campus-wide network. Not surprisingly, Internet access and institution-provided email accounts also were prevalent.

## Institution-wide issues

### *Organization, planning, and staff*

Respondents answered a series of questions to determine the degree to which MSIs are sharing IT resources with other campuses and strategically planning for technology. Responses also reflected how IT departments are organized and staffed. Eighty-six percent of respondents reported that they had one person who is responsible for all aspects of IT on campus. Forty-three percent of respondents reported that they shared campus computing resources with other campuses, and 46 percent reported being part of a state network system. Sixty-five percent of respondents had a strategic plan in place for the application of IT on campus at the time of the survey. However, another 30 percent reported having a strategic plan in progress. For comparison, the 2003 Campus Computing Project, a sample survey of public and private two-year and four-year institutions, found that 71 percent had strategic plans in place and an additional 21 percent were preparing a plan (Green, 2003).<sup>21</sup> Even fewer MSIs (36 percent) had a process for assessing the effectiveness of IT application on their campuses; 38 percent had a process in progress. One-quarter of institutions had no plan in place or in progress for assessing the effectiveness of IT.

Institutions were asked to report the total number of IT staff at their institution. The number of staff reported ranged from zero (only one institution) to 283, averaging 25 staff members. Because this variable is expected to fluctuate by institution size, ratios of total headcount enrollment to total IT staff and total faculty to total IT staff were created.<sup>22</sup> Ratios of total headcount enrollment to total IT staff members ranged from 22:1 to 2,139:1, averaging 333:1. In other words, on average, there were 333 students for every IT staff member. The ratios of total faculty to total IT staff members ranged from 3:1 to 400:1, averaging 19:1 (19 faculty members for every IT staff person).

### *Basic IT services*

Almost all respondents reported that they had a campus wide network. Not surprisingly, Internet access and institution-provided email accounts also were prevalent. Internet access was available for faculty, staff, and students at 100 percent, 100 percent, and 97 percent of institutions, respectively. The status of institution-provided email accounts followed a similar pattern, with fewer institutions providing email accounts for students. Email accounts were provided for faculty, staff, and students at 99 percent, 97 percent, and 71 percent of institutions,

<sup>21</sup> The Campus Computing Project survey is an annual sample survey of public and private two-year and four-year institutions. The 2003 survey was conducted from June to October, 2003.

<sup>22</sup> These ratios are approximations of the status at the time the survey was filled out due to a time lag in the data points. Institutions were asked to self report the headcount enrollment and total number of faculty as reported on their Fall 2001 IPEDS form because at the time the survey was mailed, that was the most recent IPEDS fall enrollment survey they would have been required to complete. It is assumed that the total IT staff reported represented the status when the survey was filled out by each institution (between Fall 2002 and Spring 2003).

respectively. An examination of the other factors (using data from the survey and IPEDS) indicate that whether a campus provides email for all faculty, staff, and students is related to sharing computing resources and being in a statewide network, having a strategic plan in place versus in progress, and offering a doctoral/first professional degree. Interestingly, low ratios of enrollment to total IT staff, and both high total expenditures/FTE and total current fund revenues/FTE also were related to providing email accounts for all three constituents.<sup>23</sup>

Institutions also were asked to estimate the percentage of their residence halls that were wired to allow students direct Internet access.<sup>24</sup> More than half (55 percent) of institutions indicated that all residence halls were wired. However, more than one-quarter (27 percent) reported that no residence halls were wired. Factors that were related to having fewer residence halls wired included being a smaller institution, and having high percentages of Pell Grant recipients.<sup>25</sup> Factors related to having a high percentage of residence halls wired included being part of a statewide network, having a strategic plan, having an assessment process for IT versus having one in progress, having low ratios of enrollment to IT staff, and having high total expenditures/FTE.

### *Student and faculty IT support*

A large majority of institutions provided various types of IT support for both students and faculty, with some preference for providing certain services for faculty (see Figure 1). Only one type of service, online tutorials, was provided for faculty by fewer than 87 percent of institutions. This type of service was the least popular overall,

with 57 percent and 63 percent of institutions providing the service for students and faculty, respectively. However, in most cases, the same IT support services were provided for both students and faculty. The exception was in-person training workshops, which were provided for faculty by 91 percent of the institutions but for students by only 60 percent of the institutions. Approximately one-quarter (28 percent) of institutions provided all of these types of support to students, and about one-half (48 percent) provided all types of support to faculty. Only four institutions did not provide any support to students, and there were no institutions that did not provide any support services to faculty.

Whether an institution provided various IT support for students, including telephone help, on-call on-site assistance, person-to-person emails, and in-person training workshops, was related to a number of factors. These included having a low enrollment to IT staff ratio, high total expenditures/FTE, and total current fund revenues/FTE. These factors also included having a high percentage of Pell Grant recipients. Having an assessment process for IT also was associated with providing these types of IT support for students. Institutions that had all student services were more likely to have offered a doctoral/first professional degree and to have enrolled a high percentage of Pell Grant recipients.

### *Administrative Applications*

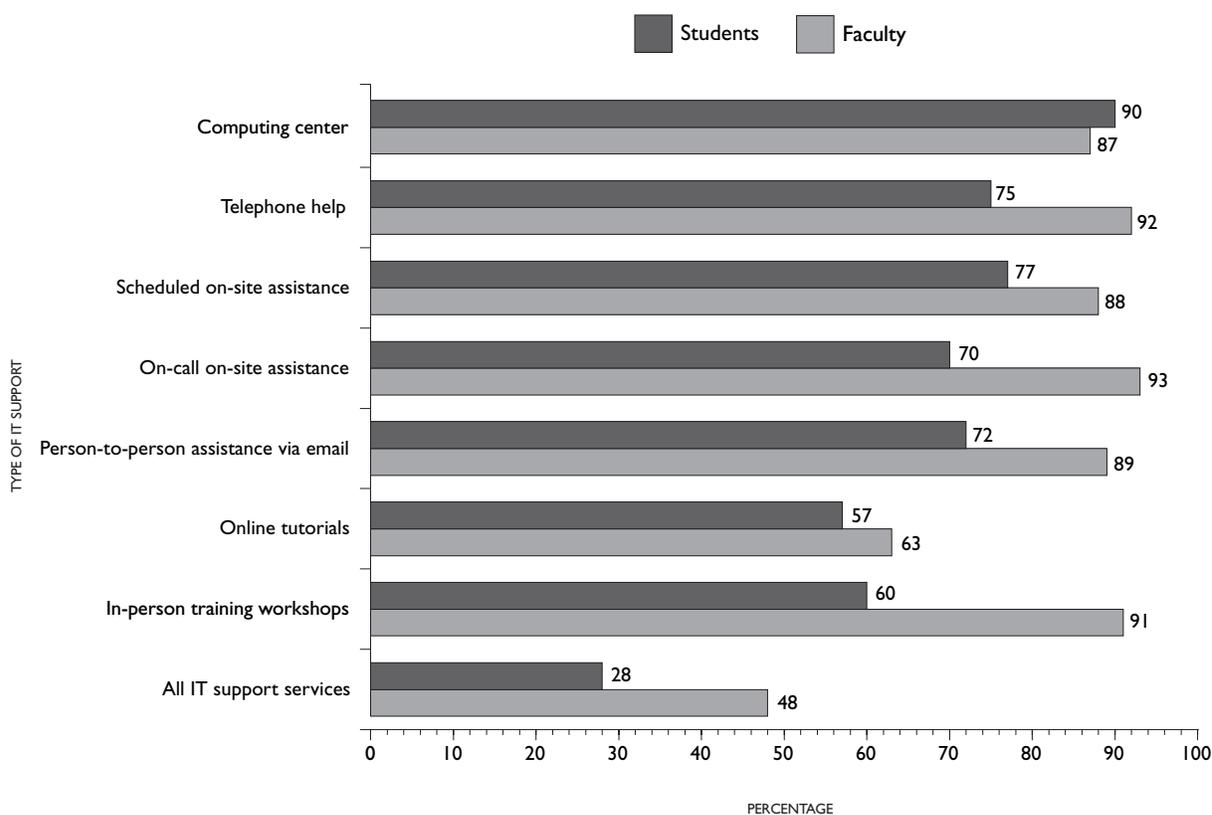
Institutions also were asked to indicate whether they had various types of Enterprise Resource Planning (ERP) software applications. These applications allow institutions to integrate information systems for various administrative,

<sup>23</sup> Throughout this section, relationships were determined by examining crosstabulations of the descriptive survey results and merged IPEDS data. Low ratios of total enrollment to total IT staff are defined as the lowest quartile based on survey data (139:1 and fewer). When referring to IPEDS financial variables—instructional expenditures/FTE, total expenditures/FTE, and total current fund revenues/FTE—high and low refer to the highest and lowest quartiles of survey respondents. In addition, relationships involving financial characteristics are restricted to public institutions only due to different accounting standards and a smaller number of private institutions in the sample.

<sup>24</sup> Only 98 schools provided a percentage; however, according to 2000-2001 IPEDS data, only 92 of the survey respondents provided on campus housing. Therefore, the non-respondents on this question are likely to be institutions without on-campus housing.

<sup>25</sup> These numbers were based on quartile cuts. Small institutions are defined as the lowest quartile based on Fall 2001 enrollment data (1,319 or fewer). High ratios of total enrollment to total IT staff are defined as the highest quartile based on survey data (362:1 and higher). A high percentage of undergraduate Pell Grant recipients is defined as 75 percent or greater.

**FIGURE I.** Percentage of MSIs that provide various types of IT support services to students and faculty



management, and student service functions. ERPs provide the advantage of allowing electronic access to information by all approved departments and are customized for individual campus needs. These systems include financial management systems (FMS), student information systems (SIS), human resources systems (HRS), data warehouses (DW),<sup>26</sup> and enterprise document management systems (EDMS).<sup>27</sup> As shown in Figure 2, more than 90 percent of institutions surveyed had FMS, SIS, and HRS applications in operation or in progress, and 92 percent had all three of these

systems in operation or in progress. A smaller percentage of these institutions had these three systems in operation at the time of the survey (79 percent, 76 percent, and 60 percent, respectively). Even fewer institutions had DW and EDMS applications in operation.<sup>28</sup>

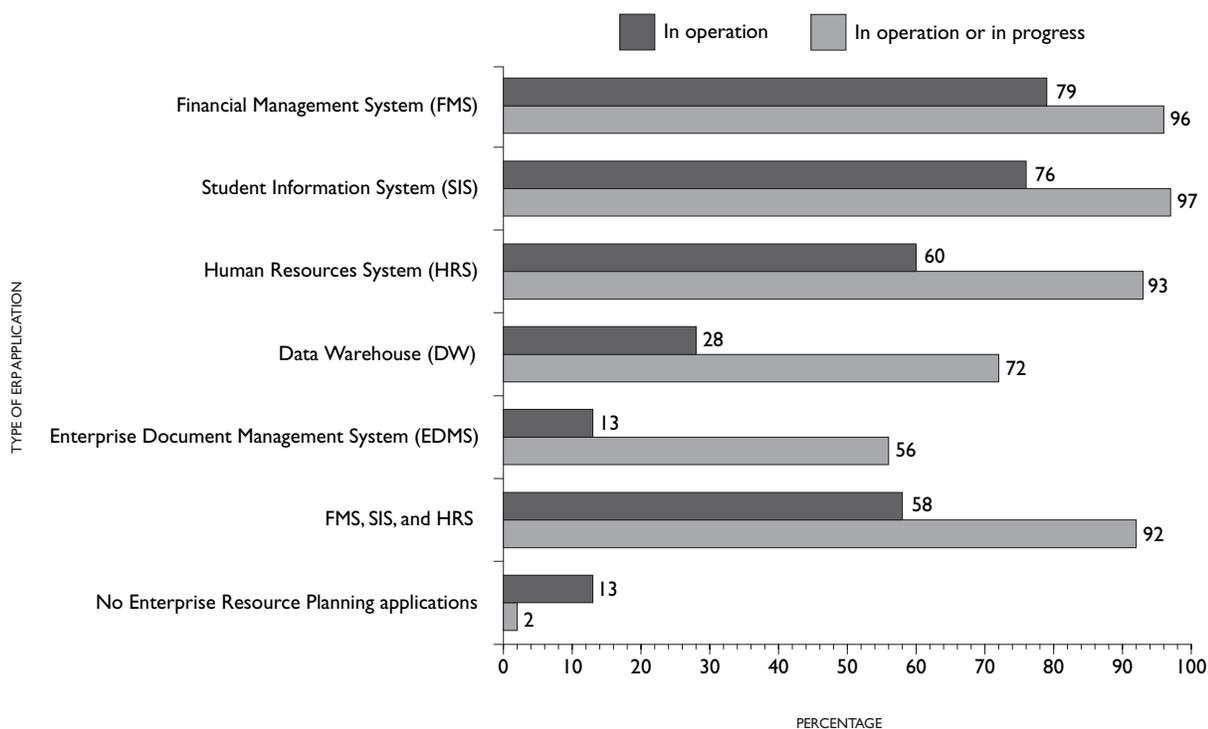
The institutions that had all three software systems for financial management, student information, and human resources in operation shared a common set of characteristics. These included having a strategic plan, sharing computing resources, and not being a small

<sup>26</sup> Data warehouses are used to store historical institutional data for the purposes of research and production of reports as well as trend analysis and projections.

<sup>27</sup> Enterprise document management systems serve as centralized electronic filing systems for archiving and retrieving documents.

<sup>28</sup> A cursory examination of the responses institutions provided as the software developer suggested that the percentages may be high. Unfortunately, with the information gathered in the survey, we were unable to determine with certainty whether many of the respondents had true ERP systems in place. This issue should be explored in more detail in future research.

**FIGURE 2.** Percentage of MSIs with various Enterprise Resource Planning (ERP) applications



institution. The same factors were related to having a data warehouse and an enterprise document management system in operation or in progress. It is possible that these systems do not prove cost efficient for smaller institutions, particularly if they do not share computing resources.

### *Admissions*

This section examines the degree to which institutions used their website as part of their recruiting and admissions process. Results of the survey indicate that for most institutions the webpage was an integral part of both the recruiting and admissions process. Although only five percent of institutions required students to apply online, another 61 percent had online applications as an option for prospective students. In contrast, the Campus Computing Project survey found that 92 percent of all

institutions had online admissions applications (Green, 2003). In addition, according to the Alliance survey, 71 percent of MSIs allowed prospective students to submit admissions questions online, and 85 percent had a specific webpage for prospective students. A set of five factors appeared to be associated with being able to apply online and to submit admissions questions online. These included sharing computing resources, having a strategic plan, having an assessment process for IT, not being a small institution, and offering a doctoral/first professional or master's degree. In addition, high ratios of enrollment to IT staff and low total expenditures/FTE were associated with institutions *not* providing these services.

Institutions also were asked to indicate how important their website was to their overall admissions strategy on a scale of zero (not at all) to five (very important), with one indicating

minimal importance, and three indicating some importance. More than half (59 percent) rated the importance of the webpage for admissions with a four or five, 32 percent indicated a two or three, and only nine percent indicated a zero or one. Two factors related to highly rating (four or five) the importance of the webpage for admissions: offering a doctoral/first professional degree and urban (versus suburban or small town/rural) location.

### *Distance Education*

The survey requested basic information about whether schools offered any courses or degrees solely online. Fifty-six percent of Alliance-member MSIs indicated that they offered at least one Internet course, and 15 percent indicated that they offered at least one Internet degree.<sup>29</sup> The Campus Computing Project survey found that among higher education institutions in general, 66 percent offered online courses (Green, 2003). Several factors appeared to be associated with offering Internet courses. Common characteristics included institutions that were part of a statewide network, offered a doctoral/first professional degree, were located in suburban (versus urban or small town/rural) communities, and had a lower percentage of Pell Grant recipients.<sup>30</sup> Offering any Internet degrees appeared to be associated with being part of a statewide network and offering a doctoral/first professional degree or Master's degree.

### *Learning Resources*

Most respondents indicated that their libraries offered technologically sophisticated resources. Eighty-eight percent of institutions had a library webpage. Students could access the library catalog online at 84 percent of Alliance-member MSIs; 92 percent of all institutions were found to have

online library catalogs in the Campus Computing Project survey (Green, 2003). Ninety-one percent of institutions indicated having some access to library databases online. Institutions also were asked to indicate the percentage of students who used the IT resources available in their campus libraries and computer labs. Among the schools that responded, 71 percent of students, on average, used campus IT resources.<sup>31</sup> The percentage of students using campus IT resources was associated with a low ratio of enrollment to total IT staff, a high percentage of Pell Grant recipients, and high total expenditures/FTE.

## **Faculty Issues**

### *Use of IT for Teaching and Learning*

These questions assess the degree to which faculty use IT, specifically email and the Internet as part of their teaching strategy.<sup>32</sup> On average, 93 percent of faculty had networked computers in their offices; at 61 percent of the institutions all faculty had networked computers in their offices. Despite the prevalence of networked computers for faculty, the use of email/Internet by departments and faculty for instructional purposes was much lower. For example, only 32 percent of institutions reported that all departments had a webpage, and 15 percent of institutions reported that no departments had a webpage. Similarly, only 29 percent of faculty, on average, had at least one course webpage, and 14 percent of institutions reported that no faculty had a course webpage.

Respondents also were asked for their best estimate of the percentage of faculty who used email or the Internet for various course functions on either a required or optional basis. Responses included access to course syllabi, access to course notes, access to course assignments,

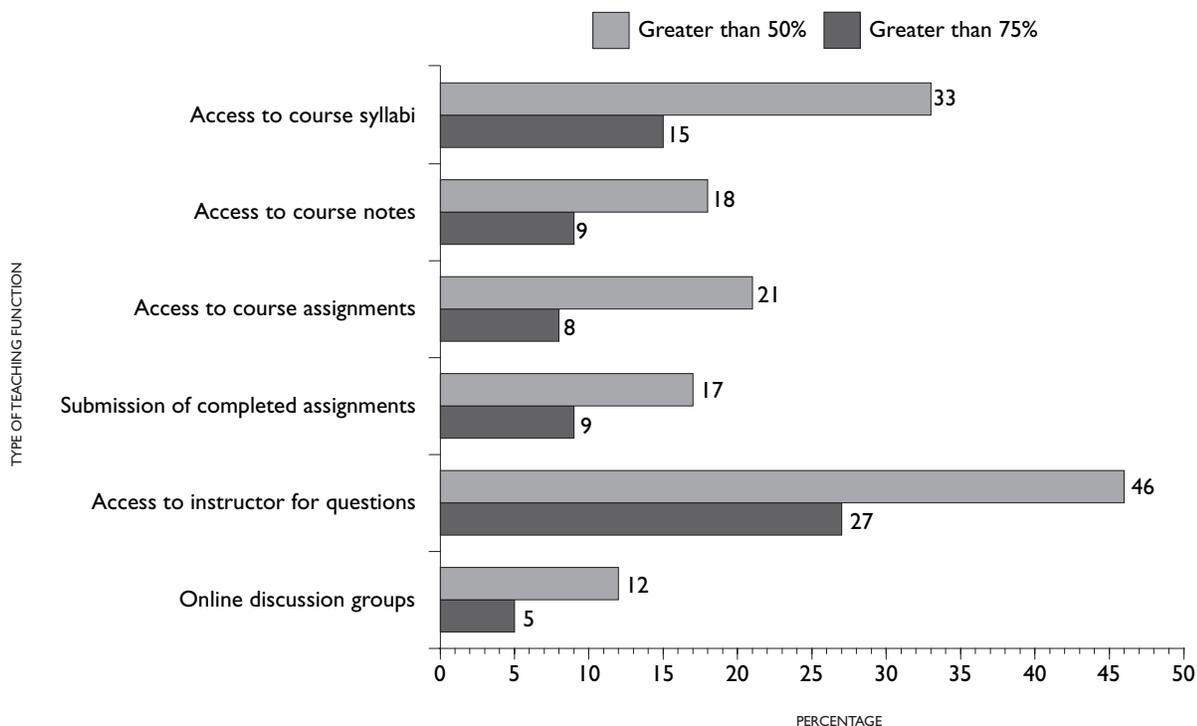
<sup>29</sup> Unfortunately, attempts to gather the number of Internet courses and degrees, and ratios to total courses and degrees were unsuccessful due to missing data.

<sup>30</sup> Low percentage of Pell Grant recipients refers here to fewer than 50 percent.

<sup>31</sup> Only 96 of 191 respondents provided a percentage.

<sup>32</sup> For each of these questions, respondents were asked to give their best estimate of the percentages.

**FIGURE 3.** Percentage of MSIs where greater than 50 percent and greater than 75 percent of faculty used email/Internet for various teaching functions



submission of completed assignments, access to the instructor for questions, and online discussion groups. In order to summarize the data, the optional and required percentages were totaled and the highest of the three (optional, required, or total) was used to indicate the percentage of institutions reporting that more than half and more than three-quarters of faculty used the email or Internet for each of the above functions.<sup>33</sup> Figure 3 shows the results of this data summary. As shown, access to the instructor for questions was the most prevalent use of email/Internet with about one-quarter of institutions having more than 75 percent of faculty and nearly one-half of institutions having more than 50 percent of faculty using IT for this

purpose. At one-third of institutions, more than half of faculty used the email/Internet for access to their course syllabi. Other teaching functions were less widespread.

Figure 3 also shows that the vast majority of institutions had less than 50 percent of faculty using email and Internet as a teaching and learning tool, with the exception of access to the instructor for questions. Despite a low overall presence of these activities, factors related to the percentage of faculty who had a course web page as well as the percentage who used email/Internet for each of the teaching functions were consistent. Factors related to having higher percentages of faculty using email/Internet included sharing computing resources,

<sup>33</sup> In many cases, respondents filled out either the optional or the required percentage; therefore if either of these data points were examined alone, there would be a large number of missing data. In a small number of cases, the total of optional and required added to more than 100, in which case the total was reset to 100. This process would result in an overestimate of the mean. For this reason, these data are reported using quartiles (i.e. percentage greater than 50 and 75 percent respectively) to convey a sense of the prevalence of these practices.

having a strategic plan, and having lower ratios of total faculty to total IT staff.<sup>34</sup> Also related were higher instructional expenditures/FTE and higher total expenditures/FTE.<sup>35</sup>

On average, only 5 percent of faculty taught at least one course solely online; the percentages ranged from zero to 40, with 39 percent of institutions reporting that no faculty taught any online classes.

### *Training and evaluation*

A few questions were included to determine the extent to which MSIs provided training to faculty in the use of IT for teaching and learning and whether this aspect of teaching was incorporated into faculty evaluations. Ninety-eight percent of institutions provided either optional or required IT training for faculty members. Fifty-eight percent of institutions had optional computer-based training or videos, and another 4 percent required this type of IT training for faculty. Seventy-eight percent of institutions had optional formal faculty IT training workshops, and 17 percent of institutions required these formal workshops. Factors associated with providing computer-based training or videos and offering all types of faculty IT training included not being a small school and offering a doctoral/first professional degree. High total expenditures/FTE also were associated with requiring all types of faculty IT training as well as formal training workshops.

More than half (55 percent) of institutions reported that they provided formal incentive programs to encourage faculty to use IT in teaching, and about one-quarter (27 percent) of institutions included the use of IT for teaching as a component of

faculty evaluations. In contrast, only 17 percent of institutions reported IT use as a component of faculty review in the Campus Computing Project survey (Green, 2003). Again, factors associated with providing formal incentives included being part of a statewide network, having an assessment process for IT, and not being a small school. Total expenditures/FTE and total current fund revenues/FTE were related to IT use being a component of faculty evaluations.

### **Student Issues**

#### *Requirements*

The survey also gathered information on the proportion of institutions that required or recommended that students have computers, oriented them to campus computing resources, and required any demonstration of formal computer competency. Only five institutions (3 percent) required that students own computers. These requirements were recent, initiated in 1999 by three institutions and in 2000 by two other institutions. Another 21 percent of institutions recommended that their students have personal computers. These policies were initiated in years ranging from 1995-2002.<sup>36</sup> In contrast, the 2003 Campus Computing Project survey found that 44 percent of institutions required or recommended computer or PDA/Handheld ownership (Green, 2003). One-quarter of Alliance-member MSIs provided some type of financial assistance for students to acquire computers.<sup>37</sup> Not surprisingly, requiring or recommending computer ownership appears to be associated with providing financial assistance. Other factors related to providing financial assistance included offering a doctoral/first professional degree, high instructional expenditures/FTE, high total expenditures/FTE, and high total current fund revenues/FTE.

<sup>34</sup> Sharing computing resources was related to five of the six email/Internet uses and having a strategic plan was related to four of six.

<sup>35</sup> High instructional expenditures/FTE were related to five of the six email/Internet uses. High and low ratios of total faculty to total IT staff are based on quartile cuts of the survey data; low ratios are 7:1 and fewer and high ratios are 20:1 and higher. Because for most faculty uses percentages are less than 50, these factors influence the difference between falling into the first or second quartiles or first and second halves.

<sup>36</sup> Thirty-eight institutions indicated that they recommended computer ownership, but only 22 indicated the year the recommendation was initiated.

<sup>37</sup> Of those that provided assistance, 60 percent provided discounts, 33 percent provided financial aid, 19 percent provided free computers, and 42 percent provided computers to rent or check-out. Numbers do not add to 100 because respondents could choose more than one response.

Forty-one percent of MSIs had formal computer competency requirements for undergraduate students, very similar to the 39 percent of institutions that reported these requirements for undergraduates in the Campus Computing Project survey (Green, 2003). Nearly one-third (32 percent) of institutions required students to participate in orientation to campus computing resources, and another 44 percent provided orientation on a voluntary basis. Several factors were associated with requiring orientation to campus computing resources. These factors included having a strategic plan, having a low ratio of enrollment to IT staff, and having a high percentage of Pell Grant recipients.

Institutions also were asked to estimate the percentage of students who had their own computers. Institutions reported that 45 percent of students, on average, owned computers.<sup>38</sup> Eighty percent of students at institutions in the Campus Computing Project survey were reported to own computers (Green, 2003).

### *Services*

This section assessed the number and type of online student services that were available, including class registration, access to grades, access to financial statements, bill payment, and advising (see Figure 4). More than 40 percent of Alliance-member MSIs provided each of the IT-supported student services at least as an option (with the exception of bill payment), while a much smaller percentage of institutions required students to perform these functions online. As a point of comparison, 77 percent of institutions in the Campus Computing Project survey reported offering online course registration (Green, 2003). The smallest percentage of institutions (about one-third) offered online bill payment as a service. Thirty-seven percent of institutions indicated that they provided all of these student services at least as an option, and 22 percent indicated that they provided none of these services.

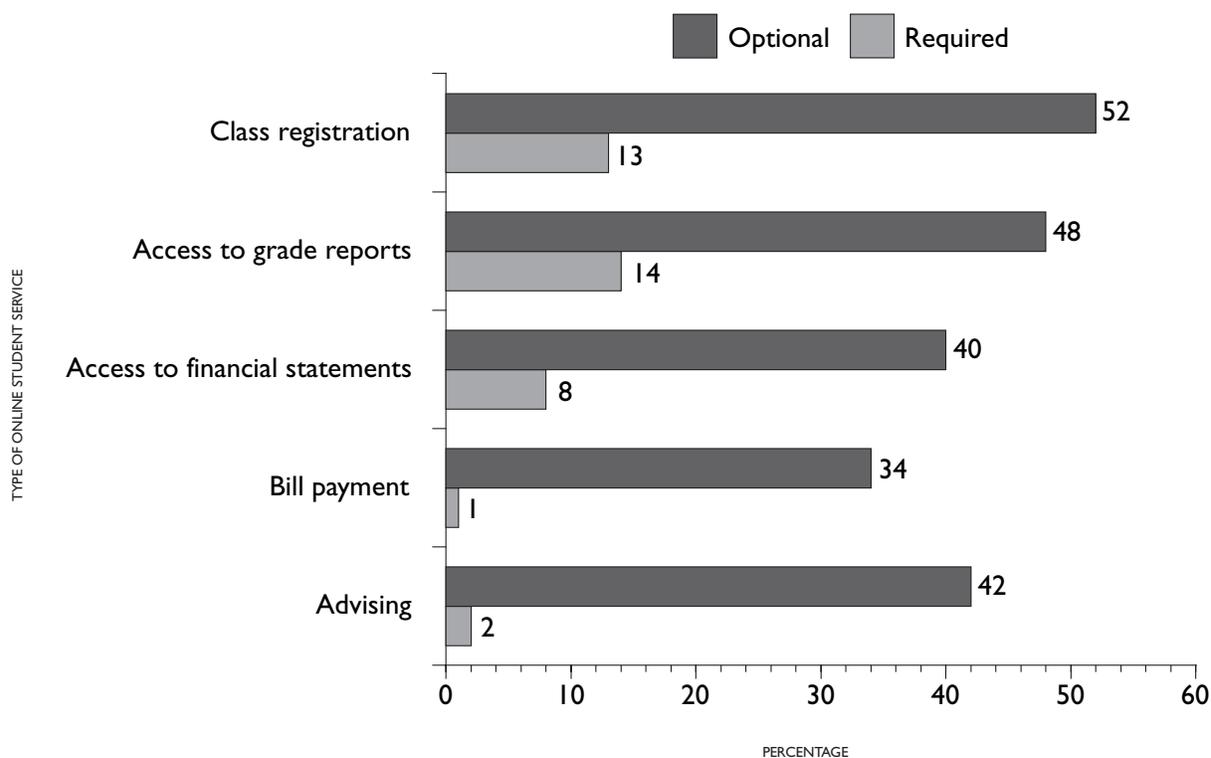
Characteristics such as sharing computing resources, being part of a statewide network, having a strategic plan, and offering a doctoral/first professional degree all were associated with providing each of the online student services. Factors associated with *not* offering these services included being a small school, and having a high percentage of Pell Grant recipients.

### **Summary of findings**

Results of the survey indicate that most MSIs have a strong foundation of information technology on their campuses and that IT is being used to enhance a variety of teaching and learning and student service functions. For example, almost all MSIs had a campus wide network and were able to provide Internet access and email accounts for faculty, students, and staff. In addition, more than 90 percent of faculty had networked computers in their offices, and almost all MSIs provided at least informal IT training for faculty. Most institutions also provided a variety of IT support services to both students and faculty. Students were able to register and access their grades online at more than half of MSIs, and about three-quarters provided student orientation to campus computing resources. More than 80 percent reported having a library webpage, having the library catalog online, and having online access to at least some databases.

Despite this strong foundation, survey results indicated that MSIs need increased investment in several critical areas. For example, only about two-thirds of MSIs had strategic plans for IT and even fewer had an assessment process. Although the percentage of MSIs that have strategic plans is comparable to mainstream institutions, it is critical that all MSIs have a strategic plan for IT in order to maximize limited resources. Also, at most MSIs, fewer than half of faculty were using IT in teaching. Despite the prevalence of IT training available for faculty, only about half of MSIs provided any formal incentives for faculty to use

<sup>38</sup> Only 80 of the 191 respondents provided a percentage.

**FIGURE 4.** Percentage of MSIs that provided various online student services on an optional or required basis

IT in teaching, and only about one-quarter made it a component of faculty evaluations. Fewer than half of students at MSIs, on average, were estimated to own computers, making the majority dependent on campus resources. In addition, all residence halls had direct Internet access at only about half of MSIs. Students at most MSIs were not offered a variety of online services, including access to financial statements, bill payment, advising, and admissions applications.

Interesting patterns emerged in the factors that were associated with providing various types of support and service and suggest ways that institutions might expand their offerings. For example:

▷ **Institutions that collaborated with other campuses were more likely to provide a variety of IT services and support.**

Sharing computing resources and/or being part of a statewide network was associated with the ability to offer a number of services, including email for all faculty, students, and staff; a high percentage of residence halls wired; ERP applications; online submission of admissions applications and questions; a higher percentage of faculty using email/Internet for teaching functions; formal incentives for faculty to use IT; and each online student service. Being part of a statewide network also was related to offering both Internet courses and Internet degrees.

▷ **Institutions that developed IT strategic planning and assessment processes were more likely to provide a variety of IT services and support.**

Strategic planning and assessment may allow institutions to better use available financial resources. Having a strategic plan in place and/or

having an assessment process for IT appeared to be related to providing a variety of services and support, including email for all faculty, students, and staff; a high percentage of residence halls wired; various IT support services for students; ERP applications; online submission of admissions applications and questions; a higher percentage of faculty using email/Internet for teaching functions; formal incentives for faculty to use IT; student orientation to campus computing resources; and each online student service.

▷ **Smaller institutions appeared to be most in need of expanding their IT resources.**

Enrollment size (being a small school) is associated with a smaller percentage of residence halls wired; a lack of ERP systems; not providing online admissions applications and questions; and not offering all types of faculty IT training or formal incentives for faculty to use IT.

▷ **Institutions that offered the most advanced degrees also were more likely to provide a variety of IT services and support.**

Offering a doctoral or first professional degree was related to many of the services and support that were included in the survey. For example, institutions that offered these advanced degrees were more likely to provide email to all faculty, students, and staff; have all student IT support services; provide online submission of admissions applications and questions; highly rate the importance of the webpage to admissions strategy; provide all types of faculty IT training; offer Internet courses and degrees; require or recommend computer ownership; and provide each of the online student services.

▷ **Institutions with the highest percentage of Pell Grant recipients were using available resources to provide the most basic IT support and access.**

Institutions with a high percentage of Pell Grant recipients were more likely to provide various

student IT support services, such as telephone help, on-call on-site assistance, person-to-person emails, in-person training workshops, and all types of student IT support services. They also were more likely to require students to participate in orientation to campus computing resources. Students at these institutions were more likely to utilize campus IT resources available at libraries and computer labs. However, institutions with high percentages of Pell Grant recipients were less likely to have other services, including a high percentage of residence halls wired, Internet courses, and various online student services.<sup>39</sup>

▷ **Institutions that had greater financial and human resources were more likely to provide a variety of IT services and support.**

It is important to note that low ratios of total enrollment to total IT staff and low ratios of total faculty to total IT staff were related to higher institutional financial resources as measured by instructional expenditures/FTE, total expenditures/FTE, and total current fund revenues/FTE. In addition, the prevalence of IT staff on campus and higher financial resources were associated with a higher number of IT services and support. Low ratios of total enrollment to IT staff and high financial resources were associated with email accounts for all faculty, students, and staff; various IT support services for students; online submission of admissions applications and questions; higher percentages of residence halls wired; and higher percentages of students using campus IT resources.

Low ratios of total faculty to total IT staff and higher financial resources were associated with higher percentages of faculty using email and Internet for teaching functions.

Low ratios of total enrollment to total IT staff were associated with requiring student orientation to campus computing resources. *High* ratios were related to having smaller

<sup>39</sup> Finding holds for online registration, grade access, bill payment, and advising.

percentages of residence halls wired and *not* offering each of the online student services.

Financial resources were related to an institution's ability to provide formal incentives for faculty to use IT in teaching, providing all types of faculty IT training, and offering financial assistance for students to purchase computers.

While HSIs, HBCUs, and TCUs continue to have separate and distinct needs, the results of this study highlight the commonalities they share in attempting to provide sophisticated IT resources for their faculty, students, and staff. The study shows that while MSIs have demonstrated many successes, they continue to be in need of further investment in critical areas of IT.

## Methodology

### *Survey administration and description of surveyed institutions versus respondents*

Drafts of the survey were reviewed by the Alliance's Technology Expert Group<sup>40</sup> with the goal of collecting the most pertinent basic information without overburdening institutions with a long and detailed questionnaire. The survey was mailed in November 2002 to the presidents of 327 Alliance-member institutions and campuses:<sup>41</sup> 178 HSIs, 117 HBCUs, and 34 TCUs.<sup>42</sup> Presidents were asked to complete the survey or to delegate the task to the most appropriate campus employee. Respondents had the option to complete the survey on paper or through an online form. Several follow-up strategies and deadline extensions were employed after the initial mailing to reach the highest possible response rate while maintaining a reasonable time-frame for the study.<sup>43</sup> The study achieved a response rate of 58 percent.<sup>44</sup>

The Alliance survey universe was composed of 54 percent HSIs, 36 percent HBCUs, and 10 percent TCUs. Data from the National Center for Education Statistics (NCES) Integrated Postsecondary Education Data System (IPEDS) were used to describe selected institutional characteristics and to determine whether the respondents represented all Alliance member MSIs. According to 2000-2001 IPEDS data, 39 percent of Alliance member MSIs were public two-year, 29 percent were public four-year, 4 percent were private two-year, and 28 percent were private four-year (see Table 4). Institutions varied in terms of the highest degree offered with the most institutions offering associate's degrees (43 percent), 20 percent offering bachelor's degrees, 23 percent offering master's degrees, and 15 percent offering doctoral

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<sup>40</sup> The Technology Expert Group was established in 2001 to provide guidance to the Alliance in advancing the use of technology on campus. It is composed of eight individuals with experience and leadership in the educational technology field and a background and interest in MSIs.

<sup>41</sup> For systems, such as Miami Dade College, in which all campuses were Alliance members, the central administration was mailed a survey and the institution was counted as one case. However, as in the case of the University of Puerto Rico (UPR), individual campuses were mailed surveys and each campus was considered a case because not all UPR campuses were Alliance members.

<sup>42</sup> The number of HSIs, HBCUs, and TCUs does not add to the total because there were two institutions in the survey universe that were both HACU-member HSIs and NAFEO-member HBCUs. These numbers represent the Alliance membership at the time of the survey administration; the number of institutions may have increased subsequently.

<sup>43</sup> Institutions were notified of the first deadline extension by both postcard and email. A final deadline extension was offered to non-respondents by letter from AIHEC, HACU, and NAFEO. In addition, AIHEC staff made phone calls as a special effort to increase the TCU response rate because of the small number of TCUs in the Alliance.

<sup>44</sup> The amount of missing data varies by question, though it is rarely above about one-third. Data are not reported for the few questions with more than 50 percent missing data.

and/or first professional degrees. As shown in Table 4, respondents resembled all Alliance member MSIs on all institutional characteristics. All Alliance member MSIs and the group of respondents also resembled each other on various enrollment characteristics (see Table 5) and had similar tuition and required fees (see Table 6). Table 6 also shows that the set of respondents were similar to all Alliance member MSIs in terms of various financial characteristics in the case of public institutions, with some notable differences for private institutions. For example, the total revenue and investment return per full-time equivalent (FTE) student was lower among private institution respondents than the full survey universe, as were instructional expenditures/FTE and total expenses/FTE. This difference in respondents versus all Alliance member MSIs indicates an overrepresentation among respondents of low resource private institutions.

### *Campus visits*

A team of two or three researchers conducted one-day visits and interviewed as many of the following people as possible at six campuses: 1) President or Representative; 2) Chief Academic Affairs Officer; 3) Faculty Leader(s); 4) VP Student Affairs; 5) Directors/Representatives for Highlighted Student Services Programs; 6) Student Leader(s); 7) Chief Information Officer/IT Director and/or Distance Education Coordinator. The main questions of interest were:

- ▷ What are your institution's strategic plans and priorities in the area of IT application for teaching and learning and student services, and how do they fit into your overall strategic plan and vision?
- ▷ What do you identify as your strengths? What would you consider to be your good practices, and what is your best practice?
- ▷ What challenges do you face in meeting the needs of students and faculty in the increasingly technologically-based society?
- ▷ What are your future goals in the arena of IT for teaching and learning and student services? What areas would you expand or create if you had access to greater resources?

Each campus liaison also provided a tour of campus facilities and discussed any specific programs they chose to highlight. Campus officials also were asked to address how their uses of and plans for information technology were tailored to fit their institutional missions. They also had an opportunity to address how IT was being tailored to fit the unique needs of the student population they serve.

**TABLE 4.** Comparison of survey universe and survey respondents on percentage of institutions with selected general institutional characteristics: 2000-2001

INSTITUTIONAL CHARACTERISTICS	SURVEY UNIVERSE	RESPONDENTS
Type of MSI		
HSI	54%	56%
HBCU	36	31
TCU	10	14
Institution Level		
2-year	43	41
4-year	57	59
Institution Control		
Public	68	72
Private	32	26
Institution Sector		
Public 2-year	39	37
Public 4-year	29	35
Private 2-year	4	4
Private 4-year	28	24
Highest Degree Offered <sup>1</sup>		
Associate's	43	40
Bachelor's	20	16
Master's	23	27
Doctoral and/or first professional	15	17
Location (Urbanicity)		
Large or mid-size city	54	51
Urban fringe of large or mid-size city or large town	19	20
Small town or rural	19	20
Not assigned	8	9
Provide On-Campus Housing		
Yes	51	50
No	49	50
SOURCE: U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), 2000-2001 Institutional Characteristics Survey.		
<sup>1</sup> In the survey universe, six of the master's degree institutions and one of the bachelor's degree institutions offer at least one first professional degree. Among the respondents, three of the master's degree institutions and none of the bachelor's degree institutions offer at least one first professional degree.		

**TABLE 5.** Comparison of survey universe and survey respondents on selected institutional enrollment characteristics: 2000-2001

ENROLLMENT CHARACTERISTICS	SURVEY UNIVERSE	RESPONDENTS
Enrollment Totals (Means)		
Full-time undergraduates	2,894	2,803
Full-time students	3,070	3,013
Part-time undergraduates	3,024	2,771
Part-time students	3,293	3,083
Undergraduates	5,908	5,559
All students	6,363	6,096
Enrollment Percentages		
Percent of full-time students who are undergraduates	95%	94%
Percent of all students who are undergraduates	92	91
Percent of undergraduates who are full-time	63	62
Percent of all students who are full-time	60	60
Percent of undergraduates who are Pell Grant recipients <sup>1</sup>	55	54
<p>SOURCE: U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), 2000-2001 Fall Enrollment Survey. Number of Pell grant recipients from Department of Education.</p> <p><sup>1</sup>The percent of undergraduates who were Pell Grant recipients was calculated using the number of Pell Grant recipients for the academic year 2000-2001 provided by the Department of Education and IPEDS Fall enrollment data from 2000-2001. Consequently, some percentages were greater than 100 (28 in the survey universe and 18 among the respondents). When this was the case, percentages were reset to 100. As a result, these data are an approximation but overestimate of actual percentages.</p>		

**TABLE 6.** Comparison of survey universe and survey respondents on selected institutional financial characteristics (means)

FINANCIAL CHARACTERISTICS <sup>1</sup>	SURVEY UNIVERSE	RESPONDENTS
All Institutions: AY 2000-2001		
Tuition and required fees (in-state full-time undergraduate)	\$3,552	\$3,391
Tuition and required fees (in-state full-time graduate)	4,325	3,940
Public Institutions: FY 1999-2000		
Tuition and fees revenue/FTE <sup>2</sup>	2,531	2,529
Total current fund revenues/FTE	20,767	22,023
Total educational and general expenditures/FTE	16,393	16,326
Total instructional expenditures/FTE	5,302	5,562
Total expenditures/FTE	17,752	17,470
Private Institutions: FY 1999-2000		
Tuition revenue/FTE	6,986	7,001
Total revenue and investment return/FTE	34,769	22,541
Instructional expenditures/FTE	9,333	5,409
Total expenses/FTE	32,534	21,046
<p>SOURCE: U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), 2000-2001 Institutional Characteristics Survey, 1999-2000 Institutional Finance Survey, and 2000-2001 Fall Enrollment</p> <p><sup>1</sup>IPEDS finance data must be examined separately for public and private institutions because of different accounting and reporting standards.</p> <p><sup>2</sup>FTE refers to full-time-equivalent and is calculated by adding full-time enrollment and 1/3 of part-time enrollment.</p>		

# Models that work: Profiles of IT use at MSIs

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Innovations in information technology arise from the MSIs' need to achieve their unique mission and goals.

In order to put a human face on the statistics gathered in the survey, six institutions were selected for campus visits, and more detailed information was gathered about how MSIs are applying information technology to student services and teaching and learning. Staff of AIHEC, HACU, and NAFEO selected six institutions to represent the exemplary IT environments that exist among minority-serving institutions: two tribal colleges, Salish Kootenai College and Fond du Lac Tribal and Community College; two Hispanic-Serving Institutions, the University of Texas at El Paso and Miami Dade College; and two Historically Black Colleges and Universities, Tennessee State University and Johnson C. Smith University.

After visiting each college and examining more detailed information from all six institutions, including interviews with key campus personnel, a set of commonalities became apparent. There were certain priorities, best practices, and challenges that were common to all or most institutions. This section of the report summarizes these key characteristics and then presents detailed profiles of each institution.

## **Institutional priorities**

Innovations in information technology arise from the MSIs' need to achieve their unique mission and goals. Frequently for MSIs, those goals expand access and opportunities for historically disadvantaged populations. For example, an interest in reaching out to geographically remote American Indian populations prompted Salish Kootenai College

to offer distance education. Miami Dade College uses a sophisticated IT-based language lab to serve a large number of limited-English proficient (LEP) students. In addition, many of the institutions that were profiled pursued activities to expand IT access to the local community as well as to their students. Furthermore, most institutions were developing at least some specialized programs to address local economic needs and provide students with training and credentials that would lead to employment after graduation. For example, the University of Texas at El Paso (UTEP) has an ongoing professional development program that links with other MSIs to promote minority participation in science master's programs, and Fond du Lac Tribal and Community College has one of the few approved E-Crime programs in the nation. Finally, all the institutions that were visited emphasized the importance of maintaining and expanding faculty training to integrate technology into the teaching and learning process. Although most schools had some type of training and/or formal grant incentives, many faculty lagged behind their students in technology usage. Tennessee State University and UTEP expressed interest in integrating technology into the curricula to improve student learning.

## **Best practices**

Most institutional personnel at all levels mentioned the importance of having a commitment to information technology from the senior-level leadership in order to maintain a sophisticated technology presence on campus. In addition, all institutions highlighted the

importance of strategic planning for technology needs, particularly the necessity of integrating the IT plan with the overall campus strategic plan. However, following through on this commitment sometimes presents challenges because of the rapid change of technology and the lack of stable funding sources. Whenever possible, institutions have attempted to establish a stable source of funding for information technology resources, including hardware, software, and human resource training. In some cases, such as Tennessee State University, institutions have been able to initiate modest student technology fees that ensure a continual and stable source of funding for information technology needs. With or without the benefit of student technology fees, institutions must make the decision to prioritize spending from the operational budget for IT purposes. Having this stable source of funding is invaluable to making and implementing strategic plans.

These MSIs also have undertaken various means to maximize financial and human resources. One step was to standardize campus hardware and software systems in order to enable IT staffs to be trained and to function more efficiently. Another step was to use student employment as part of the IT support staff. Student employees work under the leadership of professional directors and with the support of professional IT technicians. This model has proven effective at reducing the cost of a large IT staff, and it provides students from all fields with IT related work experience. Furthermore, the profiled schools were actively pursuing the newest technologies rather than catching up to mainstream institutions. For example, many institutions are

forgoing wiring buildings in favor of wireless technologies. Wireless technologies provide an advantage to HBCUs such as Johnson C. Smith University, faced with old buildings, and tribal colleges such as Salish Kootenai, that serve a geographically dispersed population. In addition, many institutions are developing or have expressed interest in developing their own administrative and course management systems in order to reduce their reliance on corporate vendors and to develop systems that specifically address institutional needs.

## Challenges

All institutions highlighted a lack of financial resources as the main reason that they are sometimes unable to meet upgrade and staffing goals or cannot move forward with desired projects. The rapid pace at which new technologies become available in today's marketplace presents a particular challenge for MSIs. They cannot expand their IT capacity without depleting the limited core funding that enables them to serve educationally and economically disadvantaged students. Consequently, it is imperative that MSIs have highly qualified Chief Information Officers or IT Directors who have the expertise to make smart decisions about what systems are purchased and when and how those systems are upgraded. In addition, many of the impressive IT-related initiatives operated by this group of institutions are supported solely or largely by grant funding. While grant funding is appreciated as an invaluable resource for program development, the process of renewal is particularly challenging for low-resource MSIs and jeopardizes the long-term stability of their programs.

# Salish Kootenai College (TCU):

Bringing education to the student and community



Approaching the small and serenely beautiful campus of Salish Kootenai College—located on the Flathead Indian Reservation in Pablo, MT near Flathead Lake—does not invoke thoughts of computers and cutting-edge technology. Immediately striking is the student sculpture that adorns the campus, the breathtaking view of the Mission Mountains, the trickling stream that runs adjacent to the main campus area.

However, at the heart of this picturesque campus is a group of dedicated and savvy leaders who single-mindedly pursue their goal to educate American Indian people throughout the United States. Through this dedication, they have aggressively but carefully pursued the use of technology not because it is the latest trend in

higher education but because of the opportunity that technology provides to expand educational access, overcome geographic isolation, and invigorate the local economy. While many mainstream institutions are still debating whether to embrace distance education, SKC—established just 26 years ago—has been a pioneer in the field and a leader among the tribal college community. President Joe McDonald states, “My continuing vision for Salish Kootenai College is to be a leader for the tribe and to prepare qualified future employees to serve the tribe, and I believe that the development of online courses and other technological capacities will serve this mission.”

Salish Kootenai began its first forays into distance education as early as 1981 when

requests came from the Rocky Boy and Fort Belknap reservations to implement branch campuses. By 1985, courses were being distributed throughout the Flathead Indian Reservation using television. Over the next decade, SKC continued to receive requests for branch campuses and experienced rapid enrollment increases as local demand grew. The leaders of the college explored distance

education as a means of expanding educational opportunity for American Indian people without sacrificing the nature of their small campus. Computer-based distance education offered the opportunity to reach a large number of American Indian students who face challenges in attending a traditional campus both on the

Flathead Reservation and other reservations too small to support a tribal college. This opportunity remained a dream until 1995 when SKC was awarded start-up funding from the W.K. Kellogg Foundation’s Native American well as additional funding from the Alfred P. Sloan Foundation.

Since that time, the distance education program has grown considerably, offering approximately 170 courses, and is currently seeking accreditation for two degree programs—an AA in general studies and a completion BA in tribal human services. In the last four years, the distance education program served more than 1,000 students from 70 American Indian tribes as well as



residents of Finland, Japan, and Canada. The success of the distance education department results in large part from the work of a talented staff committed to ensuring that both faculty and students receive the support they need to succeed. The Assistant Director of Distance Education provides ongoing training

low cost and convenience of the program also is critical for students; and the department, which includes a student services specialist, strives to maintain and expand these qualities. The department secured a grant from the David and Lucile Packard Foundation that allowed them to begin offering online admissions and

Students receive help with their distance education courses from fellow student Angie Young, who holds a work-study position with the Distance Education Department. A self-described computer hobbyist and mother of two, Angie returned to SKC to get a degree in computer science 18 years after originally attending SKC as a recent high school graduate. In support of her hobby and studies, Angie's household has four computers, including one for each of her children. Angie has just completed her first year of course work and plans to take advantage of a new online completion BA in information technology that will be available to her when she completes her AS degree. She already has taken a distance education class and looks forward to the flexibility that the online degree will offer.

and support for faculty who teach online. Faculty members are required to attend a 12-hour training session before teaching their first online course and are given both the independence and the technical support and resources they need to become successful online teachers.

Maximizing the ability of students to take advantage of the distance education offerings also is a priority for the department. Contrary to the typical distance education student who accesses classes at home with a personal computer, the majority of SKC students go to local sites, such as health centers, tribal offices, schools, and libraries to log on for their online courses. Local access sites are a key element in ensuring access for the American Indian community because many households do not own computers, and Internet connectivity is not widespread in rural areas. The Director of the Distance Education Department comments, "This model for distance education allows you to reach the poorest of the poor who have been ignored by mainstream higher education." Salish Kootenai's own library hosts five workstations that can be used for distance education. The

registration in Fall 2003. Delivery of financial aid and academic advising for distance education continues to present a challenge for the distance education department.

The collection of distance education courses and their content are modeled after those offered on the traditional campus. As a tribal college, tribal tradition and culture are integral parts of the educational program at SKC. The distance education department maintains this commitment by ensuring that all online courses integrate a cultural element, as their campus-based counterparts do. In addition, courses in the Salish and Kootenai languages are among the online offerings. Developing courses and programs in direct response to local and tribal needs also is a priority, clearly demonstrated by the inclusion of the completion BA in Tribal Human Services as one of the first two online degrees. The BS in Environmental Science and completion BA in Elementary Education, scheduled to enroll their first students in 2004-05, will help to fill critical needs for trained personnel on the reservation. For example, public schools on the reservation have many American Indian teacher aids but few American

Indian teachers. The elementary education program is designed to correct this discrepancy by preparing teachers and providing more role models for the students they serve.

While the Distance Education Department works to expand educational opportunity in a wide range of fields, the Computer Science Department is training the next generation of American Indian leaders in technological professions. A shortage of IT professionals is a critical problem on reservations because low salaries and geographic remoteness make it difficult to recruit and retain IT professionals from outside the reservation. As the technological capacity of the college and community expands, it becomes imperative to increase the number of American Indians who understand and can use technology to serve the needs of their communities. The department offers a Certificate of Completion in Digital Arts and Design, an AS in Information Technology, and a new Bachelor's in Information Technology (BIT) as of Fall 2003. This new BIT is a completion degree for students and professionals who already have associate's degrees, and it is offered entirely online. A grant from the National Science Foundation (NSF) Tribal College and University Program (TCUP) allowed the department to expand its faculty from two to nine—including two curriculum developers—in support of the development and implementation of the bachelor's program. BIT students can specialize in networking, system administration, or web development.

Computer science faculty and staff also provide support for other campus departments and programs that need information technology expertise. Because the new BIT degree will be offered entirely online, the Distance Education

and Computer Science Departments have worked together during its development. As a result of this collaboration, SKC developed its own learning management system (LMS) for delivery of online courses and support services. Although the Distance Education Department currently uses Lotus Notes for online delivery, this new LMS will provide a low cost alternative

should the prices of corporate providers become prohibitive. Developing its own LMS also allowed SKC to adopt a student-centered approach aligned with its philosophy and to build in enough flexibility that the LMS can be customized and shared with other tribal

colleges when it is fully operational.

The task of managing the technology infrastructure that makes these activities possible falls to the Information Technology Department, which includes among its staff two of the first three graduates of the Computer Science Department. Money to employ staff for the department is part of the operational budget of the college, but the financial resources required to replace technology equipment at the program and department levels comes exclusively from grants. As a consequence, the IT Department updates technology as quickly as possible but continually faces the challenge of securing funding. Most recently, the department was able to update the infrastructure to include a high speed gigabit Ethernet and digital phone system. A NASA Enrichment grant is allowing the department to convert the campus to a wireless environment. The science building is already completely wireless, and the IT Department is testing wireless access points across the campus to understand the additional technical and administrative support this new environment will require. NSF funding also is allowing SKC



PHOTO BY FRANK TYRO

to install wireless access points throughout the Flathead Reservation; some access points have already been installed in nearby Polson, MT. The new wireless environment, when complete, will allow SKC to become a low-cost Internet Service Provider (ISP) for students, faculty, and others. The IT Department also operates a testing center where students can obtain various IT certifications, including Microsoft.

Providing low-cost education and other services to students is a priority of SKC. Because the population of students served is composed largely of low-income, first-generation students, SKC strives to keep tuition low while maintaining critical services, such as child

a result, SKC has been able to use technology to enhance other programs and to expand access to its student and community services. For example, SKC houses the local public television station and provides local programming on tribal health each week. In order to advance this effort, SKC would like to progress to digital technology, but this will require a large outlay of funds that currently is not available. SKC also operates a mobile computer lab that visits various housing communities to teach computer skills to residents of the reservation. One of the wireless access points being tested on campus is located at the Adult Learning Center, which provides an array of educational services to the local community, including GED preparation, adult basic education, literacy training, ESL, and

Cynthia Rochin, M.Ed., a recent addition to the SKC faculty, currently is developing online curricula for a new completion BA in Elementary Education, available in 2004-05, that is designed to train American Indian teacher aids. Though she incorporated technology into her fourth grade classroom, she has never taught online courses. What drew her to the position at SKC was the opportunity to use her expertise to address what she saw as a need for more Indian teachers on the reservation. Confident of the support that she receives at SKC and motivated by the independence she is given to develop her curricula, she looks forward to using distance education to provide this opportunity.

care, counseling, and career placement. Like most tribal colleges, SKC educates many non-American Indians but receives federal funding based only on Indian student count and does not receive state funding. As a result, it is imperative that departments like IT and Distance Education make smart, cost effective decisions. In order to maximize the IT budget, almost all of the work of the IT Department is kept in-house, from making long-term infrastructure development plans to digging trenches and laying fiber and disposing of old equipment. Student labor also is heavily utilized, a cost-saving model that has the added benefit of providing students with hands-on experience in the field.

Despite challenges, Salish Kootenai's Distance Education, Computer Science, and IT Departments have been successful in their own endeavors. As

employability/life skills training. SKC also provides assistance to individuals interested in starting small businesses on the reservation through its Tribal Business Assistance Center. The variety of services offered at the center includes computer-assisted programs that help entrepreneurs assess their goals and plan accordingly.

Salish Kootenai's library is perhaps the best example of how technology has been used to expand access to services. In many ways the library serves as a true community center, serving academic, tribal, and local constituents. The holdings include academic publications and journals with a focus on Native American studies and education, a collection of tribal materials with more than 1,600 items as well as a smaller collection of fiction and a children's section for local residents. The library has an online catalog

that can be accessed remotely through the library webpage's link to the Montana Public Access Catalog. Visitors to the website also access the American Indian Higher Education Consortium (AIHEC) virtual library, and students and faculty link to a variety of databases. The library currently houses six computer workstations that can be used for multiple purposes in addition to the five workstations that are prioritized for distance education students. An additional computer lab is planned that will be available for faculty to hold classes.

SKC also uses technology to enhance its health programs. Currently, certificate and associate's degrees are offered in dental assistance technology and associate's and bachelor's degrees are offered in nursing. These programs are helping to fill critical shortages for dental and nursing professionals on the reservation. The health of American Indians continues to lag behind that of the general U.S. population. Because of this disparity, it is critical that the health professionals trained at SKC have access to the latest medical technologies.

In addition to training American Indian dental assistants to serve the reservation, the dental

program at SKC houses a dental care clinic that employs four tribal health dentists. SKC also serves as a site where students can take the National Board Exam; without this site students would have to travel hundreds of miles to become certified. Many of the summer students in the dental program come to SKC from the Kicking Horse Job Corps (KHJC), designed for American Indians and administered by the confederated Salish and Kootenai Tribes. The SKC dental clinic also provides dental care for KHJC participants.

SKC is a major producer of American Indian nursing professionals, training approximately 140 since its first graduating class in 1991. In order to enhance the preparation of nurses, a human patient simulator was recently acquired with a grant from the U.S. Army/Department of Defense. The simulator is programmed to mimic 40 different health scenarios that nurses may encounter. This advanced technology is quite expensive but is also becoming an integral part of training health care professionals. The nursing program would benefit greatly from additional models, including pediatric and emergency care, but is dependent on grant funding for this type of non-essential equipment.

**F**ond du Lac Tribal and Community College (FDLTCC)—located two hours north of Minneapolis in the small town of Cloquet, MN—rises out of 38 acres of majestic red pine trees as a modern Thunderbird, ready to take flight. Lester Jack Briggs, Fond du Lac’s first president, helped create the college in the mid-1980s as a place where neighboring Indian and non-Indian communities would learn together in a state-of-the-art environment that celebrates the region’s rich cultural diversity and honors the Anishinaabeg tradition. In 1987, the Fond du Lac Band of Lake Superior Chippewa chartered the institution, thus establishing the only college in the nation organized as both a state community college and a tribal college.

The college operates within a modern building complex that incorporates traditional symbolism throughout, including the four colors of the Fond du Lac Reservation—red, black, white, and yellow. The shape of a Thunderbird dominates the design of the building itself, and a circular room near the library—honoring the sacred circle—will eventually house a display of Ojibway cultural items. The single building facility houses nearly all of the institution’s academic classrooms, computer labs, faculty and administrative offices, and study space. To accommodate increasing enrollment during the late 1990s, the college was doubled in

size through a \$7.5 million dollar investment, \$4.5 million of which was authorized by the Minnesota legislature. The expansion was completed for Fall 2003, accommodating an anticipated 22 percent increase from the 2002 enrollment of 820 FTE students. FDLTCC currently offers Associate of Arts degrees designed for transfer to four-year universities in 26 areas, Associate of Applied Science degrees in four areas, as well as a variety of certificate programs.



The mission of Fond du Lac Tribal and Community College is multifaceted and includes directives to “respectfully promote the language and culture of the Anishinaabeg” and to

“provide opportunity, experience, and access to current technology to prepare students for the future.” The Ruth A. Myers Library / Ojibway Archives illustrates the dual role that FDLTCC plays in the community. The library serves as both an academic library and a tribal repository with significant holdings in Native American history and culture and special collections on the Anishinaabeg and Minnesota region. An online catalog links FDLTCC with other libraries in Minnesota and other states and provides access to databases and indexes. The library facility has CD-ROM databases and Internet access for students and faculty.

According to the Vice President of Academic Affairs, one of the highest priorities for the

college is to “develop unique science, technology, engineering, and math programs using technologies that are tied to emerging areas and local needs.” Rather than copying the models of their mainstream counterparts, FDLTCC seeks to create cutting-edge, technologically-oriented programs that will make students marketable for employment in new areas. The development of these programs, including programs in E-Crime and Geographic Information System (GIS) and Visualization have been supported by a National Science Foundation (NSF) Tribal College and University Program (TCUP) grant. FDLTCC is one of the few colleges in the U.S. to offer approved programs in E-Crime, including Associate of Science degrees in Computer Forensics and E-Crime and an Associate of Science or Certificate in Computer Security. The programs are approved by the Minnesota State Colleges and Universities (MnSCU). The TCUP grant is allowing the program to acquire top-rated forensics software for student training. Courses in this program can supplement or enhance the college’s law enforcement and computer science programs and provide continuing education credits for local law enforcement professionals. Important goals for the program are to expand community and student outreach by developing partnerships with local industry and government and law enforcement agencies to solve computer security issues and develop student internships. Leaders in the program also are working to develop online courses and establish articulation agreements with four-year universities.

The Geographic Information System (GIS) and Visualization program, which began in Fall 2002, trains students on a computer-based data processing tool for gathering, storing, manipulating, analyzing, and displaying spatial data. Students earn an Associate of Applied Science or Certificate in GIS that prepares them for entry-level employment as a GIS, Cartographic, or Global Positioning System technician or to transfer to a four-year program. Students also take GIS courses for continuing

education or to enhance skills in a variety of professional and technical fields, including environmental science, law enforcement, business, and computer science. The program was approved by MnSCU in Spring 2003. The TCUP grant has allowed the program to order 10 new GIS workstations, software, and other equipment necessary to properly train students in this emerging field. The funding also has allowed the purchase of three GeoWalls on campus that allow for three-dimensional visualization and are used for GIS, computer science, math, and environmental science research and teaching. These GeoWalls represent a safe and versatile investment in emerging technologies because they are relatively low-cost and portable. The TCUP grant also funds student and faculty attendance at important local and national conferences.

The GIS and environmental science programs at FDLTCC have worked separately and together to use emerging technologies to conduct research projects that serve local needs and provide students opportunities for real world research experience. For example, the GIS Department is working with the reservation’s Human Services Department to map motor vehicle crashes on the reservation with data such as location, time, and weather conditions in order to improve traffic planning. Students will be updating and adding data beginning in Fall 2004. In addition, a Summer Transportation Institute Program in Summer 2003 allowed 20 K-12 students to learn how to do GIS mapping of car crashes and print their own maps.

With a grant from the U.S. Department of Agriculture (USDA), environmental science students and faculty are participating in an ongoing St. Louis River Watch project, analyzing water quality and ecological health. The grant also has allowed approximately 800 students from 25 area high schools to collect information from the river. The mapping for this project currently is contracted to the University of Minnesota-Duluth’s Natural Resources Research

Institute, but FDLTCC GIS faculty and students will begin work on this project in Fall 2004. The Environmental Science and GIS Departments also are working together to preserve a valuable natural resource of the region. The USDA is funding recovery tracking of seven wild rice lakes that exist on the Fond du Lac Reservation. Environmental science students already have been conducting field work for two years in this long term effort. Since 1998, FDLTCC has been a National Center for Excellence for the USDA Natural Resources Conservation Service, with an emphasis on mapping for high tech digital applications in natural resource management. Fond du Lac was the first American Indian land grant college to be selected as a Center of Excellence, which are designed to support working relationships between the USDA and American Indian tribes.

In order to support these high tech fields as well as computer applications for more traditional courses, FDLTCC has computer workstations at four locations. There are two 32-station computer labs, one iMac and one Windows, for classroom and student use as well as seven workstations in the library and four workstations in the Center for Academic Achievement. The iMac labs are used for English writing courses, desktop publishing, and web editing. The Windows labs are used primarily for computer science, business, and some music courses. The Computer and Information Technology Department manages the computer labs as well as the satellite uplink that allows FDLTCC to send and receive courses via distance learning with any institution in the state. In addition, because FDLTCC is part of the state system, it receives a variety of network support services from the MnSCU Information Technology

Services, including assistance with leadership, planning and decision making, and teaching and learning. This system works effectively by striving for a reliable common infrastructure across campuses while maintaining enough flexibility to meet local needs. In addition, all FDLTCC classrooms are tech ready. The college currently has an encrypted wireless network and is working toward a wireless network for public use.

Fond du Lac Tribal and Community College has taken its first steps into distance education beginning with the satellite uplink. The uplink allows interactive television programs with local high schools and classes and other programs in more remote locations in addition to increasing access to courses for FDLTCC students. As of Fall 2003, five classes will be fully online and an additional 11 will be hybrid courses, using the Internet for some aspect of the class such as administering tests and quizzes. In 2001, 62 students took advantage



of online classes, and that number has now grown to 152 for 2003. FDLTCC has created a secure online environment and uses Educator to generate course environments for all 229 courses even if they are not used by faculty. This system is automated so that when students register an account is created for them to access that course environment. The current challenge is to encourage faculty to use the course management software that has become available. Information technology also is used on campus to provide some student services. For example, students can access class schedules, financial aid information, and register for classes. A future goal is to allow students to monitor their academic progress online. The department has recently hired an institutional research professional and plans to

begin strategic planning that will help expand online student services.

The philosophy of Fond du Lac differs from some mainstream institutions that build information technology programs around computer certifications. FDLTCC emphasizes building social and interpersonal skills for collaborative problem solving using computer and other technology tools. For example, in addition to its traditional computer science program, FDLTCC is developing an Associate of Science degree in Advanced Collaboratory Technologies. This program will teach core technology and computer science skills as well as critical thinking, problem solving, oral and written communication, and human behavior. The designers of this program believe that the curricula will better prepare students for the team work environments they will face in the professional world. This program also will help ensure that technology is infused across all curricula at FDLTCC so that all students understand how to use advanced technology to collaborate across a distance. The leaders of this initiative also seek to develop academic and

industry partners to provide student internships and plan to create a student run technology support system to provide students with real world experiences.

Fond du Lac Tribal and Community College has created an impressive array of unique computer and technology based programs mainly with the support of federal grant money. The goal of the leadership is to make these programs self-sustaining by increasing enrollment through recruitment efforts. For example, through an aggressive marketing campaign, including brochures and fact sheets, newspaper articles, and job fair appearances, the GIS program is on target to be self-sustaining through student enrollment in three years. However, long-term federal money remains crucial; because of the uniqueness of the programs and the small size of tribal colleges, it takes a number of years to grow a program to a self-sustainable size. The leaders of the college continue to research cutting-edge technology areas that will fit their mission, size, and capabilities and hope their programs will serve as role models to other Tribal Colleges and Universities.



## University of Texas at El Paso (HSI): Using technology to embrace the non-traditional student

The University of Texas at El Paso (UTEP), the largest Hispanic-majority university in the United States, was established in 1914 at the Rio Grande and Rocky Mountain foothills on the Texas-Mexico border. The original and striking Bhutanese monastic architectural style<sup>45</sup> that gives the campus a clean and unpretentious atmosphere has been maintained even as El Paso has grown into a diverse major metropolitan community, with a population of 800,000. Juárez, El Paso's Mexican sister city, whose rapidly growing population now stands at 1.8 million, joins with El Paso to form the largest binational metropolitan area in the world.

UTEP's student population is more than two-thirds Mexican American with an additional 9 percent Mexican nationals. Seventy percent of students are employed and the average undergraduate age is 25. UTEP's student body, many of whom are working students who attend school part time and have families to support, challenge the assumption that taking more than four years to graduate from college demonstrates a lack of talent. President Diana Natalicio states, "My goal is to keep UTEP at the cutting-edge of technology, while focusing on the needs of our unique student body. Our mission is to provide

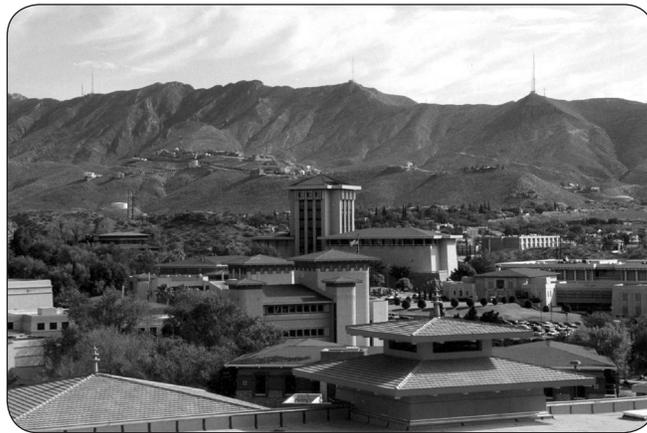
a high quality public education where access and excellence co-exist." UTEP's students possess a significant advantage over other students by attending an institution with a strong technology presence on campus and important links to local and international Latino communities, providing uniquely diverse learning and social experiences. UTEP serves as a vital force in the economic,

academic, and cultural advancement of this bicultural region.

UTEP is one of only two U.S. universities to establish an international Internet 2 link with Mexico. Distance learning provides a means for international and El Paso commuter students to access

postsecondary education and maintain their academic progress, in part by allowing them to avoid frequent time-consuming border crossings in order to attend traditional on-campus classes. UTEP also has developed satellite centers for existing degree programs in northern Mexico.

In addition to the international collaborations fostered through UTEP's technology innovations, the University has partnered with other U.S. minority-serving institutions. The UTEP/Howard University linkage program has received a Sloan Foundation grant to represent minority-serving research institutions. Under this collaboration, alliances are promoted between MSIs to



<sup>45</sup> The Bhutanese style is derived from the style of buildings, particularly the monasteries, in the Himalayan kingdom of Bhutan. UTEP's unique buildings are the only examples of this ancient architecture in the Western Hemisphere.

encourage progress on campuses and build networks for more powerful research proposals for funding and support in areas not historically successful in attracting minority students. Recruiting efforts are made to move Howard graduates to UTEP for doctoral degrees and vice versa. An ongoing professional development activity has been instituted to promote minority participation in science master's programs and to prepare students for jobs in industry, government, and other professional areas in the sciences. Specific training is provided for minority students intending to teach at minority-serving institutions. These professional development opportunities link UTEP students with other universities to develop joint degrees and other programs in areas that one school alone could not support because of geographic isolation, lack of funds, or other limitations.

UTEP has committed to enhancing career development online through resume review services and an alumni mentor base through the office of Career Services. Students participate in online workshops and information sessions they might not otherwise attend in person. This is an essential part of the college experience for the majority of UTEP students who are the first in their family to attend college. A key institutional goal for technology is to automate all manual processes so there are few reasons for students to have to wait in line at an office for a university service such as checking grades or account balances. Automating administrative processes such as these also will make tracking student activities and data on utilization rates of services available for analysis of best practices for the future. Automation of services also helps first-generation students navigate the bureaucratic hurdles of a large university.

The University is committed to implementing a new infrastructure to manage and extend its web presence, including an effort to standardize servers, databases, and other development tools. A new IT Director with extensive experience in the private sector has been brought in to

revamp the UTEP system utilizing a partially student-staffed team. The IT Director stresses the importance of providing a quality service so that users will choose the UTEP portal for their email and online home base, rather than Yahoo, AOL, or other platforms. Officials believe that student use of the UTEP portal contributes to a sense of belonging to the university, thereby promoting student retention.

UTEP is perhaps best known for its commitment and excellence in distance education. In 2002, *U.S. News & World Report* recognized UTEP's distance education online degree offerings among the top 100 in the nation. In 1997, UTEP opened an Undergraduate Learning Center (ULC), a 15 million dollar project, built to satisfy the need for facilities to teach online and hybrid courses—those taught both online and face-to-face—and others that use new technology. The building has become UTEP's flagship for technology and houses the Office of Technology Planning and Distance Learning, which received an award for excellence for commitment to quality in online instruction by the University of Texas Chancellor's office. In addition, the Associate VP of the department was honored with the Jack Barden award for outstanding support of IT innovation in MSIs.

The ULC building is the home of 350 computers and 375 data ports, and has a capacity for 2,000 occupants. The ULC and several other areas around campus provide wireless Internet access, and plans are in place to provide access in all campus buildings. Laptop computers and Personal Digital Assistants (PDAs) are available for students to borrow. Technical support is available until midnight daily and 24 hours two days each week. Based on the ULC's success, plans are in the works to regularly upgrade technology in other buildings on campus despite the limitations of state budget cuts. Currently, the Texas Infrastructure Fund (TIF) and other state revenues do not provide enough dollars to upgrade the number of classrooms recommended in UTEP's technology plan and to keep the

institution current. In order to provide students with the services they need and desire, students voted to establish a student technology fee. Despite the necessity of the technology fee, Dr. Natalicio is committed to maintaining the fee at a level that will not prevent low-income students from attending the University.

The Undergraduate Learning Center is supported by the main University Library that stands six stories high and houses a collection of more than 2.8 million items, including 828,000 books and bound journals. The library subscribes to 2,666 periodicals and numerous electronic databases. The UTEP library provides support for student research through 1,000 web pages in both English and Spanish and employs a

A special Access to Technology Learning and Service (ATLAS) laboratory is also housed within the ULC. The ATLAS computer laboratory provides training sessions for various software applications and the Center for Effective Teaching hosts workshops on courseware development to support faculty and student learning. Faculty who develop and present digital course content are given a \$2,000 stipend to support innovative curricula. University-employed student developers typically work with each teacher to create his or her courseware. Projects may include creating an interactive CD-ROM to supplement curricula or developing a department or course website. Faculty members commend online classes for creating parity between full-time and commuter students

Nathan Jacquez, Communications Graduate Student, was a former political science major and worked as a courseware developer for the UT TeleCampus. He had little experience with technology when he began his studies at UTEP. He became interested in software applications through exposure to audio and video editing applications he discovered as a music minor. He was hired and trained as a Technology Student Assistant by the ULC after being recommended by a professor that noticed his interest in technology. During his time with the ULC, he helped nursing faculty create an interactive CD-ROM, among other projects. The support from staff and the synergy among the other student employees allowed him to learn quickly to become a courseware developer. He also enjoys the online course format because it is sometimes easier to express opinions and interact with other students and the professor in that format.

full-time staff specifically devoted to IT in the library. The catalog, as well as databases such as Lexis Nexus, is fully online. Library services supporting distance learning include book and article requests by mail, a live “Ask a Librarian” chat feature in which librarians can push web pages to the user, free access to journals and databases, and express retrieval of materials for graduate students. Library staff provide classroom and consultation service for students and faculty needing specialized assistance. The UTEP library staff is currently working on a project to upload images online and identify the Hispanic population pictured in turn-of-the-century photographs and negatives from the library’s special collections.

by leveling their access to classes. That is, all students may take the online course when they have the time, which puts commuter students into university life at the same level of access as full-time students. Student employees have access to a wide range of software applications as a benefit of employment as IT course developers. Before getting into the workforce, they gain an edge in the job market by becoming acquainted with a variety of tools used within private industries. Many of the student employees do not come from computer or engineering backgrounds but have interest in IT and are trained by ULC staff. Employing student developers is cost-effective for the University because sufficient funds are not available to employ the number of

full-time IT professionals needed to adequately staff the ATLAS laboratory.

Student IT staff provide vital support for online courses. The growing number of participants in the distance learning program makes online courses an important component of the services UTEP provides. Ten years ago, distance learning was provided solely through video conferencing. In 1998, the University of Texas system launched a TeleCampus offering 12 degree courses of study entirely online, which is staffed largely by students. Programs include advanced degrees in kinesiology, business administration, and educational technology. Two or more campuses may collaborate on a degree program, offering students a broader range of faculty expertise. Two of the programs offered through the TeleCampus, a joint Master's in Kinesiology and a joint MBA, received instructional excellence awards in both 2002 and 2003 by the U.S. Distance Education Association. UTEP, through the TeleCampus, also will offer a professional development certificate program in criminal justice forensics DNA through the continuing education office beginning in Fall 2003. Faculty who teach distance education at UTEP are enthusiastic about the model and agree that they would not have attempted an online class without the training and support received from the University IT staff. "Online classes are very exposed," says one faculty member, "and therefore need to be of the highest quality, with dedicated IT staff developers providing the technical support to put the content into course management systems." Another faculty member comments, "I became interested in the distance education model because of the equity it can bring to education. Unlike a commuter campus model, distance education can get the lowest SES students into college."

Technology touches each student at UTEP, including graduates, commuters, international

students, and full-time students. According to the Dean of the Graduate School, technology is the most commonly cited concern in surveys of graduate students at UTEP. All undergraduates are now required to take at least one fully-online course to complete their degree. President Natalicio sees technology as a means of connecting local and large-scale communities through education. She notes the sense of intimacy students and staff gain from the ability to send email directly to the President of the University. UTEP is nationally recognized for its mission to create excellent academic opportunities for a largely first-generation student population and for its innovative approaches to higher education. The hope is that IT developments in teaching at UTEP will promote the retention and professional success of students and faculty and thereby benefit the Hispanic community of El Paso and beyond.

*\*Since the time of the campus visit, the University of Texas at El Paso has suffered many cutbacks in its IT programs due to both state budget cuts and decreasing federal grant monies. These cutbacks have resulted in the loss of key personnel,<sup>46</sup> departments, and many student staff. In addition, the strategic plan for expanding/updating the campus infrastructure has been put on hold. The current situation at UTEP is reflective of the disproportionate effects that budget cuts have on MSIs because they do not possess the depth of financial and human resources that many mainstream institutions enjoy. UTEP was chosen for this report because of the impressive IT environment it had created over the last decade, which was clearly evident during the visit. UTEP has unfortunately suffered from the effects of being chronically underfunded, a situation that many MSIs face, and has lost important programs that took years to build because it was unable to absorb the financial loss resulting from the recent budget cuts.*

<sup>46</sup> The loss of key personnel included the newly recruited IT Director.

In 1960 when Miami Dade College (then Dade County Junior College) opened its doors, its student body included seven African American students and thousands of Cuban refugees who were seeking a better life in the United States, making Miami Dade College (MDC) the first integrated community college in Florida. The school was nicknamed “Chicken Coop College” representing the original buildings that were transformed into classrooms. Today, MDC supports more than 155,000 students through its six campuses—North, Kendall, Wolfson, Medical Center, Homestead, and InterAmerican. MDC awards more associate’s degrees than any other school in the United States and graduates the highest number of minority students in the nation. In addition, MDC enrolls more Hispanic students than any other college in the United States. Three-quarters of MDC graduates enroll at a four-year institution in Florida immediately after graduation, and 15 percent of all students in the Florida university system started college at MDC.

With the dawn of the new millennium, MDC represents one of the most technologically advanced colleges in the nation. Achievements in this area stem directly from its dedicated administration, staff, and faculty who made the decision to develop, execute, and monitor a

well-devised strategic plan that concentrates on using technology to full capacity in all areas of college life. For example, by the 1990s, MDC was recognized by Yahoo!’s *Internet Life* as the second “most wired” campus of all U.S. colleges and universities. In addition, the Smithsonian



Institution awarded the college a Smithsonian Innovation Award for its information technology efforts. Knowing technology in higher education is a moving target, the campus strives to improve quality and expand the types of technology centered upon the needs of the learner. To assess student competency and familiarity with computers, MDC administered a student services survey in 1999.

Almost all (95 percent) felt that computer skills are very important in getting or keeping a good job. The survey revealed that seventy percent of students at Miami Dade felt comfortable using computers, and more students use computers on campus than in their home.

Responding to the needs of its students and the demand for technology in the new economy, MDC developed its College-wide Strategic Plan for 2000-2005. Twelve areas of emphasis were highlighted and plans to use technology to enhance each area’s productivity were incorporated.<sup>47</sup> As the Vice Provost and Chief Information Officer commented, “Our plan

<sup>47</sup> The main areas of emphasis that substantially incorporate technology are: enrollment management, student services, and professional development and training.

is to bring in technology in a ‘big way.’ With most students being part-time, they have no time to come to campus and so they need accessibility 24 hours a day.” MDC introduced Web Portal technology to provide its students with online college admissions, registration, advising, and distance learning capabilities. Retention rates are being tracked by computers, students are registering on the web at increasing rates, email accounts are now provided for Honors College students, Virtual College (distance learning) faculty are trained to web-enhance their classrooms, and close to 4,000 employees participated in professional development and technology training workshops from August 2002 to February 2003.



One of the biggest achievements for MDC is its Emerging Technologies Center for the Americas (ETCOTA).<sup>48</sup> This impressive 40,000 square-foot facility, which serves not only MDC but also the surrounding technology industry, is outfitted with the latest in technology. Facilities include wireless Internet access in each classroom and a 120-seat auditorium with network connections and A/C outlets at each seat. More than 10,000 students are trained in this cutting-edge environment each year. The building has 400 computers in 19 classrooms and laboratories and hosts classes in computer animation, computer programming and database development, electronics and telecommunications, graphic design, Internet technologies and website development, and network technologies. MDC plans to introduce classes in the popular fields of video games development and cyber security, among others.

In addition to its use in teaching and learning, using technology to provide enhanced student

services at MDC also is high priority. For example, in 1999, the Wolfson Campus received a Title V grant from the U.S. Department of Education to pioneer a College Information

Center geared toward increasing student retention and success rates. Through a telephone service and website, students are able to access registration and financial aid information, register for classes, and speak with “tel-e advisors.” The “tel-e advisors” reach out to students throughout the academic year in order to

reduce drop out rates. In addition, the Center answers calls from the larger outside community with questions pertaining to academic life at Miami Dade. In May 2000, the Center received 25 calls per day; by May 2003, the Center received approximately 333 calls per day and has served more than 70,000 people via web and telephone since its inception. Recently, the Center introduced a “live chat” where students can find advisors online for assistance; the Center estimates that 154 live chats occur each month.

Outreach to the community drives much of the technology activity at MDC. For example, the Refugee/Entrant Vocational Education Service and Training (R/E.V.E.S.T.) Program offered at two MDC outreach centers in the community provides free English classes for non-native speakers and other support services.<sup>49</sup> The program offers vocational skills training and certificate programs to refugee/entrants in the Miami Dade community who have been in the United States for five years or less. Important goals of the program are to expose participants to computers and to provide related training services. More than 1,200 people participate in the program and almost all have little to no experience with computers. Within these centers,

<sup>48</sup> The State of Florida awarded the initial grant of \$5.2 million for ETCOTA in April 2000.

<sup>49</sup> R/E.V.E.S.T. is funded by the State of Florida Department of Children and Families Refugee Programs Administration.

MDC offers the R/E.V.E.S.T. program 50 computers for student use. Participants receive basic training on how to open an email account, English as a Second Language (ESL) training on computers, access to all campus computer courtyards, and computer training preparing them to work in a technology-based society.

Using technology in teaching students receives considerable emphasis on all six MDC campuses. Faculty and staff realize that students must be prepared to use technology when they leave the classroom. One campus that has demonstrated tremendous technological capacity in teaching is the Medical Center Campus. The Medical Center Campus awards the most degrees in the United States in the allied health professions and ranks second in

touch. Students are provided with real-life medical situations in a controlled environment.

The InterAmerican Campus, located in the heart of Little Havana, educates on average 3,000 ESL learners per semester. The ESL department at InterAmerican is the largest in the nation and offers ESL classes from 7:00 a.m. to 11:00 p.m., Monday through Saturday. Most students require one-on-one training and are not accustomed to using a computer. However, the department requires that students take computerized assessment tests. Even before language learning begins, some students must be taught basic computer techniques such as how to use a mouse. Thus, in order to provide this huge population of students with computer literacy training, InterAmerican has invested

For students like Emilio Rodriguez who have no computer at their home, campus computers are the only option. Emilio depends on the campus computer laboratories, known as “computer courtyards” for activities such as research, writing, registering, and checking email. As Emilio commented, “Some of the best things that MDC offers: Everyone in the Honors College gets an email address, every lesson that is taught is on PowerPoint; and wireless computers can be borrowed from the library.” Emilio, Vice President of the Student Government Association, was a former high school dropout. It was an admissions counselor at MDC who encouraged Emilio to finish high school. He finished with a 3.0 and enrolled in the Honor College at MDC. Today, Emilio has graduated with a 4.0 and will be attending Columbia University and majoring in English literature and education.

nursing degrees awarded across the nation. Almost two-thirds of the registered nurses in the county are educated at the Medical Center Campus. The Dental Hygiene Clinic offers state-of-the-art digital radiography tools and diagnostic computers to students, allowing them to provide the most advanced dental care to actual patients from the community. In addition, students taking classes at the Medical Center Campus also benefit from practicing on a full body Human Patient Simulator. With the assistance of a computer, the Human Patient Simulator can present the symptoms of more than 200 medical conditions, and it reacts to medications, medical procedures, and physical

in 120 computers located in its language lab. Within the language lab, faculty teach classes through the use of computers, students are able to independently work on language skills at their convenience, and assessment tests are administered. This neighborhood campus provides a burgeoning non-native English speaking population with the language skills needed for employment and everyday coping with life in the United States.

Three years ago, the InterAmerican Campus had minimal network services. Today, InterAmerican teaches some of its students in “smart classrooms.” For example, physics students are

able to measure velocity and distance with the use of computers. One science professor even invites local children to use the equipment in the “smart classrooms” on Saturdays, demonstrating MDC’s and its faculty’s commitment to educating students and the community in the latest uses of technology.

Faculty also are enthusiastic about implementing technology components in their classrooms and enhancing the teaching and learning experiences of their students. The Learning Innovations Leadership Team (LILT), “a comprehensive, College-wide, faculty-driven collaboration focusing on student success” allows faculty to award other faculty grants to conduct research, pilot programs, devise new curriculum, and various other projects. Two of the exemplary grants under LILT include: the “Virtual Midwifery Practice” at the Medical Center Campus, and the “Online Student Newsletter Dedicated to Publishing ESL Student Work” at the Kendall Campus. The Virtual Midwifery program presents students with hypothetical patient information, including a complete medical history, test results, consultation reports, and assessments made at each prenatal visit. The student follows and charts patient progress throughout her pregnancy and determines recommended care, education, consultations, and referrals. Students can receive phone calls generated by a computer in the middle of the night asking them to make a decision on their patient’s care. This computer-



driven program provides students with unique opportunities not typically available in a clinical setting. The Online Student Newsletter project developed a photo journal “ezine” (online magazine) dedicated to publishing ESL student writing. Students proofread, edit, and revise their writing and integrate the use of grammar, reading, writing, and speech to reach their publishing goals.

The energy of the faculty, staff, and administration at MDC filter throughout all six campuses, creating a spirited college climate excited about implementing and using technology in multiple aspects of campus life. From faculty teaching ESL courses in the Heart of Little Havana on the Inter-American campus to LILT projects bringing virtual midwifery to their students to recruiting and retaining students through proactive centers and websites, MDC knows the power of technology in closing the achievement gaps between minority and non-minority students. Technology tools are utilized to help all students develop their true potential and to prepare tomorrow’s workforce for life in the twenty-first century. The ETCOTA building is a perfect example of MDC’s progress in the area of technology. The building stands prominently in the center of Miami, demonstrating MDC’s position in producing top-quality graduates for the local business community. For a community college that started with the nickname “Chicken Coop College,” MDC has come a long way.

**L**ocated in the heart of Nashville, Tennessee State University (TSU) educates more than 9,000 undergraduate and graduate students originating from nearby local metropolitan areas and faraway countries throughout the world. TSU is an 1890 land grant institution first established solely to educate African Americans prohibited by law from entering institutions attended by White students. True to its mission as a historically Black university, in Fall 2002, 80 percent of TSU's undergraduate students and close to half of its graduate students were African American. TSU is credited with educating such famous alumni as Oprah Winfrey, television talk show host and entrepreneur, and track and field Olympic athletes who have won 29 Olympic medals since 1952, 16 of them gold medals.

In recent years, TSU has become widely known across the nation for its advanced computing capabilities, computer-savvy graduates, and campus-wide commitment to making technology a number one institutional priority in the areas of teaching and learning. In 2001, TSU was listed as number 27 on the Yahoo! *Internet Life* Top 100 Most Wired Colleges. Interestingly, TSU was the only institution, both public and private, in the state of Tennessee to make the Yahoo! list and the only HBCU to make the Top 100. TSU's



website also has been ranked first among all HBCU websites.

TSU must financially support all of its current computing services while still continuing to plan for future upgrades and additional services. As the Vice President for Academic Affairs commented, "The need is great but the

resources aren't." TSU is fortunate to benefit from a technology access fee charged to its students. Not all colleges and universities are able to charge this fee; in fact, many public institutions encounter resistance from state legislatures. Each year, TSU receives approximately \$1.7 million from the fee.<sup>50</sup>

The direct benefactors are the students. The laboratories in the residence halls and the academic centers are outfitted with the latest technology for student use. In addition, the Tennessee Board of Regents, the governing body which authorizes the fee, stipulates that 12 percent of the revenue from the fee must be spent on student personnel. Thus, many of the students employed in the campus laboratories are funded through the technology access fee. The technology access fee allows students to receive a salary while fostering opportunities to graduate with real world computer experiences.

This past year TSU has been faced with a 9 percent decrease in state funding. Along with

<sup>50</sup> TSU has benefited from the technology access fee for the past five years.

this budget cut, the university also is faced with staff shortages and the need to provide competitive salaries, to increase help desk services, to provide additional support for online degree programs, and to provide laptop computers for students. While similar state university technology budgets are suffering due to budget cuts, the technology access fee provides TSU with a stable source of funding, allowing them to maintain their computer offerings to students, which in turn allows their graduates to be competitive players in the job market. Though not all technology needs are covered by the fee, services to students in the area of technology are somewhat protected.

TSU's overall achievements in technology stem from the establishment of the institution's Technology Vision Committee (TVC) in 1996. This committee was charged by the President with developing a strategic plan for information technology, guidelines to evaluate institutional progress, and ways to monitor its implementation. The TVC also invited students to sit on the committee in order to design the institution's computer interface around student needs. Evidence of the TVC's success in making technology a major part of the teaching and learning process is witnessed throughout TSU's campus. From the almost completely wireless campus to the state-of-the-art "smart classrooms" to online registration, TSU has demonstrated that it is a cutting-edge institution. The strength and support of technology for teaching and learning is not only visible in TSU's infrastructure but also in the people on campus who research and purchase it, teach with it, and use it on a daily basis. When visiting TSU, faculty can be seen working alongside students using computer programs geared toward dynamic fields from aeronautics to robotics.

Members of the TVC show deep commitment to bringing the latest, cutting-edge trends in technology to TSU students and faculty. As the current chair of the TVC commented, "The number one priority is keeping TSU abreast of

technology that helps faculty teach and students learn." In addition, the faculty are enthusiastic about using technology in their classrooms. For example, faculty in the Computer Information Systems and Engineering Departments collaborated and encouraged both graduate and undergraduate students to conduct hands-on research in the area of robotics. TSU even established an Office of Administrative Services devoted to training faculty. Faculty receptivity to using technology has been attributed to hiring a patient and non-threatening instructor and having department support in encouraging faculty to receive training in technology. Students also are delighted with the many changes over the years in the area of technology. In particular, students commented on the ease of registering for classes online and receiving their financial aid checks. Before online registration, students could be seen waiting in endless lines to register for one class only to find that it had reached its enrollment capacity. Today's student, as one administrator commented, is oriented to taking care of all their business with computers.

All of these teaching and learning computing improvements occurred over several years. During the first year of the project, the TVC ordered the installation of new computer laboratories, technology classrooms, and media laboratories. From 2001-2005, TSU is scheduled to install 60 technology classrooms. Currently, there are 35 master classrooms equipped with projectors, a computer, a document camera, and a VCR; 10 of those classrooms have "smart boards," which allow transfer of a professor's notes directly into a computer file for student use. TSU's institution-wide network has been upgraded, including the email system. Every interior building is almost 100 percent wireless. In 2001-2002, 10 new computer laboratories were established and six old laboratories were upgraded to support instruction and research. In addition, 25 technology classrooms were inspected for optimal use in 2001 and 10 new technology classrooms are being installed for faculty use.

Not one personal computer for student use is more than three years old. Furthermore, the TVC has insisted on the standardization of computers. All campus computers have been furnished by Howard Industries, allowing TSU to present a standardized computing network, which fosters streamlined troubleshooting and an institutionalized computing atmosphere.

One of the areas on campus that has experienced significant upgrades in technology is the library. For example, TSU has been working on digitizing the library for the past seven years. More than 80 personal computers and 30 wireless

laptop computers are available to students for research. Electronic books are offered along with some 100 online databases.

The card catalog is completely automated and the library has been digitizing yearbooks (up to 1925) as part of a community preservation project.

In attempting to assess student's satisfaction with the upgrades, the library offers a survey to students and posts the results online. Though the response rate was small, of those students and faculty who did respond, 100 percent of graduate students believed that access to the Internet and software applications at the library were excellent, and 80 percent of sophomores believed that the digital collection was excellent. The online "Ask A Librarian Service" and the Electronic Reserve Items were highly rated by all student and faculty levels.

The success of the TVC's initiatives and TSU's institution-wide commitment to advanced computing capabilities are evidenced in its graduates. For example, TSU graduates who concentrate in computers and engineering are

a cut above other comparable graduates in their field because of TSU's strategic decision to introduce a concentration in e-business. TSU is the first institution in the southeast to have an e-business concentration, offering certification in DB2 database management, Java programming, and Solaris/Unix administration. The program is a joint effort between TSU, IBM, Sun Microsystems, and Howard Industries. In addition to regular classes under the program, TSU offers a two-week certification class in Java. Last semester, 26 students were enrolled in the class and 12 have already been certified. This additional certification is estimated to increase

the annual salary of a recent graduate from between \$10,000 to \$12,000. TSU administrators who work closely with the e-business concentration commented that TSU cannot offer enough classes under the e-business concentration; demand is very high.



TSU students also are increasingly attracted to online courses, particularly those leading to a degree. All online courses are offered through the Tennessee Board of Regents Online Degree Program. Individual courses typically are at maximum enrollment every semester. TSU offers two undergraduate degrees—a Bachelor of Professional Studies with concentrations in Information Technology or Organizational Leadership and a Bachelor of Interdisciplinary Studies—and one master's degree in education.

TSU is an institutional leader in the application of technology for a host of reasons. One of TSU's major strength is its overall institutional commitment to making technology a regular aspect of the teaching and learning experience.

The President's insistence on establishing the Technology Vision Committee in the mid-1990s has made TSU an award-winning institution in technology offerings. Responding to the needs of the business community, such as offering an e-business concentration and allowing students to work alongside professors to gain computing experiences, has allowed TSU to graduate marketable employees for the Nashville area and

nationwide technology industry. The technology access fee has supported many of the student computing services offered on campus; this funding has been instrumental in making TSU an institution that excels in the area of technology. The combination of institutional commitment, sound decisions, stable funding sources, and a keen vision of the future of technology makes TSU a model institution.

Johnson C. Smith University, located in Charlotte, NC, began educating students in the liberal arts tradition when it was founded in 1867 under the auspices of the Presbyterian Church. As part of its mission, the university strives not only to prepare students in their chosen fields, but also to guide them in developing self-confidence and ethical values, to coach them to think critically and work independently, and to encourage in them a sense of civic responsibility. As a small, private university, educating approximately 1,500 students each year, the university staff takes pride in maintaining a residential campus with a familial atmosphere. As such, the campus is infused with a collegial spirit, a place where higher education is a serious and enthusiastically pursued undertaking. Because of the new role that technology plays in society, leaders across the campus agree that incorporating various forms of technology into the curricula at JCSU is an integral part of the goal of liberal arts, educating the well-rounded citizen.

The Executive Vice President of JCSU comments, "Technology is integrated into all aspects of the university—research, teaching, and service. Technology is part of the centerfold of JCSU, not only computers but all media." With the support of senior campus officials, including President Dorothy Cowser Yancy, the leaders of

JCSU brought technology to the university with the same critical thought and aim for excellence that is expected of its students. JCSU soon became a leader in the HBCU community and a model for other small colleges. In 1994, the university established a computer engineering program, and the Computer Science and Engineering Department was relocated to the state-of-the-art Technology Center that opened in 1997. In 1999, renovations brought new technologies to the James B. Duke Library. Fall 2000 brought the most dramatic change with the launch of the IBM Laptop Initiative, making JCSU the first HBCU Thinkpad University and one of few in the nation.



Through the Laptop Initiative, every student on campus leases an IBM laptop computer. The laptops are replaced every three years. The laptops, supported by an extensive campus infrastructure, give students complete access to the campus network and Internet, allowing them to use the machines as portable libraries, laboratories, and communication tools. There are currently more than 3,000 Internet connections available on campus—in the library, common areas, and every residence hall room. Many academic buildings also have technology classrooms with Internet access for faculty and/or students. JCSU has begun a conversion to a wireless infrastructure, beginning with classrooms, allowing full integration of the laptops into the

teaching and learning environment. JCSU strives to create an environment in which the collegial, liberal arts nature of JCSU is enhanced by the laptops. Students are able to do research and complete assignments anywhere on campus and to communicate with professors and fellow students via email at any time.

Students are able to use their laptops for research because of the extensive online offerings available through the library's webpage. Students link to a service called NC Live (North Carolina Libraries for Virtual Information). There they gain access to 5,500 newspapers, journals, magazines, and encyclopedias as well as an index of 15,000 periodical titles and 13,000 electronic

of training and support, and this mission falls to the User Support Services unit of the Information Technology Department. The Help Desk—the main component of User Support Services—provides technical and usage support for JCSU issued computers and software for faculty, students, and staff via email, telephone, walk-in, and the Help Desk website. A Mobile Computing Lab, the second component of User Support Services, is responsible for management of the laptops, including distribution, orientation, hardware maintenance, and upgrades. User Support Services also services faculty and staff desktop computers. A third component, the Training Center, provides instruction and support for

Johnson C. Smith University's IBM Thinkpad Initiative was a major influence in the decision of students Anthony Tindall, a junior political science major, and Marcus Scurry, a senior finance major to attend. Both students knew about the program before enrolling, and Marcus, who was among the first class to receive laptops, was particularly concerned with attending a technologically advanced campus because of his interest in business. Marcus uses his laptop for library and Internet research and to complete online assignments. He also finds it helpful that the Business Department provides a course plan on its webpage and that all business faculty members have both individual and course webpages. Anthony also appreciates the convenience that his laptop provides for doing library research and has used it in his role on the yearbook committee and in various internships outside of campus.

books. They also can link to JSTOR, a scholarly journal archive that currently offers access to 322 academic journals. The library's website has been redesigned to include an information literacy skills instructional component, Johnson C. Smith University Information Literacy and Learning (JILL). This feature provides training to students through the use of a virtual library tour, an online self-paced learning module, and pre- and post-tests. The library facility, which is available to students, faculty, staff, and the community, also maintains extensive hours, allowing access to print, audiovisual, and electronic materials.

Such a broad scope of technology on campus requires a well-integrated system

faculty and staff to use educational technology to reach their performance goals. The Center houses a training room equipped with desktop computers loaded with all JCSU supported software programs as well as a library of manuals, multimedia CD-ROMs, instructional videos with disks, and workbooks with disks. The department will explore web-based training delivery as funding is available.

Much of the support provided through the Help Desk is accomplished by student employees through the Student Technical Assistants (STA) Plus program. The STA Plus program began in April 1998 as a pilot project for the Teaching, Learning, and Technology (TLT) Group, an affiliate of the American Association of Higher

Education (AAHE). The program is student-centered and student-run, with guidance from the User Support Services Manager and assistance from two professional computer technicians. The STA Plus program employs approximately 30 students, whose salaries are funded by a student technology fee. The services that STAs provide include IT training as well as remote and on-site technical and usage support for faculty, students, and staff.

STAs also support and maintain three public computer laboratories on campus during operating hours, which have been abbreviated since the introduction of laptops. The program is run much like a business, allowing STAs to gain field relevant experience, as well as training in customer service techniques and management principles. Although the turn-over of the student staff presents challenges for the department, the use of STAs serves as both a cost-saving mechanism and a means of providing students with invaluable work experience.

Responsibility for managing the infrastructure and campus-wide network systems that support technology initiatives belongs to the Director of Information Technology. With a staff of 13, including three network managers, the IT Department has been challenged to adapt and expand the campus infrastructure to support the laptop environment, including the upcoming wireless conversion. The department benefits greatly from a budgeting formula that includes approximately 14 percent of all allocations for maintenance, though they still encounter the challenge of hidden costs in implementing new systems.



The IT Department also oversees the selection and management of campus-wide software applications for functions such as student services. The current AS400 application allows students to register online, check their grades and financial statements, and view their list of classes. Although stronger modules to support functions such as payroll, alumni tracking, and student advising are available, the purchase

of these Enterprise Resource Planning applications, which are common at large universities, is a great expense for a small institution. The IT Department has the additional challenge of making these decisions as well as conducting broader strategic planning in the absence of a Chief Information Officer (CIO). The Director of Information

Technology produces the campus' technology strategic plan with the assistance of the Executive Vice President. While the support of senior level leadership is critical to the success of the department, a CIO would greatly contribute to long-term planning and leave the university less vulnerable to the vendor community for purchasing decisions.

With a rich infrastructure in place, a number of professional development activities have been initiated to help departments and faculty use technology to maximize student outcomes. With funding from the Bush-Hewlett Collaboration, a Faculty Development Steering Committee awards \$2,000 mini-grants to academic departments to develop plans for integrating discipline relevant technology applications into the curricula. For example, the English Department secured a mini-grant to hire consultants to help introduce

the technology skills their students would need to conduct research and participate in collaborative writing at the graduate level. An English Department professor comments, “With these grants, academic departments are giving their students opportunities that many otherwise would not encounter until graduate school or the workplace.”

Individual faculty members or departments also can receive smaller mini-grants of \$1,000 for an instructional technology project designed to

student laptops for recitations. Both of these projects allowed students to gain more skills practice than is possible with traditional physical laboratory space and limited classroom time. The knowledge that individual faculty develop also is shared through UNCF funded Technology Mentor Grants that provide a faculty technology mentor for each academic department.

The next five-year strategic plan includes key components such as supporting faculty development and improving ways to assess the

The state-of-the-art Technology Center at Johnson C. Smith University has allowed nationally and internationally recognized scientists and engineers from JCSU and other institutions to work together, thereby providing students with training in cutting-edge research areas. For example, Dr. Magdy Attia, Computer Science and Engineering Department Chair and Director of the Technology Center, and Dr. Alan Lettington, professor emeritus at the University of Reading in the United Kingdom, have been collaborating since 1999 on the development of a passive millimeter wave imager with funding from the NASA Glenn Research Center. The camera would be unique in its ability to detect objects through dense fog, smoke, and even clothing. The project was designed to explore the feasibility of using this technology to improve airport efficiency by allowing planes to land in foggy weather conditions, but the imager has many other potential uses, including airport security and military applications. Earlier this year a prototype camera was completed and transported to JCSU from the United Kingdom. The next phase of work will involve refining the images that are produced by the camera. Dr. Attia anticipates that students will begin participating in research projects using the imager in Fall 2003.

increase student performance on a particular outcome. The grant money provides a stipend for the faculty member as well as funds to purchase software or equipment, and a training workshop is provided for grant recipients. Grant recipients must prepare a final report and give presentations that allow other faculty members to learn from the work. Approximately 40 faculty members, more than half, have now completed a variety of creative projects spanning many disciplines, including the humanities. For example, a grant recipient who teaches electronic and acoustic composition used grant funds to purchase a virtual music lab software application. An English professor teaching a Chaucer course purchased high quality microphones that were used with

effect of instructional technology on student learning outcomes. The assessment process will be an important next step in maximizing the investment in technology, because it will allow leaders to purchase instructional technology in direct response to department, faculty, and student needs. Software application development also is on the horizon because the tools currently available in the market are not always adequate or do not align with institutional pedagogical philosophies. Current goals include applications for faculty training in new technologies, e-portfolio assessment, and a campus-wide course management tool.

JCSU also has become an important producer of African American graduates in technology

fields through the Computer Science and Engineering Department. Establishing this technical department at a small private liberal arts institution represented a bold move that has proven quite successful. The department is currently the largest at the university with 300 majors and produced 40 new graduates in the last academic year. Students can major in three areas: computer engineering, information systems engineering, and management information systems. The Department Chair and Director of the Technology Center states, "The digital divide still exists. If JCSU wants to contribute to its demise, we must have a strong, quality computer science program." Department leaders would like to grow the program by attracting more junior level faculty and eventually hope to establish a graduate program, which would significantly increase research funding.

The Technology Center was built to support the Computer Science and Engineering Department, as well as the infusion of technology into other disciplines. The Technology Center currently has nine state-of-the-art laboratories, including general computing, programming languages, digital electronics, analog electronics, computer graphics, digital signal processing, database and business applications, telecommunications and computer networking, and automatic control and robotics. The availability of these laboratories ensures that computer science students get high quality technical training. The Technology Center and its resources also have provided opportunities for faculty and staff to participate in specialized high tech research areas. Student participation in these research projects is a priority of the department. It currently hosts a summer research program in which no more than three to four students work with a faculty member.

Other disciplines also benefit from the Technology Center. For example, the graphics laboratory is used by communication arts students to produce publications and by natural

science students for visualization applications and cell biology. Also, the Division of Lifelong Learning uses the Center for computer classes. The department provides a basic computer science competency course for entering students. In 2000, JCSU became the only HBCU to participate in a study of Arabic Language and Middle East/North African Cultural Studies. As part of this project, students studied the Arabic language via distance learning technologies on campus. After completing two semesters of Elementary Modern Standard Arabic, a student had the option of studying abroad at Al Akhawayn University in a one- or two-semester program. This semester Dr. Andrea Novicki, the science Change Agent, will teach Neurobiology as a Video Teleconferencing Center course between UNC-Pembroke and JCSU. The Center is home to two multimedia rooms with wireless technology, a 68-seat video teleconferencing Auditorium Center, and a 17-seat Executive Center, used by faculty and staff as well as community business leaders.

The laptop and other technology initiatives have been made possible by the commitment of senior level leadership at JCSU. Integrating technology into the campus is part of President Yancy's vision and carries the support of the Board of Trustees. Consequently, technology is always a priority for resource allocation during the college's annual operational budgeting and planning process. There has been a sustained commitment to invest in technology, including training and professional development for faculty and staff. The technology initiatives also benefit from aggressive and creative fundraising. From 1996 through 2003, when many of these initiatives began, JCSU saw a significant increase in financial support from a variety of sources, including individual donors, private foundations, and federal agencies. Leaders in IT also have pursued corporate partnerships to help create and maintain technology initiatives. The challenge to maintain these costly programs will depend on keeping technology near the top of the priority list.

# Conclusions and recommendations

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The technological disenfranchisement that still exists among minority, low-income, and rural groups, and the demonstrated success of MSIs despite their limited financial resources present a strong case for further investment in these institutions.

**T**he Alliance survey and campus visits conducted for this report indicate that most MSIs have built a solid foundation for information technology on their campuses. Most MSIs were operating and/or developing a variety of programs to expand IT-related services and training for their students, faculty, and staff. The study also shows that MSIs were using their available resources to provide basic IT (computer, email, and Internet access) and support services. A smaller percentage of institutions were able to provide more sophisticated online services, such as grade access, bill payment, and online admissions applications.

However, MSIs need improvement in several areas. Although the percentage of MSIs that have strategic plans is comparable to mainstream institutions, it is critical that all MSIs have a strategic plan for IT in order to maximize limited resources. In addition, MSIs lag behind other institutions in student computer ownership and online student services, including online admissions applications. Only half provide direct Internet access in residence halls, and faculty use of email/Internet is very low despite efforts by some schools to provide incentives and rewards. The institutions profiled also expressed an interest in continuing to expand and update their computer science and technology offerings and providing more advanced degrees in order to keep pace with industry standards.

Data analysis also indicated that institutions with certain characteristics were more likely to provide various IT-related student services; to provide student and faculty training and support; and to have more widespread faculty use of email and Internet. These characteristics included collaborating with other campuses, having a strategic plan and/or assessment process for IT, offering a doctoral or first professional degree, and having more financial resources and IT staff available. In addition, results suggest that the smallest MSIs have the most difficulty providing some student and faculty services. The results of this analysis are consistent with information gathered from the campus visits as well as from previous studies, including the recent GAO study, in concluding the importance of financial resources and adequate IT staffing to institutions' success in meeting their IT goals.

The technological disenfranchisement that still exists among minority, low-income, and rural groups, and the demonstrated success of MSIs despite their limited financial resources present a strong case for further investment in these institutions. As drivers of the engine of educational advancement for minorities, MSIs have clearly demonstrated their ability to use limited financial and human resources effectively in order to provide their students, staff, and faculty with many IT-related services. Moreover, MSIs manage to create innovative programs for incorporating IT education into all academic

fields. As a group, MSIs are critical to training the nation's future minority leaders for the information technology sector.

Unfortunately, many of the programs MSIs have created remain vulnerable because of two fundamental threats: they rely upon outside funding sources that are inherently unpredictable; and staff turnover is high in this competitive market that is short on well-trained IT professionals. MSIs also are disproportionately affected by state and federal budget cuts because they do not possess the depth of financial resources enjoyed by mainstream institutions. Continued financial investment in these institutions will ensure that MSIs can maintain the hard won progress they have achieved and expand the educational opportunities they provide. Furthermore, evidence suggests that this investment will prove essential to closing the gaps in information technology access and remedying the underrepresentation of minorities in science, technology, engineering, and math fields.

Based on these findings, the Alliance strongly supports the following recommendations:

- ▷ **Enact and fund the “Digital and Wireless Network Technology Program Act of 2003,” an unprecedented legislative effort to address the variety and scope of the nation’s minority-serving institutions’ information technology needs.**

The Digital and Wireless Network Technology Program Act is a bold effort to address the issue of technological disenfranchisement in minority communities on two levels—infrastructure and application—and recognizes that MSIs are the ideal vehicle to confront these problems impacting people of color. The importance of this legislation lies in the variety of activities that are covered and the recognition that MSIs continue to need financial resources to expand their IT capacity without depleting the limited core funding that enables them to serve

educationally and economically disadvantaged students. The components of the legislation address the array of needs at MSIs by providing for both equipment and training, as well as allowing MSIs that are more advanced in their use of technology to partner with and mentor their peers. Given the wide variety in size and resources of MSIs, support of partnerships and collaborative efforts is crucial.

Maximizing information technology's effectiveness requires well-trained and supported faculty, staff, and students using technology in ways that impact all aspects of the modern college and university experience. Provisions of the act allow MSIs to better address the educational needs of their students and communities by strengthening the capacity of these institutions to provide technology instruction to faculty and students, as well as future teachers and librarians. By allocating the necessary funds to MSIs, the legislation provides institutions with not only the infrastructure needed but also the tools to offer faculty leadership development in the groundbreaking uses of technology. Ultimately, faculty and enrolled students are encouraged to seek degrees or certification in technology application areas, particularly in teaching and learning capacities.

Furthermore, the legislation provides MSIs with the ability to stay on the cutting edge of technology application. Instead of continually trying to catch up with other institutions, MSIs could become leaders in the field. This legislation is critical to their ability to produce minority leaders for IT-related fields and thereby ensure the economic success of their communities and the nation as a whole.

- ▷ **Create new sections in the HEA under Titles III and V that provide new funding for technology maintenance and enhancements at HBCUs, HSIs, and TCUs.**

Financial support provided under Titles III and V of the Higher Education Act (HEA)

help developing institutions and those that serve large numbers of minority, low-income, and first-generation students to maintain administrative stability and build core operational capacity without detracting from their missions to enroll underserved students. Today, information technology plays a major role in all aspects of institutional operations, including administrative, student services, and teaching and learning. In addition, acquiring and maintaining IT equipment and training students and staff are costly endeavors. Consequently, the Alliance recommends the creation of new subparts under Titles III and V that would provide additional funding for MSIs to maintain and enhance information technology on their campuses, including infrastructure, Internet connectivity, and applications.

- ▷ **Create a new subpart under the Minority Science and Engineering Improvement Program (MSEIP) during the reauthorization of HEA to encourage improvements in the infrastructure and application of information technology at MSIs.**

MSEIP was created to effect long-range improvement in science and engineering education at predominantly minority institutions and to increase the participation of underrepresented ethnic minorities, particularly minority women, in scientific and technological careers. In order to achieve the goals of MSEIP, investments must be made in both technology infrastructure and application. Investments made through the creation and funding of a new subpart under the MSEIP program will help ensure that all graduates of MSIs will be able to use technology effectively and can pass invaluable information technology skills on to the communities in which they will live and serve.

- ▷ **Increase access for MSIs to new and existing federal programs that assist in the development of science and technology at higher education institutions and provide**

### **MSIs with opportunity parity to participate in the latest technological advancements.**

In addition to increasing the number and scope of programs that are designed specifically to address the needs of the nation's minority-serving institutions, it is imperative that the resources of the largest federal programs that target science, technology, engineering, and math (STEM) initiatives and research and development activities be distributed more equitably. Much of the funds allocated through these programs—including National Science Foundation (NSF), National Institutes of Health (NIH), National Aeronautics and Space Administration (NASA), and U.S. Departments of Commerce, Defense, Homeland Security, Energy, and Education programs—go to the nation's largest and most advanced research institutions. As a result, MSIs receive little support to participate in cutting-edge research in areas such as network security.

Overall, MSIs are severely underrepresented in the allocation of federal research and development dollars as well as in specific programs, such as the NSF Computer Science, Engineering, and Mathematics Scholarships (CSEMS) program. The underrepresentation of MSIs in these programs marginalizes them among the nation's colleges and universities and prevents them from participating in the newest information and communications technology areas. Therefore it is imperative that measures are taken to create opportunity parity in the application process either by guaranteeing a percentage of funding be allocated to MSIs or providing priority/preference points for these institutions.

- ▷ **Ensure that MSIs can participate fully in the National Science Foundation's (NSF) proposed Advanced Cyberinfrastructure Program (ACP).**

The emerging cyberinfrastructure program, given its potential to revolutionize science and engineering research, has the unfortunate negative potential to leave MSIs behind. The Alliance supports the NSF Blue-Ribbon Advisory Panel

on Cyberinfrastructure's recommendation that NSF set aside \$1 billion in funding per year to establish a program that would "create, deploy, and apply cyberinfrastructure in ways that radically empower all scientific and engineering research and allied education." The panel also recognized the need to ensure that all universities and colleges—regardless of size, budget, and student demographics—have an opportunity to participate in and benefit from cyberinfrastructure developments so that no class of institutions, no group of faculty researchers, and no population of students is left behind. The Alliance also supports the panel's goal to more effectively include MSIs by supporting strategic IT planning for underserved communities and improvements in network connectivity at MSIs (Atkins et al., 2003). It is imperative that MSIs have a voice and contribution in the collaborative nature of research that will be enabled by the emerging cyberinfrastructure framework.

▷ **Develop new graduate level opportunities to enhance the capacity of MSIs to train future faculty and senior institutional leaders.**

A major concern is the significant underrepresentation of minorities in many advanced degree fields, including science, engineering, and technology. The need for educational experiences and credentials beyond the BA continues to grow in the workplace. Though there is a need for more minority fellowships in general at higher education institutions, MSIs in particular lack both programs and funding to provide the necessary graduate and professional level training needed by minority students. The limited graduate level opportunities available to MSI graduates and other minorities can be enhanced through policies that support the infrastructure of post-baccalaureate education at MSIs. These could include Ph.D. programs for schools currently offering master's degrees; recruitment and retention of minority professors; and financial resources necessary to attain an advanced degree, including fellowships. These minority graduate

fellowships should be provided to MSIs so that they can attract and retain minority students, including those who graduate from MSIs and those who commit to teach at these institutions.

During FY 2001, MSIs received only 5 percent of the funding awarded through the Graduate Assistance in Areas of National Need (GAANN) program. The GAANN program was established to provide funding to academic departments or programs that provide courses of study leading to a graduate degree in areas of high national need (as determined by the Secretary of Education). Likewise, students at Alliance colleges and universities were not awarded any of the 147 Jacob K. Javits Fellowships. Javits Fellowships are awarded to students pursuing graduate study in the arts, humanities, and social sciences who demonstrate superior ability on the basis of demonstrated achievement, financial need, and exceptional promise. The fact that MSIs have been overlooked with regard to these programs is reflective both of the dire underrepresentation of minorities in graduate education and the need for funding targeted to students of color at MSIs who wish to pursue advanced degrees.

▷ **Continue and expand funding for the U.S. Department of Education's Preparing Tomorrow's Teachers to Use Technology (PT3) program.**

The Department of Education's PT3 program was created in 1999 to provide grants to higher education consortia for the purpose of improving the ability of postsecondary institutions to prepare future K-12 teachers to use information technology in their curricula. An important component of addressing the technological disenfranchisement of low-income and minority groups will be increasing exposure to technology in many arenas, including elementary and secondary schools. Therefore, it is imperative that K-12 teachers be experts in incorporating information technology into their curricula. Furthermore, as shown in the Alliance's

*Educating the Emerging Majority* report, Alliance-member MSIs prepare nearly half of all Blacks, Hispanics, and American Indians who graduate with teacher education degrees (Alliance, 2000). These teacher candidates have the potential to serve as instructors and role models for the very populations who are less technologically savvy. Therefore, the Alliance recommends that the PT3 program be continued, that funding be expanded, and that efforts be made to ensure that MSIs have opportunity to succeed in the competitive grant process.

- ▷ **Create a Hispanic-Serving Institutions Program (HSIP) within the National Science Foundation (NSF) similar to the Tribal Colleges and Universities Program (TCUP) and the Historically Black Colleges and Universities Undergraduate Program (HBCU-UP) to build the information technology capacity of HSIs in the fields of science, technology, engineering, and mathematics (STEM).**

The HBCU-UP and the TCUP programs have been excellent vehicles for HBCUs and tribal colleges to enhance their uses of technology for undergraduate teaching, learning and research. They also have been good ways for NSF, with its intellectual and technical resources, to be engaged with TCUs and HBCUs. A similar program for HSIs would help to build the technology capacity of HSIs to educate and train the more than 50 percent of Hispanic undergraduates they enroll, particularly in the fields of science, technology, engineering, and mathematics.

- ▷ **Target specific state funds to MSIs for expanding information technology capacity.**

Although the nation's public minority-serving institutions currently receive funding from their respective states, MSIs often receive fewer state dollars in comparison to the flagship and research institutions. Further, private MSIs and most Tribal Colleges and Universities do not receive regular allocations from the state. However, some states, including Minnesota and

North Dakota, provide invaluable services to their MSIs, including TCUs, by including them in statewide networks and network servicing initiatives. These initiatives allow participating MSIs to improve their Internet connectivity, reduce costs of Internet service and network management, and expand opportunities for distance education delivery. In addition to this type of service, states where MSIs are located should have an interest in correcting their financial underinvestment in the IT capacity of these institutions because of the potential that information technology has to invigorate local economies. Consequently, states should target specific funding to MSIs to build their IT capacity in general and to train students in IT-related areas that would support statewide and local economic development initiatives.

- ▷ **Expand industry contributions to MSIs for information technology capacity and innovation.**

Information technology industries have a clear role to play in developing the IT capacity of MSIs and fostering innovative IT solutions at their campuses and communities. Because MSIs are critical to training the future minority workforce and leaders for these industries, partnerships benefit both parties. Industry has the potential to contribute in many areas, including providing direct funding or equipment and software donations, as well as lending personnel expertise for activities such as staff training, curriculum development, and strategic planning.

For example, Johnson C. Smith University (JCSU) secured a corporate partnership to help support its laptop program; through the IBM Thinkpad University initiative, JCSU receives special pricing on its computer leasing contract. AIHEC, HACU, and NAFEO also have developed corporate partnerships that support their respective member institutions. For example, both HACU and NAFEO have an alliance with Gateway that provides special pricing on Gateway products for students,

faculty, staff, and alumni of member HSIs and HBCUs. The partnership also includes rebates and discounted computing resources, including networking and technical support, for institutions (HACU, 2003a; NAFEO, 2003). HACU also has secured a partnership with the IBM Corporation to provide computer discounts and to advance IT use in the education of Latinos. Activities have included producing a report on Latinos and IT through the Tomás Rivera Policy Institute (TRPI, 2002) and an e-mentoring program in conjunction with the Hispanic Educational Telecommunications System (HETS) (HETS, 2003). Verizon also is sponsoring the initial development of a HACU Virtual Learning Marketplace (HACU, 2003b).

The Tribal Technology Prosperity Game, designed to help tribal colleges develop and plan locally relevant strategies for bringing technology opportunities to TCUs, involved a variety of stakeholders, including the private sector. Many of the projects that are now underway as part of the TCU Framework for Community Technology are supported in part by these industry partners. For example, AIHEC established a national coordinating office to implement the TCU Framework, with partial support from Microsoft Corporation. AIHEC's virtual library, an Internet based library designed to supplement tribal colleges' local holdings, was established with support from IBM and other partners (AIHEC, 2003). In addition, the Advanced Networking with Minority-Serving

Institutions (AN-MSI) project, supported by a National Science Foundation (NSF) grant to EDUCAUSE, promotes industry involvement in network evaluation, technical assistance, and strategic planning. AN-MSI supported the TCUs Prosperity Game, as well as HSI, HBCU, and MSI-wide initiatives. For example, as part of the AN-MSI project, both IBM and Verizon have sponsored seminars on academic computing for presidents of HSIs. In addition, one HSI was able to partner with CISCO to showcase a new product line at considerable savings after AN-MSI reviewed its network upgrade plan (Ramirez, 2003).

The Alliance encourages institutions to look to local industry for support and partnership and challenges industry to continue and expand its role in helping to develop the training ground for its future workforce.

In these times of increasing concern about homeland security, global competitiveness, and national economic growth, investing in the application of technology at MSIs represents a critical pathway to achieving the goals of prosperity, security, and harmony for all Americans. Investment in the policies and programs outlined above will speak not only to the needs of minority-serving institutions and their students, but also to all those who see access to a quality higher education as a fundamental path to achieving the American dream.

# References

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- AIHEC. See: American Indian Higher Education Consortium.
- AN-MSI. See: Advanced Networking with Minority-Serving Institutions.
- Advanced Networking with Minority-Serving Institutions (AN-MSI). 2002a. Strategic Plan. From AN-MSI website ([www.educause.edu/ir/library/pdf/EAF0221.pdf](http://www.educause.edu/ir/library/pdf/EAF0221.pdf))
- \_\_\_\_\_. 2002b. *Third Annual Report*. From AN-MSI website ([www.educause.edu/ir/library/pdf/EAF0216.pdf](http://www.educause.edu/ir/library/pdf/EAF0216.pdf)).
- Alliance. See: Alliance for Equity in Higher Education.
- Alliance for Equity in Higher Education. 2000. *Educating the Emerging Majority: The Role of Minority-Serving Colleges & Universities in Confronting America's Teacher Crisis*. Washington, DC: The Institute for Higher Education Policy, September.
- American Indian Higher Education Consortium (AIHEC). 2003. "Statement of the American Indian Higher Education Consortium (AIHEC)". Hearing on Telecommunications in Indian Country. Committee on Indian Affairs. United States Senate (SR-485). Presented by Dr. Gerald Monette, May 22, 2003.
- Anderson, Rachel. 1999. "Native Americans and the Digital Divide." *The Digital Beat*. Vol. 1, No. 17 (October). From Benton Foundation website ([www.benton.org/publibrary/digitalbeat/db101499.html](http://www.benton.org/publibrary/digitalbeat/db101499.html))
- Arafah, Sousan and Levin, Douglas. 2002. *The Digital Disconnect: The Widening Gap Between Internet-Savvy Students and Their Schools*. Washington, DC: Pew Internet and American Life Project, August.
- Artze, Isis. 2002. "Collaborative Technological Assistance: Educause Project Helps MSIs Bridge the Digital Divide." *The Hispanic Outlook in Higher Education*. Vol. 13, No. 5 (December 2). Paramus, NJ: The Hispanic Outlook in Higher Education, pp. 1-2.
- Atkins, Daniel E. et al. 2003. "Revolutionizing Science and Engineering Through Cyberinfrastructure: Report of the National Science Foundation Blue-Ribbon Advisory Panel on Cyberinfrastructure." From website ([www.communitytechnology.org/nsf\\_ci\\_report](http://www.communitytechnology.org/nsf_ci_report)).
- Benítez, Margarita. 1998. "Hispanic-Serving Institutions: Challenges and Opportunities." In Jamie P. Merisotis and Colleen T. O'Brien, eds. *Minority-Serving Institutions: Distinct Purposes, Common Goals*. New Directions for Higher Education. No. 102. San Francisco: Jossey-Bass Publishers, pp. 57-68.
- Booz Allen & Hamilton. 2000. *Historically Black Public Colleges and Universities: An Assessment of Current Information Technology Usage*. October.
- Boyer, Paul. 1997. *Native American Colleges: Progress and Prospects*. Prepared for the Ernest L. Boyer Project of The Carnegie Foundation for the Advancement of Teaching. San Francisco: Jossey-Bass Publishers.
- Census. See: U.S. Bureau of the Census.
- Colwell, Rita. 2003. "Minority Serving Institution Digital and Wireless Technology

- Opportunity Act of 2003.” Testimony before the Committee on Science, Basic Research Subcommittee, U.S. House of Representatives, July 9, 2003.
- Cooper, Mark N. 2002. *Does the Digital Divide Still Exist? Bush Administration Shrugs, But Evidence Says ‘Yes’*. Washington, DC: Consumer Federation of America (CFA), May.
- Cunningham, Alisa F. and Christina Parker. 1998. “Tribal Colleges as Community Institutions and Resources.” In Jamie P. Merisotis and Colleen T. O’Brien, eds. *Minority-Serving Institutions: Distinct Purposes, Common Goals*. New Directions for Higher Education. No. 102. San Francisco: Jossey-Bass Publishers, pp. 45-56.
- Davis, Thomas and Trebian, Mark. 2001. “Shaping the Destiny of Native American People by Ending the Digital Divide.” *EDUCAUSE Review*, Vol. 36, No. 1 (January/February), pp. 38-46.
- Dorr, Jessica and Akeroyd, Richard. 2001. “New Mexico Tribal Libraries: Bridging the Digital Divide.” *Computer in Libraries*, Vol. 21, No. 8 (October), pp. 36-43.
- Frاند, Jason L. 2000. “The Information-Age Mindset: Changes in Students and Implications for Higher Education.” *EDUCAUSE Review*, Vol. 35, No. 5 (September/October), pp. 15-24.
- Forest, James J. F. 2000. “Technology: International Dimensions.” *International Higher Education*, No. 18 (Winter), pp. 5-7.
- GAO. See: U.S. General Accounting Office.
- Gartner Inc. 2000. *The Digital Divide and American Society*. San Jose, CA: Gartner Inc., October.
- Green, Kenneth C. 2003. *Campus Computing 2002: The 14<sup>th</sup> National Survey of Computing and Information Technology in American Higher Education*. Encino, CA: Campus Computing, December.
- HACU. See: Hispanic Association of Colleges and Universities.
- HETS. See: Hispanic Educational Telecommunications System.
- Hispanic Association of Colleges and Universities (HACU). 2003a. From website ([http://www.hacu.net/hacu/Gateway\\_EN.asp?SnID=244968331](http://www.hacu.net/hacu/Gateway_EN.asp?SnID=244968331))
- \_\_\_\_\_. 2003b. From website ([http://www.hacu.net/hacu/HACU\\_Virtual\\_Learning\\_Marketplace\\_EN.asp?SnID=118151480](http://www.hacu.net/hacu/HACU_Virtual_Learning_Marketplace_EN.asp?SnID=118151480))
- Hispanic Educational Telecommunications System (HETS). 2003. From website (<http://www.hets.org/>)
- ITAA. See: Information Technology Association of America.
- Information Technology Association of America (ITAA). 2003. *Building the 21<sup>st</sup> Century Technology Workforce: Underrepresented Groups in the Information Technology Workforce*. Arlington, VA: ITAA, May.
- \_\_\_\_\_. 2002. *Bouncing Back: Jobs, Skills and the Continuing Demand for IT Workers*. Arlington, VA: ITAA, May.
- Kelly, Michael C. 2003. “Bridging the Digital Divide.” *Opportunity Outlook*. Washington, DC: Council for Opportunity in Education (COE), January, pp. 2-7.
- Lenhart, Amanda et al. 2003. *The Ever-Shifting Internet Population: A New Look at Internet Access and the Digital Divide*. Washington, DC: Pew Internet and American Life Project.

- NAFEO. See: National Association for Equal Opportunity in Higher Education.
- NCES. See U.S. Department of Education. National Center for Education Statistics.
- National Association for Equal Opportunity in Higher Education (NAFEO). 2003. From website (<http://www.nafeo.org/index8.html>).
- \_\_\_\_\_. 2000. *Historically Black Colleges and Universities: An Assessment of Networking and Connectivity*. Washington, DC: USDC, October.
- Oblinger, Diana G., Barone, Carole A., and Hawkins, Brian L. 2001. *Distributed Education and Its Challenges: An Overview*. Washington, DC: American Council on Education (ACE) and EDUCAUSE.
- O'Brien, Eileen M. and Catherine Zudak. 1998. "Minority-Serving Institutions: An Overview." In Jamie P. Merisotis and Colleen T. O'Brien, eds. *Minority-Serving Institutions: Distinct Purposes, Common Goals*. New Directions for Higher Education. No. 102. San Francisco: Jossey-Bass Publishers, pp. 5-15.
- O'Donnell, Michael et al. 2003. "Information Technology at Tribal Colleges and Universities: Moving Into the 21<sup>st</sup> Century." In Maenette Kape'ahiokalani Padeken Ah Nee-Benham and Wayne J. Stein, eds. *The Renaissance of American Indian Higher Education: Capturing the Dream*. Mahwah, NJ: Lawrence Erlbaum Associates, Inc, pp. 257-272.
- Phipps, Ronald and Wellman, Jane. 2001. "Funding the 'Infostructure': A Guide to Financing Technology Infrastructure in Higher Education." *New Agenda Series*. Vol. 3, No. 2 (April). Indianapolis, IN: Lumina Foundation for Education, Inc.
- Ramirez, Alex. 2003. "Impact and Future Plans for AN-MSI". Presentation at the HACU 17<sup>th</sup> Annual Conference, October 18-21, 2003.
- Rodriguez, Charles C.; Gonzalez, Rene A.; and Cano, Narciso. 1996. *Improving Utilization of the Information Highway by Hispanic-Serving Institutions*. Washington, DC: HACU, April.
- Staudt, Dave. 2001. "What is AN-MSI?" *EDUCAUSE Review*, Vol. 36, No. 1 (January/February), pp. 40.
- TRPI. See: The Tomás Rivera Policy Institute.
- The Children's Partnership. 2000. *Online Content for Low-Income and Underserved Americans: The Digital Divide's New Frontier*. Santa Monica, CA: The Children's Partnership, March.
- The Tomás Rivera Policy Institute (TRPI). 2002. *Latinos and Information Technology: The Promise and the Challenge*. Claremont, CA: TRPI, February.
- USDC. See: U.S. Department of Commerce.
- USDE. See: U.S. Department of Education.
- U.S. Bureau of the Census. 2002. "(NP-T4) Projections of the Total Resident Population by 5-Year Age Groups, Race, and Hispanic Origin with Special Age Categories: Middle Series, 1999 to 2100." Population Projections Branch, Population Division. From Census website (<http://www.census.gov/population/www/projections/natsum-T3.html>).
- U.S. Department of Commerce (USDC). Economics and Statistics Administration. National Telecommunications and Information Administration (NTIA). 2002. *A Nation Online: How American Are Expanding Their Use of the Internet*. Washington, DC: USDC, February.

\_\_\_\_\_. 1999. *Falling Through the Net: Defining the Digital Divide*. Washington, DC: USDC, July.

U.S. Department of Education. 2002. "Federal Pell Grant Program Current Authorization Report Award Year: 2001-2002."

U.S. Department of Education. National Center for Education Statistics (NCES). 2000. Integrated Postsecondary Education Data System (IPEDS). Finance Survey, Fiscal Year (FY) 2000.

\_\_\_\_\_. 2001a. Integrated Postsecondary Education Data System (IPEDS). Fall Enrollment Survey, Academic Year (AY) 2000-2001.

\_\_\_\_\_. 2001b. *Internet Access in U.S. Public Schools and Classrooms: 1994 – 2000*. Washington, DC: NCES, May.

U.S. General Accounting Office (GAO). 2003. *Distance Education: More Data Could Improve Education's Ability to Track Technology at Minority Serving Institutions*. Washington, DC: GAO, September.

# Appendix: Alliance survey

## STAFF AND SUPPORT

Does your campus share computing resources with any other campuses?

- a. Yes                      b. No                      c. Don't know

Is your campus part of a state network system?

- a. Yes                      b. No                      c. Don't know

Does your institution have a strategic plan that covers the application of information technology on your campus?

- a. Yes                      b. No                      c. In progress                      d. Don't know

Does your institution have a process for assessing the effectiveness of information technology application on your campus?

- a. Yes                      b. No                      c. In progress                      d. Don't know

Is there one individual at your institution who is responsible for all aspects of information technology (IT)?

- a. Yes                      b. No                      c. Don't know

If yes, his/her title is: \_\_\_\_\_

If yes, he/she reports to (title): \_\_\_\_\_

What is the total number of IT staff at your institution? \_\_\_\_\_

How many IT staff support students only? \_\_\_\_\_

How many IT staff support faculty only? \_\_\_\_\_

How many IT staff support both students and faculty? \_\_\_\_\_

What was the headcount enrollment on your campus in Fall 2001, as reported on the IPEDS Fall Enrollment Survey, 2001? \_\_\_\_\_

What was the total number of faculty on your campus in Fall 2001, as reported on the IPEDS Fall Staff Survey, 2001? \_\_\_\_\_

*Which of the following types of IT support are provided for students and faculty? Please answer by circling “Y” for yes, “N” for no, and “U” for unknown for each type of support.*

TYPE OF IT SUPPORT	STUDENTS			FACULTY		
	Y	N	U	Y	N	U
Computing center	Y	N	U	Y	N	U
Telephone help	Y	N	U	Y	N	U
Scheduled on-site assistance (personnel assigned to help with IT classes or equipment)	Y	N	U	Y	N	U
On-call on-site assistance	Y	N	U	Y	N	U
Person-to-person assistance via e-mail	Y	N	U	Y	N	U
Online tutorials and references	Y	N	U	Y	N	U
In-person training workshops	Y	N	U	Y	N	U
Other:	Y	N	U	Y	N	U
Other:	Y	N	U	Y	N	U
Other:	Y	N	U	Y	N	U

*Please use the following table to indicate the status of any Enterprise Resource Planning (ERP) applications on your campus? Please answer by circling “Y” for yes, “N” for no, and “U” for unknown for each type of application.*

TYPE OF ERP APPLICATION	IN OPERATION			IN PROCESS			YEAR ACQUIRED	SOFTWARE DEVELOPER
	Y	N	U	Y	N	U		
Financial management system	Y	N	U	Y	N	U	_____	_____
Student information system	Y	N	U	Y	N	U	_____	_____
Human resources system	Y	N	U	Y	N	U	_____	_____
Data warehouse	Y	N	U	Y	N	U	_____	_____
Enterprise document management system	Y	N	U	Y	N	U	_____	_____
Other:	Y	N	U	Y	N	U	_____	_____
Other:	Y	N	U	Y	N	U	_____	_____
Other:	Y	N	U	Y	N	U	_____	_____

## STUDENT REQUIREMENTS

Does your institution *require* undergraduate students to have their own computers?

- a. Yes                      b. No                      c. Don't know

If yes, in what academic year was this requirement initiated? \_\_\_\_\_

Does your institution *recommend* that undergraduate students have their own computers?

- a. Yes                      b. No                      c. Don't know

If yes, in what academic year was this recommendation initiated? \_\_\_\_\_

Does your institution provide financial assistance/incentives for students to acquire computers?

- a. Yes                      b. No                      c. Don't know

If yes, which of the following are available? *Circle all that apply.*

- a. Discounts              b. Financial aid              c. Free computers  
d. Computers for rent or check-out      e. Other, please specify \_\_\_\_\_

Does your institution provide orientation to campus computing resources for undergraduate students?

- a. Yes, required      b. Yes, voluntary      c. No      d. Don't know

Does your institution have any formal computer competency requirements for undergraduate students?

- a. Yes                      b. No                      c. Don't know

## GENERAL IT SERVICES

Does your institution have a campus-wide network?

- a. Yes                      b. No                      c. Don't know

If yes, what is the speed of the network? \_\_\_\_\_

What type of internet connectivity is used on your campus? \_\_\_\_\_

For which of the following groups does your institution provide on-campus internet access? *Circle all that apply.*

- a. Faculty                      b. Students                      c. Staff  
d. Alumni                      e. No one                      f. Don't know

For which of the following groups does your institution provide e-mail accounts? *Circle all that apply.*

- a. Faculty
- b. Students
- c. Staff
- d. Alumni
- e. No one
- f. Don't know

What is your *best estimate* of the percentage of student residence halls that are wired to allow students direct Internet access? If you have no basis for estimating, enter "U" for unknown.

\_\_\_\_\_ %

## DISTANCE EDUCATION

Can any *courses* be obtained at your institution *solely* via the Internet?

- a. Yes
- b. No
- c. Don't know

If yes, how many? \_\_\_\_\_

What is the total number of courses offered by your institution? \_\_\_\_\_

Can any *degrees* be obtained at your institution *solely* via the Internet?

- a. Yes
- b. No
- c. Don't know

If yes, how many? \_\_\_\_\_

What is the total number of courses offered by your institution? \_\_\_\_\_

## ADMISSIONS

Can prospective students apply to your institution online?

- a. Yes, it is required
- b. Yes, it is an option
- c. No
- d. Don't know

Can prospective students submit admissions questions online?

- a. Yes
- b. No
- c. Don't know

Is there a web page for prospective students on your institution's website?

- a. Yes
- b. No
- c. Don't know

How important is your website to your overall admissions strategy?

- 0
  - 1
  - 2
  - 3
  - 4
  - 5
- Not at All      Minimally      Somewhat      Very

**FACULTY USE OF IT**

What is your *best estimate* of the percentage of faculty who have networked computers in their offices? If you have no basis for estimating, enter “U” for unknown. \_\_\_\_\_%

What is your *best estimate* of the percentage of faculty who have at least one course web page? If you have no basis for estimating, enter “U” for unknown. \_\_\_\_\_ %

What is your *best estimate* of the percentage of faculty who have personal web pages? If you have no basis for estimating, enter “U” for unknown. \_\_\_\_\_ %

What is your *best estimate* of the percentage of departments that have web pages? If you have no basis for estimating, enter “U” for unknown. \_\_\_\_\_%

What is your *best estimate* of the percentage of faculty who use e-mail / Internet as part of their classes for each of the purposes listed in the table below? If you have no basis for estimating, enter “U” for unknown.

PURPOSE	OPTIONAL	REQUIRED
Access to Course Syllabi	_____ %	_____ %
Access to Course Notes	_____ %	_____ %
Access to Course Assignments	_____ %	_____ %
Submission of Completed Assignments	_____ %	_____ %
Access to Instructor for Questions	_____ %	_____ %
On-Line Discussion Groups	_____ %	_____ %

What is your *best estimate* of the percentage of faculty who teach at least one course *solely* via the Internet? If you have no basis for estimating, enter “U” for unknown. \_\_\_\_\_ %

## FACULTY TRAINING AND EVALUATION

Are there any formal incentive programs to encourage faculty to use technology in teaching and learning?

- a. Yes                      b. No                      c. Don't know

Which of the following types of training are available for faculty in using the Internet in their courses? Please answer by circling "Y" for yes, "N" for no, and "U" for unknown for each type of training.

TYPE OF TRAINING	OPTIONAL			REQUIRED		
Informal Training	Y	N	U	Y	N	U
Computer Based Training (CBTs) or Videos	Y	N	U	Y	N	U
Formal Training Workshops	Y	N	U	Y	N	U
Other:	Y	N	U	Y	N	U
Other:	Y	N	U	Y	N	U
Other:	Y	N	U	Y	N	U

Is the use of IT for teaching and learning purposes a component of faculty evaluations?

- a. Yes                      b. No                      c. Don't know

## STUDENTS AND STUDENT SERVICES

What is your *best estimate* of the percentage of students who have their own computers? If you have no basis for estimating, enter "U" for unknown. \_\_\_\_\_%

Which of the following services can students access online? Please answer by circling "Y" for yes, "N" for no, and "U" for unknown for each type of service.

SERVICE	OPTIONAL			REQUIRED		
Class Registration	Y	N	U	Y	N	U
Access to Grade Reports	Y	N	U	Y	N	U
Access to Financial Statements	Y	N	U	Y	N	U
Bill Payment	Y	N	U	Y	N	U
Advising: Information and Referrals	Y	N	U	Y	N	U
Other:	Y	N	U	Y	N	U
Other:	Y	N	U	Y	N	U
Other:	Y	N	U	Y	N	U

## LEARNING RESOURCES

Does your institution's library have a webpage?

- a. Yes                      b. No                      c. Don't know

Is your institution's library catalog available online?

- a. Yes                      b. No                      c. Don't know

Can students access library databases online?

- a. Yes                      b. No                      c. Don't know

If yes, what types of databases are available online? *Circle all that apply.*

- a. abstract databases      b. full-text databases      c. other \_\_\_\_\_

What is your *best estimate* of the percentage of students who use IT resources available at your institution's libraries and/or computer labs? If you have no basis for estimating, enter "U" for unknown. \_\_\_\_\_ %

What is your *best estimate* of the percentage of students who access IT resources remotely? If you have no basis for estimating, enter "U" for unknown. \_\_\_\_\_ %



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