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Trends in Cloud Computing in Higher Education

Colleges and universities are making their way into cloud computing—unevenly, but with a sense of inevitability.

eCampus News

How are higher education institutions using cloud computing? Which services and applications are most popular? How do institutions pay for cloud services? What benefits and challenges do technology decision-makers and purchasers see as they move to the cloud? What are their plans for the near future?

To answer these questions, *eCampus News* conducted an online survey of key technology decision-makers and purchasers in higher education institutions. The survey, sponsored by ViON Corporation, gathered information from people in leadership roles including chiefs, directors, and managers of information technology (IT), information systems (IS), and academic or educational technology.

Respondents came from public and private four-year liberal arts colleges, community or technical colleges, and research universities of all sizes:

- Small (under 2,500 students)
- Mid-sized (2,500 to 5,000 students)
- Large (5,000 to 10,000 students)
- Largest (over 10,000 students)

"Cloud computing is the direction IT is going in."
–Survey respondent

While respondents from all types and sizes of institutions showed some similarities in their perceptions of the cloud and cloud usage, there are some notable differences that are highlighted in the key findings.

88% of respondents rate their knowledge of cloud computing as high or moderate, including 27 percent who agree that "I'm among the cloud experts at my institution" and 61 percent who agree that "I know enough to have an intelligent conversation about cloud computing."

KEY FINDINGS

1. Software as a Service (SaaS) is by far the most commonly used cloud computing service in higher education. Almost eight in 10 respondents (79 percent) report that their institutions are using SaaS. That's about twice as many as the roughly four in 10 respondents (39 percent) who report that their institutions use Infrastructure as a Service (IaaS).

Communications as a Service (CaaS), cited by 22 percent of respondents, and Platform as a Service (PaaS), cited by 18 percent, are less commonly used, as shown in Figure 1.

Respondents from mid-sized institutions say that their institutions are significantly more likely not to use certain types of clouds than their colleagues from larger institutions. Twenty-three percent of respondents from mid-sized institutions report they do not use SaaS (compared to only 8 percent from the largest institutions), while 80 percent of respondents from mid-sized institutions say they do not use PaaS (compared to 45 percent of respondents from large institutions).

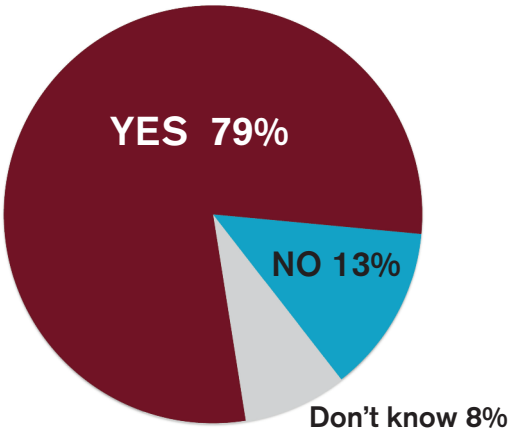
Defining Terms

Survey respondents were provided with these definitions about cloud computing services:

- **Software as a Service (SaaS)**—Software distribution model in which applications are hosted by a vendor or service provider and made available to customers over a network, typically the Internet.
- **Infrastructure as a Service (IaaS)**—Outsourcing the equipment used to support operations, including storage, hardware, servers, and networking components.
- **Communications as a Service (CaaS)**— CaaS builds on the basic foundation of Software as a Service (SaaS), with some requirements unique to communications applications including voice over IP (VoIP or Internet telephony), instant messaging (IM), collaboration and videoconference applications using fixed and mobile devices.
- **Platform as a Service (PaaS)**—A method for delivering operating systems and associated services over the Internet without downloads or installation.

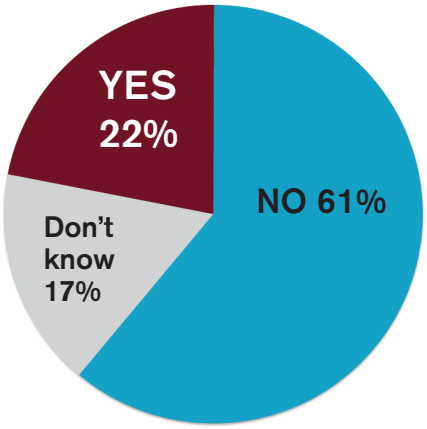
Figure 1. Most Higher Education Institutions Use SaaS

Software as a Service (SaaS)



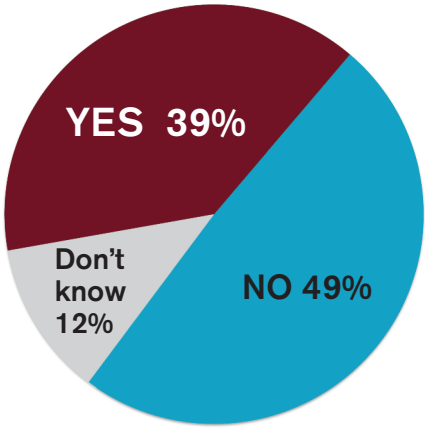
Q. Are you using Software as a Service (SaaS)?

Communications as a Service (CaaS)



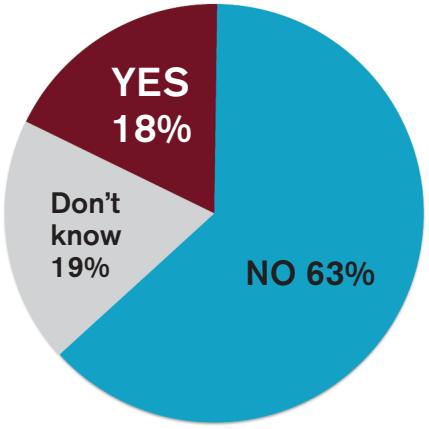
Q. Are you using Communications as a Service (CaaS)?

Infrastructure as a Service (IaaS)



Q. Are you using Infrastructure as a Service (IaaS)?

Platform as a Service (PaaS)



Q. Are you using Platform as a Service (PaaS)?

2. Higher education institutions are using the cloud to manage a wide range of technology, administrative, and educational systems, from nuts-and-bolts services to more innovative applications:

Software as a Service (SaaS). Email is the most popular software application in the cloud, cited by 66 percent of respondents who say their institutions use SaaS, followed by learning management systems and productivity tools, cited by 55 percent and 42 percent, respectively, as shown in Figure 2.

Figure 2. Top Three SaaS Applications

Email	66%
Learning management system	55%
Productivity tools	42%

Q. What applications do you use for SaaS? (Check all that apply.)

SaaS usage covers a variety of other applications as well, according to respondents who say their institutions use SaaS:

- Customer relations management (CRM) (27 percent)
- Human resource management (25 percent)
- Video management (23 percent)
- Content management (21 percent)
- Student information system (SIS) (20 percent)
- Curriculum applications (15 percent)
- Accounting tools (11 percent)
- Data management (11 percent)
- Research applications (10 percent)
- Management information systems (9 percent)

Four-year liberal arts colleges are significantly more likely to use cloud CRM applications than other institutions, with 37 percent of respondents whose institutions use SaaS citing CRM use, compared to 17 percent of these respondents from community or technical colleges and 13 percent from research universities. On the other hand, four-year liberal arts colleges are significantly less likely to use cloud management information systems, cited by only 2 percent of these respondents, than either research universities (17 percent) or community or technical colleges (14 percent).

Differences in SaaS usage show up as well between small institutions and the largest institutions, according to respondents in institutions that use SaaS. Small institutions are more likely to use a cloud student information system (SIS), with 39 percent of respondents reporting this use, compared to 16 percent in the largest institutions. Cloud-based video management is more prevalent in small institutions as well, with 39 percent of respondents citing this use, compared to 12 percent in the largest institutions. Conversely, respondents in the largest institutions report greater use than those in small institutions of cloud-based human resource management (by a margin of 35 percent to 10 percent) and management information systems (by a margin of 16 percent to 0 percent). All of these differences are statistically significant.

In open-ended comments, individual respondents also volunteered other applications their institutions have migrated to the cloud, including:

- IT service management (ITSM)
- Project, service, resource, finance, talent, scholarship, student event, and vehicle fleet management
- Document imaging, health center operation, bookstore operation, residential life system, career services, development, and foundation and planned giving

Infrastructure as a Service (IaaS). Respondents from institutions that use IaaS report that servers (66 percent) and data storage (63 percent) are the most popular services. Thirty-one percent of these respondents also report the use of cloud hardware services, as shown in Figure 3, while 18 percent say their institutions use cloud networking services.

In open-ended comments, one respondent noted the use of IaaS for disaster recovery (DR) services.

Figure 3. Top Three IaaS Services

Servers	66%
Data Storage	63%
Hardware	31%

Q. What applications do you use for IaaS? (Check all that apply.)

Communications as a Service (CaaS). Respondents from institutions that use CaaS report that web conferencing (65 percent) and collaboration tools (60 percent) are the most widely used communications applications in the cloud. Videoconferencing and social media tools, each cited by 49 percent of these respondents, and instant messaging, cited by 46 percent, are other communications applications rounding out the top five CaaS applications, as shown in Figure 4. Thirty-seven percent of respondents also say their institutions use VoIP/Internet telephony; 11 percent cited call center/tech support.

Figure 4. Top Five CaaS Applications

Web conferencing	65%
Collaboration tools	60%
Videoconferencing	49%
Social media tools	49%
Instant messaging	46%

Q. What applications do you use for CaaS? (Check all that apply.)

In open-ended comments, individual respondents noted that their institutions are using CaaS for emergency notification systems and as a mass communications tool (bulk emails and texts).

Platform as a Service (PaaS). By far, the operating system is the top feature that institutions using PaaS contract out to the cloud, cited by 70 percent of respondents from these institutions. Rounding out the top four applications are server software (cited by 48 percent of these respondents), storage (44 percent), and hosting (41 percent) as shown in Figure 5. About one-third of institutions that use PaaS are using it for database management (cited by 33 percent of these respondents), support (33 percent), and network access (30 percent), and about one-quarter use PaaS for server-side scripting environment (26 percent) and tools for design and development (26 percent).

Figure 5. Top Four PaaS Features

Operating system	70%
Server software	48%
Storage	44%
Hosting	41%

Q. What features do you use for IaaS? (Check all that apply.)

3. For every type of cloud computing in higher education, the dominant model is a private cloud funded by operating expenses. Most institutions prefer to keep their cloud applications, services, and equipment private, although the findings make clear that institutions also tend to use more than one type of cloud—private, public, and hybrid—for different services and applications. Few use community clouds. Table 1 shows the breakdowns in usage for each type of cloud, based on survey responses. Notably, about one in 10 respondents, on average, doesn't know what type of cloud their institutions use for cloud computing.

Table 1. Private Clouds Dominate for All Types of Cloud Computing

	SaaS	IaaS	CaaS	PaaS
Private	54%	46%	51%	58%
Public	38%	31%	34%	27%
Hybrid	15%	28%	23%	8%
Community	2%	3%	6%	4%
Don't know	8%	13%	11%	12%

According to survey respondents, most higher education institutions pay for cloud services, applications, and equipment out of operating expenses, not capital expenses, as shown in Table 2. In open-ended comments, a few respondents indicated that their institutions use both operating and capital expenses to pay for cloud computing. Notably, substantial percentages of respondents don't know how their institutions pay for cloud computing.

Table 2. Most Institutions Pay for Cloud Computing as an Operating Expense

	SaaS	IaaS	CaaS	PaaS
Operating expenses	76%	72%	63%	84%
Capital expenses	5%	9%	9%	8%
Don't know	19%	19%	29%	8%

4. Key technology decision-makers and purchasers in higher education see both benefits and challenges with cloud computing. Survey respondents cited the top two benefits of cloud computing as access of use (63 percent) and mobility (62 percent). At least half of respondents also reported that automatic updates and patch management, cost savings, and efficiencies of scale are benefits. The full list of potential benefits and responses is shown in Figure 6.

Figure 6. Benefits of Using the Cloud

Access of use	63%
Mobility	62%
Automatic updates and patch management	53%
Cost savings	52%
Efficiencies of scale	51%
Easier administration	43%
Collaboration	34%
Improved resource allocation	30%
Improved communication	16%
Compatibility	13%
Don't know	3%

Q. What are the benefits of using the cloud?

Respondents from community and technical colleges (66 percent) are more likely than those from four-year liberal arts colleges (42 percent) to report cost savings and improved resource allocation (41 percent to 23 percent) as benefits. Respondents from research universities are more likely than those from four-year colleges to report efficiencies of scale as a benefit, by a margin of 65 percent to 42 percent. All of these differences are statistically significant.

Respondents from small institutions (72 percent) are significantly more likely than those from the largest institutions (52 percent) to view mobility as a benefit of the cloud.

On the flip side, respondents reported plenty of challenges with cloud computing as well. Security tops the list, cited by 68 percent of all respondents, followed by data ownership (52 percent), limited customization (45 percent), and privacy (41 percent). At least one-third of respondents reported that governance, ease of switching vendors, offsite (offshore) data storage, contract issues, and compliance are challenges as well. The full list of potential challenges and responses in the survey are shown in Figure 7.

Figure 7. Security Is the Top Challenge with Cloud Computing

Security	68%
Data ownership	52%
Limited customization	45%
Privacy	41%
Governance	38%
Ease of switching vendors	37%
Offsite (offshore) data storage	37%
Contract issues	36%
Compliance	34%
Vendor service	27%
Connectivity	23%
Portability	16%
Upkeep	11%
Don't know	5%

Q. What are the challenges or problems with using cloud services?

When it comes to the challenges, differences emerge in the perceptions of respondents from community and technical colleges and those from four-year liberal arts colleges. Fifty percent of community and technical college respondents cite contract issues as a challenge, compared to 29 percent from liberal arts colleges. Forty-six percent of community and technical college respondents cite compliance as a challenge, compared to 35 percent from liberal arts colleges; and 18 percent of community and technical college respondents cite upkeep as a challenge, compared to 4 percent from liberal arts colleges. All of these differences are statistically significant.

Voices from the Field

Key Benefits of Cloud Computing

"Cloud computing makes it easier to start or try something without a large investment in infrastructure."

"The primary drivers of cloud computing for us are agility and flexibility."

"The three primary (current) benefits are scalability, price, and security."

"Cost assurance, secure management, reliability, service that cannot be provided in-house, compliance."

"One of the factors we are looking at is the lack of need to provide infrastructure for backup-related services for services we put in the cloud."

"Most cloud SaaS has been to improve the ability of our teams to use information from our SIS [student information system]. Most cloud IaaS has been to support research or to provide a sandbox for tech development."

Key Challenges of Cloud Computing

"Security in the fact that it's easy for constituents to use cloud services without the proper vetting of contracts, data ownership, etc."

"Concerns about compromising data or information shared in the cloud being shared or leaked."

"Your business processes are at the mercy of the vendor. Unless you have a very good lawyer to negotiate the SLA [service-level agreement] that places the financial penalties on the cloud vendor for your loss of business due to the defect of their product or lack of response—essentially make them feel your pain—there is no guarantee that they will be responsive to your business outages."

"Cost is a challenge. SaaS always costs more."

"Many times our vendors have outages—either planned or unplanned—without letting us know. Since many of our users have no idea that the software is cloud-based, or even what that means, it is hard to explain that we are at the mercy of our vendors and have no control over when issues will be resolved."

5. Looking ahead, many higher education institutions plan to increase their use of cloud computing services or applications—but budget is a limiting factor. A majority of survey respondents (63 percent) reported that their institutions plan to expand to new cloud computing services or applications over the next three years. Still, about one in five respondents (21 percent) said that their institutions plan to cut back on their cloud services—and individual respondents said they plan to bring some services back in-house.

Other institutional plans respondents report for the future:

- Moving to different services (45 percent)
- Making connectivity enhancements (33 percent); a number of individual respondents commented that they plan to increase bandwidth
- Changing how they budget (28 percent)

"We're seeking a 5–6 percent budget increase each year."
–Survey respondent

Budget is, in fact, the predominant limiting factor for higher education institutions for expanding their cloud services, according to 69 percent of respondents. Other limiting factors they cited:

- Internal expertise (33 percent)
- Compliance issues (28 percent)
- Vendors (25 percent)
- Resource allocation (20 percent)
- Timing (16 percent)
- Concerns about platform (19 percent)
- Pushback from stakeholders (16 percent)
- Bad experience with using cloud services (15 percent)

"We are using a 'cloud first' strategy—if it makes sense to move to the cloud, we are considering it for ERP [enterprise resource planning] and CaaS."
–Survey respondent

ABOUT THIS SURVEY

eCampus News deployed this online survey in March and April 2015 to 8,074 subscribers of *eCampus News* magazine and online newsletters, yielding 254 complete responses. All respondents are key technology decision-makers and purchasers in higher education institutions. The survey sample population by type and size of institution is shown in Table 3. The sample population is not necessarily representative of all higher education institutions. Not all findings are statistically significant. Where noted, statistically significant differences are reported at the 95 percent confidence level (p = .05).

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