Serving the iGeneration requires breaking down barriers between the physical campus and the virtual campus to create a fully digital learning environment without a distinction between face-to-face and online learning.

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1.0 Introduction

In the past twenty years, disruptive technologies have transformed many parts of the American economy. These shifts have, on balance, improved efficiency and expanded services while reducing overall costs. Today, advances in information and communication technology are changing how knowledge is delivered at colleges and universities throughout the United States. Institutions of higher learning are rethinking how they can deliver their curricula through the use of digital technology to reach more students, reduce costs, and improve effectiveness. Consistent with long established practice, efforts have focused on classroom technologies like adaptive leaning and Massive Open Online Courses (MOOCs) that retain the distinction between online and face-to-face programs.

Universities have organized the relationship between online and face-to-face learning in varied ways without any definitive, successful model emerging. NJIT’s vision of digital learning is one that transcends this distinction and is intended to recapture the pioneering lead NJIT had in the mid 1980s through the early 2000’s. The objective is that by 2020 all master’s degree programs and many undergraduate courses will be delivered by methods that end the distinction between face-to-face and online instruction. The physical classroom and the virtual classroom will converge, resulting in the anywhere classroom, where all students, regardless of physical location, participate in learning activities together.

2.0 An Overview of Digital Learning at NJIT

In the early days of online education, NJIT was a pioneer in developing the technology to support content delivery and an innovator in pedagogical approaches to digital learning. Today, an increasing number of undergraduate courses and complete master’s-level programs are delivered online, and many courses delivered on the university’s campus are also offered in a hybrid fashion, combining elements of face-to-face and online instruction. In developmental education, there has also been some use of adaptive learning technology, software which assesses a student’s knowledge base, customizes interactions, and tracks the learning trajectory. Other innovations in computerized learning and professional digital applications are also integrated into the curriculum of many departments. Nevertheless, NJIT has lost its leadership role in digital education due to factors ranging from internal competition for resources to lack of a coherent consensus vision. We can now change this environment at NJIT.

NJIT began offering computer-based or “e-learning” courses in the 1980s. The innovations of NJIT faculty paved the way for development of the Virtual Classroom. NJIT trademarked the term in 1989 although it is now used ubiquitously throughout higher education. Using the state-of-the-art technologies of the time, NJIT expanded digital learning from individual courses to full academic degrees delivered online. At the same time, the market was expanding for busy professionals who desired remote access to certificate and corporate training. NJIT faculty, mostly through grant-funded support, collaborated with the Office for Continuing and
Professional Education (CPE) to develop courses for graduate certificates and other initiatives. In particular, faculty partnered with CPE on global initiatives such as the “Africa Virtual University,” which provided undergraduate degrees, non-credit training and seminars, remedial instruction, and electronic library services to twenty-two African nations.

Throughout the 1990s, the NJIT digital enterprise was led by CPE. This unit’s management of recruitment, admissions, student services (including career counseling and financial aid), and exam proctoring, coupled with grant-funded support for faculty, constituted a framework for a niche digital learning enterprise at NJIT. The Oct. 17, 2006 issue of US News singled out NJIT’s online program as sixth in the nation based on enrollment among ABET-accredited engineering schools and fifth in the nation based on the age of the program. Courses typically incorporated online chat rooms for synchronous communication and discussion boards for asynchronous collaboration. Streaming video, audio and podcasts were also the norm.

By the early 2000s, grant funding began to diminish and university support for online learning declined. The organization proved inadequately structured for rapid, large-scale expansion, and NJIT found it increasingly difficult to support faculty in online course development and instructional design. As a result, the decision was made in 2007 to decentralize the management of online education at NJIT, and responsibility for online teaching and learning was distributed to individual academic departments. CPE has continued to serve in an advisory and support role, and the Division of Information Services and Technology (IST) provides, to the extent possible, digital technology for classroom instruction and workshops for professional development. As a result of IST support, the university has kept somewhat abreast of current trends in the delivery of online learning. NJIT has adopted an open source learning management system, Moodle, widely used to enhance face-to-face, hybrid, and online courses. IST also helps promote NJIT’s participation in the worldwide OpenCourseWare Consortium.

Six master’s degree programs are currently available to students in a fully online format, developed by the departments in which they reside: MS in Business and Information Systems; MS in Civil Engineering; MS in Emergency Management and Business Continuity; MS in Engineering Management, MS in Information Systems, and MS in Professional and Technical Communication.

Nevertheless, growth in the percentage of total online enrollment at NJIT has not matched the average growth at American universities. As the following chart shows, the percentage of online enrollment at NJIT has remained relatively stable, while the percentage of online enrollment in the United States as a whole has dramatically increased. Low enrollment challenges the sustainability of most existing online NJIT programs. At the existing levels, it is difficult to achieve the economies of scale necessary to make our on-line operations sustainable. In light of these facts, and the determination to regain the lead in digital learning, a new vision that encompasses and integrates new kinds of technology, pedagogy, assessment, allocation of resources, and organizational efficiency is required.
Although the growth of online learning at NJIT has not kept pace with the national average, the use of digital technology in pedagogy has continued to increase, albeit without a coherent vision or goal. In fact, most face-to-face courses now use Moodle to some degree, and a growing number are totally online or hybrid in nature with face-to-face meetings augmented or partially replaced by digital interaction.

Experimentation is taking place across the campus. Demonstration “smart classrooms” equipped with the latest technology have been developed and iteratively revised to facilitate novel teaching methods. In developmental education, adaptive learning technology has been used innovatively to address the needs of underprepared entering students and this effort continues to expand. Increasingly, courses also use paid or open source online materials in place of traditional textbooks or physical library materials. Plans also exist for the expanded use of cloud computing which will give students wireless access to digital resources anywhere on campus and on any device.

In light of these facts, and the determination to regain a leadership position in digital learning, a new vision that encompasses and integrates new kinds of technology, pedagogy, assessment, allocation of resources, and organizational efficiency is required.

### 3.0 Online Learning: A Review of Current Nation-Wide Practices

As online education has expanded, most universities in the United States have adopted one of three basic organizational models for the delivery of digital learning:
Autonomous For-profit: An external unit operates under the umbrella of the brick and mortar institution but outside of university policies, procedures, and administration. It might, for example, negotiate different employee contracts, maintain different academic standards, and set its own tuition levels.

Auxiliary: A distinct online unit operates within the institution and abides by university policies and procedures. The unit administers online programs while sharing resources with academic units.

Integrated: Online courses and programs are developed and delivered within the same departments as face-to-face courses and programs; delivery modes are clearly distinguished. Under this model resources and revenue are accounted for through the academic unit.

The first model, autonomous for-profit, has typically been associated with access and convenience of implementation. This model employs outside contractors. With limited online experience, tight financial resources, and limited support for marketing, many institutions find themselves without a viable alternative. Forming partnerships with private companies that are commonly referred to as bundled service providers, results in tuition revenue sharing and the outsourcing of course development, platform IT needs, marketing, and student recruitment.

There is a concern that autonomous units may promote access to online education at the cost of quality, particularly in cases where there is no incentive to comply with established university standards and procedures. When direct access to university faculty is limited, maximizing the number of students served instead of ensuring academic excellence becomes the priority.

The integrated model, in contrast, operates fully within academic departments with policies that may not adequately support online programs. Academic departments could lack the incentive to advocate for online programs that might directly compete for resources and students with established face-to-face versions. While leadership by academic departments and the application of university standards and procedures can provide higher quality of online education, competition with face-to-face courses and programs could impede the growth in online course enrollment.

The auxiliary model, on the other hand, offers a compromise between the autonomous and integrated models by establishing an independent online unit within the university’s organizational structure. The online unit brings specialized skills in technology, marketing, and recruitment, while the professional faculty provides academic expertise. Although appealing in principle, this model creates a tension between the online unit and the academic departments over issues related to, among other things, resource allocation.

With these and other problems inherent in the three standard models for online education, a new and different vision is needed.

4.0 NJIT’s Current Response to the Online Education Market
To remain competitive, NJIT must dramatically increase its online offerings. More than that, the university should work to reclaim its leadership in digital learning. The need to enhance our online footprint has been acknowledged for several years, but sufficient effort and investment has not been made. In 2010, the university, following a version of the autonomous model, contracted with a for-profit external partner, Embanet-Compass (EC) to help remedy our lack of capacity in the field of digital learning.

By the terms of the agreement, EC manages the marketing, recruitment and retention strategies for a fully online Master’s of Science in Civil Engineering (MSCE). The existing MSCE program already has some online content, and NJIT instructional designers and EC staff are jointly managing the conversion of additional content to a digital platform.

In December 2012, NJIT and EC expanded their relationship by agreeing to convert three additional master’s degrees with fully online course offerings beginning in Fall 2013. These include Electrical Engineering, Computer Science, and Business Administration. According to the new agreement, and distinctive from the pilot partnership with Civil Engineering, course conversion is managed by EC instructional designers, working with NJIT faculty.

In January 2013, Embanet-Compass (EC) became Pearson Embanet (PE), and the 2012 contract continues the commitment made with EC. Over the life of the new seven-year agreement, NJIT and Pearson Embanet will develop nine fully online master’s degrees. PE projects that by 2020, these nine programs will increase the total NJIT enrollment by 1000 students.

5.0 Challenges and Opportunities for Digital Learning at NJIT

While partnering with for-profit companies offers NJIT the opportunity to expand its online presence, the university must carefully consider the challenges such arrangements pose to innovation. The digital revolution in higher education has only begun and commitment to a long-term contract, whereby an autonomous organization contributes to curriculum delivery, may dampen faculty motivation to contribute their innovative ideas for digital learning. Fundamentally, both the autonomous and auxiliary models emphasize a distinction between face-to-face and online education, a distinction that the convergence vision of this document seeks to eliminate.

Recognizing that the online learning market is an area of rapid growth and is increasingly important in higher education, NJIT’s Academic Plan 2013-2015 underscores the need for investment in the NJIT digital enterprise, bringing digital learning from the periphery to the mainstream. The vision for NJIT is not just an expanded online learning program; it sees the boundary between online and face-to-face courses and degree programs completely dissolving.

6.0 Vision for 2020: Convergence

Because of our history and aspirations, NJIT’s educational vision for 2020 should transcend any of the three standard models to prepare the university for a better future by using an approach that has not been tried before. The vision is for the physical classroom and the virtual classroom will asymptotically converge.
The objective of this new model is for NJIT to achieve functional convergence of the physical and virtual campus, with no functional distinction between face-to-face and online courses. Both modalities will operate synergistically in an *anywhere* classroom. A student will have the opportunity to transparently engage in a course either remotely or in a classroom environment, with both modalities occurring in the same course section. Because of individual circumstances, one mode may have advantages for a given student at a given time, but the tools and venues open to all students are expected to provide equivalent outcomes. Academic standards will be consistent because course content and learning outcomes will stand independent of delivery mode.

Imagine a class where all students register in the same way whether they want to attend by coming to the classroom, logging into the class from their dorms or nearby apartments, or joining the class from another state or country. Admission, registration procedures, and costs are the same regardless of the location from which they attend the class. Those in the classroom experience the delivery of the course content as they would in a traditional class—except they are joined via synchronous streaming by other students who are taking the course from a distance, anywhere in the world. These remote students are held to the same standards for academic excellence as their classmates on campus: they engage in the same discussions, do the same homework, and take the same exams. The classroom is brought to the remote learner in real time, and he or she participates in the class in the same way as those physically present.

Rather than continuing the distinction between face-to-face and online courses within academic programs, NJIT will break down the divide and bring them together using new technology and transforming pedagogy. This will enable NJIT to reclaim the leadership in digital learning that it once held.

### 7.0 Offline Digital Learning

While this document envisions the convergence of face-to-face and online education at NJIT, the use of modern digital technology in the curricula of all programs is of equal importance. Even for those programs of study where the *anywhere* classroom may be found to be inappropriate, innovative use of the latest computer-assisted learning is necessary.
Some examples of offline digital learning include Computer Assisted Design technology in programs of the College of Architecture and Design; Adaptive Learning software in mathematics, chemistry, and other areas; computer scoring of essays and other written forms; automated grading of exams; and the asynchronous class management in all classes with platforms such as Moodle. The conversation which this document intends to initiate must consider both online and offline technology that will catapult the quality and effectiveness of learning at NJIT into the generation.

8.0 Conclusion

The proposed convergence of the physical campus and the virtual campus is the logical consequence of the technological transformation in higher education that is taking place now.

True innovation does not come without risk, and every step toward the vision must have delineated goals and clear performance measures. NJIT pioneered the Virtual Classroom almost a quarter century ago because there was a vision that was invested in and made reality. Today we have a new vision with the anywhere classroom, where the best pedagogy and technology will effectively converge delivery of face-to-face and online learning. If we choose, we can act upon it, invest in it, and reclaim the mantle of leadership in innovative learning that we lost along the way.

The 2013-2015 Academic Plan stated that we should become leaders in digital education. This document outlines what we need to do to achieve this. We must challenge ourselves so that, by the end of the next strategic planning cycle in 2020, the proposed convergence will position NJIT as one of the global academic leaders of the 21st century in science and technology.