Utah's Response to Disruptive Innovation

Utah's Response to Disruptive Innovation

Executive Summary

America's institutions of public higher education find themselves at another crossroads. While continuing to offer globally recognized learning opportunities, they once again find themselves under attack on a variety of fronts and from a variety of parties. And the fact is, while the higher education community does many things remarkably well, there are legitimate areas of concern and obvious areas in need of improvement in America's higher education system.

This paper outlines some of the current challenges present in higher education, and then studies them within the environmental framework of disruptive innovation, as outlined by Harvard Business School professor Clayton Christensen. The disruptive innovation model speaks to disruption within industries, as a result of the application of new technologies and new service providers.

The paper next reviews the technology hype cycle, and explains its potential applicability to the commonly held view that the answer for public universities is to rather simplistically apply more technology to assist students in achieving desired learning outcomes. This discussion is followed by a review of more meaningful and in-depth applications of technology in higher education; the paper looks at teaching and learning models focused on learning outcomes, and how technology might be applied to the enterprise in ways that more fundamentally and effectively change the existing paradigms.

Examples of the application of technology currently taking place in the learning environment with the Utah System of Higher Education (USHE) and its member institutions are next provided.

The paper concludes with the thought that USHE's efforts to achieve the Big Goal of 66% of Utahans possessing a postsecondary certificate or degree by 2020 will, in fact, require the application of technology in the learning environment in new and meaningful ways. This is exactly what is currently happening across the USHE institutions; significant innovations are resulting in quality improvements to learning outcomes, even as the more simplistic cost efficiencies are of necessity being implemented. Continuing work in effectively applying technology is clearly called for, and the USHE will answer the call as it strives to continue its leadership role in innovatively meeting the demands placed upon higher education going forward.

Utah's Response to Disruptive Innovation

Dorothy, we are not in Kansas anymore!

These days, the headlines for public higher education are troubling at best:
- Tuition increases are over three times the rate of inflation; an attempt to partially offset declining appropriations support from state legislatures.
- Student debt and defaults are increasing at alarming rates as students bear the cost for a greater share of their education and employment opportunities are diminished in a challenging economy.
- Private financial support is more difficult to garner, the result of both reduced donations to higher education and diminished investment returns on endowment funds.
- Federal support for research is declining with no turnaround in site.
- Fewer low income and first generation students are able to attend college, and numerous opinion leaders are even questioning the value of a college education, despite conclusive economic data to the contrary.
- Completion rates for students are declining, as the cost of affording an education requires ever more time devoted to employment for the typical college student.
- Significant numbers of new for-profit competitors have emerged, offering students new options for educational attainment that compete with traditional institutions across the most popular and cost-effective course offerings.
- Increasingly, for-profit competitors are securing the same accreditation as public institutions, largely because they are providing data about their students' learning attainment.

As if all of these trends were not disruptive enough, for-profit providers of higher education degrees are offering degree programs that, at times, are less expensive, more convenient, and promise accelerated paths to completion. While the completion rates of these institutions are, in general, even lower than those for state-supported higher education institutions, students do complete. Those students then enter the marketplace and compete for jobs along with graduates of more traditional institutional programs. All of this results in a growing public outcry for measurable improvements in public higher education institutions and systems. In short, higher education has challenges as never before in its history. For some, the disruptive innovations of the various technologies appear to provide the simple "answer" to having more students succeed in college and complete degrees.

Disruptive Innovation

Disruptive innovation is nothing new to the larger marketplace. Renowned Harvard Business School professor, Clayton Christensen, has written about disruptive innovation for nearly 20 years, researching and explaining how market disruptions occur in virtually every market. The basic idea is that new entrants into a market focus attention on either the underserved or over-served customers. In both cases, existing products and services cost more than underserved or over-served customers are willing or able to pay. By focusing on these two customer groups, innovative firms are able to introduce a new product or service at a much lower price point. Often these new products or services are initially of much lower quality than those already in existence but of sufficient quality at the low price to attract some consumers.

Because the underserved or over-served customers provide little or no profit margin for established providers, the established providers are delighted to have others serve these "low profit" customers. Meanwhile, the established organizations continue to focus on more profitable products and customers. The problem is that, over time, the new providers develop ever better quality products that increasingly satisfy the profitable customer base. Established organizations ultimately find themselves fighting to keep their few remaining customers; while now at a significant disadvantage from a product cost perspective.

Recently, Clayton Christensen has teamed with Henry Eyring to look at disruptive innovation in the higher education marketplace. In their book, *The Innovative University*, Christensen and Eyring argue that new, for-profit universities are threatening to disrupt the traditional university market by offering degree programs at substantially lower costs and with greater convenience to the learner. These universities have focused initially on the underserved or over-served working adult market that tends to be less well served by traditional education. A traditional university experience (with student activities and services focused on young adults' needs, inflexible scheduling designed for the resident, full-time student, etc.) is different from what working adults need or desire. For-profit universities have developed offerings for an increasingly larger body of customers and are beginning to encroach on the traditional student customer base of public universities – the young adult, full-time student.

Moving forward in the midst of this increasingly disruptive setting, what steps are the Utah System of Higher Education (USHE) and its member institutions taking to embrace a changed and changing environment? What steps are they taking to compete and/or collaborate successfully with new providers of higher education? How are they evolving technologically to best serve the State and its citizens?

Before tackling these important questions, however, the following provides a framework for thinking about the use of technology for innovation in the higher education setting.

Technology Hype Cycle

Because Christensen and Eyring point to examples of disruption by new, for-profit universities providing lower-cost, online degrees, **some believe that the answer for public institutions is to simply use more technology to assist students in achieving the desired learning outcomes.** As a result, an increasing number of legislators, parents, and students are calling for universities to provide electronic classrooms, video recordings of online lectures, electronic textbooks, automated work processes, decreased time on campus for coursework completion, etc.; as a means for more effective, or at least, more efficient delivery of educational offerings. Oftentimes, the focus is on the adoption of what appears to be a "quick fix" technology…and not on the impact on learning that can or should result from a more deliberate application of technology.

Since the advent of modern information technology there has been plenty of hype about the impending impact of technology on every industry. If one fact has been proven over and over again it is that **initial predictions about the impact of technology are both over- and under-stated**. The tendency is for organizations to quickly adopt technologies and their perceived applications without consideration for the goals to be achieved. In fact, Gartner Research, the world's largest information technology

research and advisory firm, has a formalized conceptualization of the technology "hype cycle." It describes the tendency to accept a technology because it is "in," become disillusioned with the technology when it does not provide "the answer" to a particular problem, but to eventually shape and adopt the technology over time as the technology matures and successful applications are developed. See **Appendix A** for a full description of the technology "hype cycle" model.

What is true for other industries is true for higher education – there is a sizeable gap between the hype of technology's impact and reality. The gap between the hype and reality is that organizations must figure out how people, processes, and technology work together before the technology matures to be productive. This maturing process cannot be rushed or ignored. However, given that the impact of technology on higher education has been in play for decades, it should not be surprising that evidence of its significant impact is now emerging, primarily because of the disruption in the business model of higher education. New entrants to the higher education market are using technologies to change the core of the higher education business model.

Increasing Impact of Technology on Learning?

Given all the work to apply technology to learning there is a substantial body of literature reporting on the results of such efforts. Two conclusions are reported in a 2009 meta-analysis of research on on-line learning[1] with respect to the use of technology for teaching and learning:

1. In the studies reviewed, **students performed BEST in instruction that is a mix of online and face-to-face (hybrid instruction)** than in purely online or purely classroom learning experiences.

2. No one has the future of higher education and technology completely figured out, but a growing number of higher education institutions (both for profit and not-for-profit) continue to try new approaches to teaching and learning and are providing increasingly reliable data to support their claims of success.

Nonetheless, there is need to do additional study because **the reasons why some uses of technology work and others do not are not known**. The effectiveness of on-line learning for various individual student learning styles and for the types of desired learning outcomes are confounding factors as well. Writing about the recent Higher Ed Tech Summit held *in* conjunction with the Consumer Electronics Show in Las Vegas, Josh Fischman writes:

> During the rest of the day, technology executives described programs that could improve graduation rates and learning, but won't be able to do so for several years. They collect many points of data on what professors and students

As with all other industries, simply using technology to automate current paradigms . . . does not result in significant improvements in quality, timeliness, and cost.

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[1] *Evaluation of Evidence-Based Practices in Online Learning: A Meta-Analysis and Review of Online Learning Studies* by the US Department of Education - *see* http://www.distance-education.org/Articles/Online-Education--Better-Than-Traditional-School--194.html.

do, but can't yet say what results in better grades and graduation rates. "We're beginning to get lots of data on things like time on task, but we don't have the outcomes yet to say what leads to a true learning moment. I think we are three to five years away from being about to do that," said Troy Williams, vice president and general manager of Macmillan New Ventures, which makes the classroom polling system called I-clicker. "These are really early days," agreed Matthew Pittinsky, who runs a digital transcript company called Parchment and was one of the founders of Blackboard (http://chronicle.com/blogs/wiredcampus/technology-at-least-3-years-away-from-improving-student-success/34941).

Not surprisingly, as researchers behind the previously cited meta-analysis tried to identify the reasons for the findings in the studies they examined, they noted the following:

- **Learning time** - The studies suggested that online mediums allowed more time for learning than the traditional classroom. In a brick-and-mortar school environment, students are in the classroom for only a set amount of time. The amount of study using texts and other traditional materials outside the classroom (time that is necessary to really grasp the concepts and achieve the learning outcomes) has been decreasing. In an online educational program, students can watch video lectures multiple times and spend as much time as they need, participating in online interactive learning programs.
- **Individualized instruction** - There were few studies that looked at online learning programs that automatically adjusted to take into account the learner's performance, questions or other needs. Those that did, however, found very positive results in comparison to traditional instructional approaches. In a classroom setting, it's much more difficult for a teacher to individualize instruction.
- **Opportunities for collaboration** - In the studies, collaboration with other students produced better results—in both traditional and online classrooms.
- **Opportunities for reflection** - Learning mechanisms that, at the end of a learning module, prompt students to reflect on what they've learned produce good results. These reflection mechanisms include automatic "self-assessment" questions asking students to think about what they learned, their own learning methods and their performance in class.

All of this argues the need for colleges and universities to focus squarely on *learning* and on the strategies (including but not limited to technology) that enhance student learning. Rather than the application of technology being the core focus, technology becomes a tool, a means to an end that requires careful thought about how it is applied to achieve the greatest effects on learning outcomes. With that in mind, the teaching and learning model presented in *Appendix B* provides a guide to the application of technology that focuses on learning and is worth consideration.

Learning as the Core

At the core of the higher education enterprise is learning. Assessments of the value of higher education focus on imprecise "proxies" for learning: enrollments, retention of students from the first to second year of college, and degree completion. While these are important measures to track in seeing just how well higher education is doing, they are meaningless measures if students are merely "checking off the requirements" of a higher education degree and not learning the key skills and abilities needed to make them better contributors to society – as individuals, family members, community members, and, for many, workers. What society needs, and employers demand are the "essential learning outcomes" shown in Figure 1 below.

Percentage of Employers Who Want Colleges to "Place More Emphasis" on Essential Learning Outcomes

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

✷ Knowledge of Human Cultures and the Physical and Natural World

• Science and technology	70%
• Global issues	67%*
• The role of the United States in the world	57%
• Cultural diversity in the United States and other countries	57%
• Civic knowledge, participation, and engagement	52%*

✷ Intellectual and Practical Skills

• Written and oral communication	89%
• Critical thinking and analytic reasoning	81%
• Complex problem solving	75%
• Teamwork skills in diverse groups	71%*
• Creativity and innovation	70%
• Information literacy	68%
• Quantitative reasoning	63%

✷ Personal and Social Responsibility

• Ethical decision making	75%
• Intercultural competence (teamwork in diverse groups)	71%*
• Intercultural knowledge (global issues)	67%*
• Civic knowledge, participation, and engagement	52%*

✷ Integrative and Applied Learning

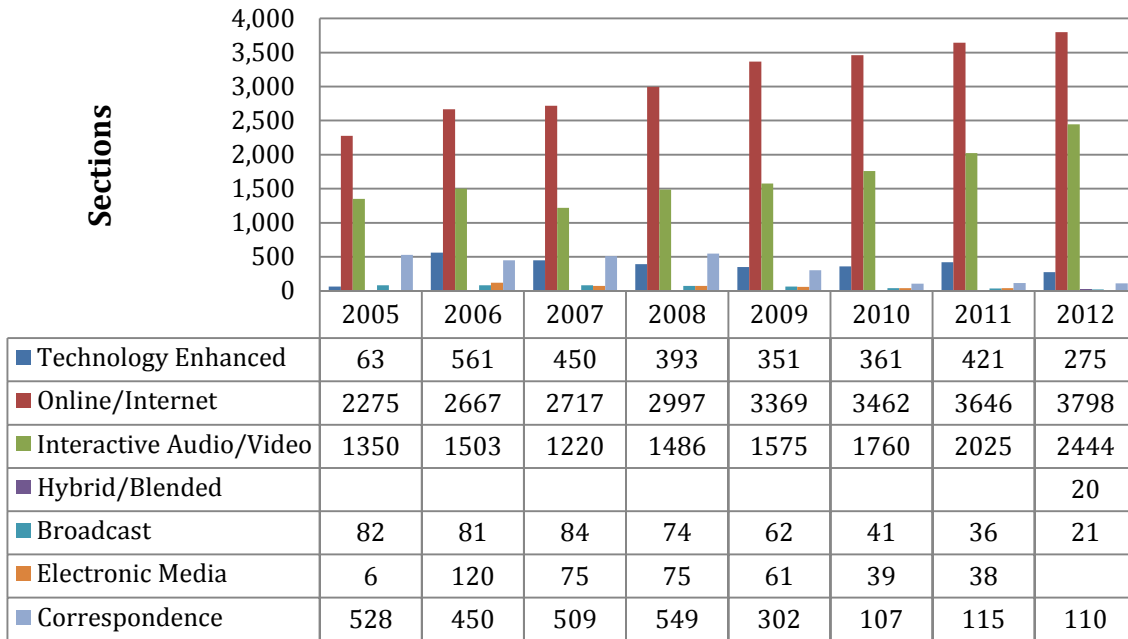|	
• Applied knowledge in real-world settings	79%

Progress on Technology-delivered Instruction and Technology-enhanced Learning

As the best applications of technology for learning are discovered and applied, the USHE institutions have seen a steady increase in the amount of online and distance-delivered sections offered. The following chart displays the progress.

Distance Education & Technology Delivery Course

	2005	2006	2007	2008	2009	2010	2011	2012
■ Technology Enhanced	63	561	450	393	351	361	421	275
■ Online/Internet	2275	2667	2717	2997	3369	3462	3646	3798
■ Interactive Audio/Video	1350	1503	1220	1486	1575	1760	2025	2444
■ Hybrid/Blended								20
■ Broadcast	82	81	84	74	62	41	36	21
■ Electronic Media	6	120	75	75	61	39	38	
■ Correspondence	528	450	509	549	302	107	115	110

Innovation in Utah Higher Education: Teaching and Learning

The following are some selected examples of innovations in Utah higher education that show how technology is being used in the USHE institutions to improve learning. A complete list is contained in **Appendix C**.

Weber State University's Developmental Mathematics Program

Weber State University was an early innovator in using the "Emporium" model for developmental mathematics. In the wake of national and Weber's early successes with student learning in mathematics using this model, other USHE institutions are adopting the model as well. The result? Students can use the successful hybrid model, combining online and face-to-face instruction targeted to their learning needs, for accelerating mathematics learning. Effectiveness. Weber State University, along with other colleges and universities across the United States, teach developmental math in this format because the results show that students experience:

1. higher course pass rates

2. higher levels of math learning
3. increased math confidence and enjoyment
4. decreased math anxiety and frustration
5. ability to work ahead and complete more than one course each semester
6. reduced time to earn a college degree

Hybrid Course Development at Utah Valley University

UVU has launched the Hybrid Teaching Initiative (HTI) for faculty. Hybrids transform one or more face-to-face sessions from a regular classroom instruction into online experiences, reducing physical seat time without diminishing educational outcomes. HTI consists of 12 hours of training that covers a wide range of topics, from objectives to innovative technology use. Since its inception, the HTI initiative has assisted in the development of roughly 30 courses, including topics such as English and Accounting.

Utah State University: Regional Degree Programs

Presently, USU has 72 complete degree programs offered via regional campuses and distance education efforts. This significant achievement could not be accomplished without technology being applied by creative and innovative faculty and administrators. The current offerings are only a beginning. Of course, geographic and demographic reach is a goal of this initiative; but it has required USU to change teaching methods in very fundamental ways in order to be effective in this initiative. Enrollments at USU regional campuses continue to rise as students discover the programs they need are offered in a format and location that meets their needs.

Dixie State College: A Technology-based Portal for High Quality Instruction from Top Institutions

In the last few years, Dixie State College of Utah (DSC) has handled some of the need for upper division (major) courses for students in its baccalaureate offerings by partnering with the University of Utah in a technology-based initiative. University of Utah faculty teach courses on the main campus in Salt Lake City that gather DSC students into the virtual classroom through the use of interactive video and online coursework. By combining the DSC and U of U students in a single learning situation, the expertise of the U of U faculty reaches more students. DSC and the U of U more effectively deploy faculty resources (reduced faculty cost for DSC because they do not have to hire a full-time faculty member to teach the smaller number of students in upper division courses and reduced per-student costs for the U of U through larger enrollments for more specialized courses) with this use of technology. The next step for DSC is to expand this model through partnerships for upper division course offerings from the top institutions in the United States and abroad in the four-year programs most needed by their students. DSC will become a "broker" and a "portal" to high quality learning experiences from other providers.

USHE System-wide Initiative En"TICE'ing: Technology-Intensive Concurrent Enrollment (TICE)

One of the most exciting cross-system and K-16 initiatives is the development of technology-intensive concurrent enrollment courses. Utilizing the best practices from instructional design and learning studies, the Utah System of Higher Education (USHE) faculty from all campuses and experts from the Utah State Office of Education are creating six new technology-intensive (hybrid) concurrent enrollment (TICE) courses that institutions can use in partnership with Utah school districts for offering college-level courses to students throughout the state.

All of the courses satisfy General Education requirements (or prerequisites) at Utah colleges and universities, and thereby accelerate students' progress to graduation.

With the support of the state, the USHE can create 18 TICE courses over a three-year period to create a complete set of high-quality General Education courses that high-achieving high school students can take in order to prepare themselves to transition to college and earn their degrees.

Technology Innovations in Higher Education: Operations Applications

This paper focuses on technology that contributes directly to teaching and learning, but there are many business and operations applications of technology that higher education institutions have employed to become more efficient and effective.   For a very brief listing, see *Appendix D.*

Change Management Paradigm

In his timeless book *The Prince*, Machiavelli writes:

It must be considered that there is nothing more difficult to carry out, nor more doubtful of success, nor more dangerous to handle than to initiate a new order of things. For the reformer has enemies in all those who profit by the old order, and only lukewarm defenders by all those who could profit by the new order. This lukewarmness arises partly from fear of their adversaries who have the laws in their favor, and partly from the incredulity of mankind who do not truly believe in anything new until they have had actual experience with it.

The use of technology to change the nature of any kind of work requires the careful coordination of process, people, and technology. Rarely is the relationship of the three in a new application optimized in the initial effort. Often it requires several iterations over an extended period of time. Particularly problematic in optimizing the relationship of the three components is the issue of changing peoples' *behavior.*

Frequently those sponsoring innovative uses of technology either ignore the issue of people by assuming the use of technology will eliminate the role of people entirely, or assuming that with the right incentive people will certainly change their behavior, or by assuming that they can simply tell people to change through some form of coercion. Such assumptions have been proven wrong time and time again over the years. Without an adequate framework for dealing with change, organizations - including institutions of higher education - will spend significant time, effort, and money on new

technologies and not realize the potential benefit because the needed behavior change on the part of individuals does not occur.

Fortunately, we have, in the State of Utah a team that has become the leader in helping develop influence strategies that are shown to realize significant changes in individual behavior. (See *Appendix E* for a brief summary of the change model that shows chances for success dramatically influenced by the ability to combine sources of influence across domains.)

When organizations are careful to not fall prey to the hype cycle of technology, when the focus is on a holistic view of the learning process, and when a proven model of changing human behavior is used, then the likelihood of successful technology-enabled solutions is greatly increased.

Conclusion

Christensen and Eyring suggest:
> Most university communities will need to go further, asking fundamental questions about what they can do well and abandoning much of what they have undertaken in a spirit of emulation. Those that continue to imperfectly imitate Harvard's strategy will find their costs increasing and their market share shrinking, whether they accept the metaphor of a higher education marketplace or not.
>
> On the other hand, those university communities that commit to real innovation, to changing their DNA from the inside out, may find extraordinary rewards. The key is to understand and build upon past achievements while being forward-looking. Lawrence Lowell spoke of looking fifty years into the future as he led Harvard. The universities that survive today's disruptive challenges will be those that recognize and honor their strengths while innovating with optimism.

This is exactly what is happening across Utah's institutions of higher education. There are significant innovations that are resulting in improvements in the quality and timeliness of higher education, even as cost efficiencies are being implemented. Clearly there is more work to do, but significant progress is being made across the system.

The significant contributions of the Utah System of Higher Education in "changing their DNA" and driving forward toward the "Big Goal" of having 66% of Utahns with a postsecondary certificate or degree are as follows:

- **Identifying standards for learning**
- **Working collaboratively to maximize the "reach" of projects and the number of students served**
- **Focusing on quality delivery systems that are current, reliable and sustainable**

- **Maximizing advising and transferability so that students take the shortest route to their academic goals**
- **Keeping the end goal in mind: student success in achieving his/her educational goals**
- **Connecting student academic goals to the needs of the state**

In his 1869 inaugural address, Charles Eliot, Harvard University's new president, suggested that he would have jumped at the opportunity to use new technology:

> The revolutions accomplished in other fields have a lesson for teachers…In education, there is a great hungry multitude to be fed. [I]t is for this American generation to invent, or to accept from abroad, better tools than the old; to devise or transplant…prompter and more comprehensive means than the prevailing, and to command more intelligent labor, in order to gather rapidly and surely the best fruit…and have time for other harvests.

This is as true today in the 21st century as it was in the 19th century. There is a great hungry multitude to be fed. The need for a more intelligent populace is even more acute and the consequences of not addressing the need, that much more significant. Utah is aggressively leading out in innovation to increase the number of learners served, at higher quality, and at lower costs.
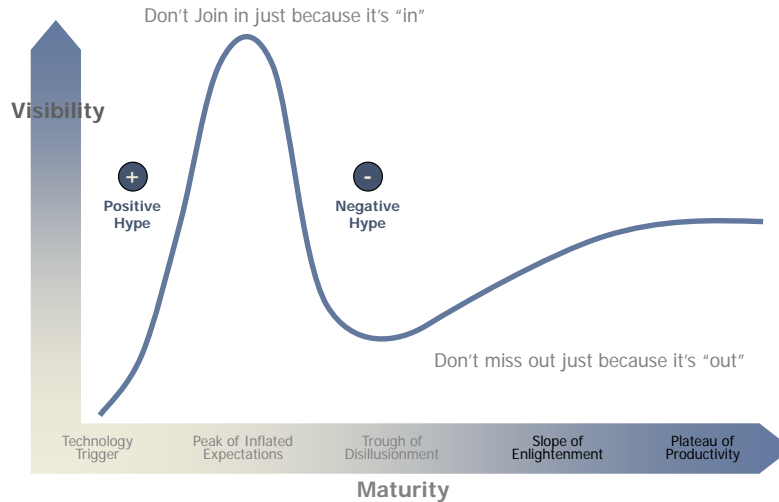
While the higher education industry has at times been maligned for being unresponsive to market pressures and with people, on occasion, joking that progress in academe is measured in glacial periods, higher education has, nonetheless, been more resilient than any other industry (individually and collectively) in the history of the world. This is not at all to argue that real change is unnecessary. Rather, it underscores the importance of the work and that is being done right now. As *BYU Education Week* noted in 1992, "…those of us who have spent much of our lives involved with traditional education regard it as one of mankind's most useful, productive, and cost-beneficial enterprises"[2] There is much being done right in Utah's system of higher education and much still to do. The great minds within the Utah System of Higher Education are being applied to the task and the important work already underway will continue to advance and benefit student learning.

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[2] Maxwell, Neal A. *BYU Education Week*,18 August 1992,).

Technology Hype Cycle

Don't Join in just because it's "in"

Visibility

+
Positive Hype

-
Negative Hype

Don't miss out just because it's "out"

| Technology Trigger | Peak of Inflated Expectations | Trough of Disillusionment | Slope of Enlightenment | Plateau of Productivity |

Maturity

Source: Gartner Research 2003

The Hype Cycle can start with nothing more than an announcement that triggers a rapid rise in visibility because of all the positive hype; climaxing at the "Peak of Inflated Expectations." Trade publications are always looking for the "next big thing" so there is a bit of a symbiotic relationship where new ideas feed new publications feed greater and greater hype about the idea. Visibility (hype) always grows faster than a technology matures at the early stages of a technology. During the increase in hype surrounding the technology, people either start to use the technology or critique the idea. This results in negative hype that reduces visibility until it reaches the "Trough of Disillusionment" as the technology continues to mature. As the technology matures, people and organizations begin to learn how to actually use the technology and visibility begins to rise again along the "Slope of Enlightenment" eventually reaching the "Plateau of Productivity." A recent example might be the introduction of the iPad, although the technology hype cycle was fairly short (in terms of elapsed time) for this particular device!

Organizations across all industries have decades of experience sorting through the hype of technology to help them figure out how best to use technology to provide their services in a better, faster, and cheaper fashion. As with all other industries, simply using technology to automate *current paradigms* in teaching and learning, research, or administrative work does not result in significant improvements in quality, timeliness, and cost structures for higher education. Of far more importance is the opportunity to use the present disruptive environment to take a *fundamental look* at the nature of the academic work and how technology can be used to help make quality, timeliness, and cost improvements to the work of the university at a more elemental level.

As with every other aspect of our lives, technology introduces new possibilities for how we might work, make decisions, play, compete, move about…and importantly, learn. Not unexpectedly, what actually changes and how it changes is never quite the same as

what was predicted, and it almost always takes longer than initially assumed to learn how to effectively and efficiently use technology. The "take-away" from these cross-organizational lessons is that we should resist using whatever is "in" because it is "in" while not missing out, just because some technology is "out." Learning to effectively use technology requires patience and discipline.

Appendix B: A Teaching and Learning Model Focused on Learning Outcomes

The following is a simple framework that can guide Utah's use of technology for teaching and learning purposes. The Teaching and Learning Model consists of four parts:

- **Learning objective** – a concise statement of what is to be learned. This statement describes the BEHAVIOR a student will exhibit to demonstrate the learning.
- **Learning assessment** – a concise description of how to measure whether the learning objective has been achieved.
- **Learning experience** – a description of an experience that is intended to achieve the learning objective.
- **Learning resource** – the resources used by the learner to achieve the learning objective.

One of the primary challenges with the traditional higher education enterprise is that, all too often, faculty focus first on the task before them – teaching. For many in the early stages of their career or involved only sporadically in the teaching/learning setting (serving as an adjunct), the importance of focusing on what students are learning may not be immediately evident. For these instructors, the learning resource may be the first thing they begin to think about -- scanning textbooks offered by publishers, or – in the case of adjuncts – being assigned the course materials to be used by the academic department. The texts often provide lecture slides for instruction and come with a test bank of questions (typically multiple choice or true/false) that serve as the primary assessment mechanism. The "textbook first" (or learning resource) approach also assumes the primary learning experience offered by the professor is the lecture—and class scheduling paradigms support this assumption. Unfortunately, learning objectives are often not made explicit with this traditional approach.

## Teaching and Learning Model
(traditional)
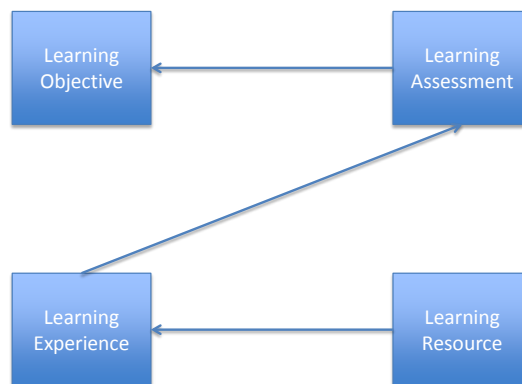
Simply throwing technology at the traditional materials-based approach may well save some money in that text books might become electronic (although even that conclusion has been countered by recent research[3]), but such an approach will not fundamentally improve learning. The risk is that this minor enhancement might prove satisfactory enough that higher education doesn't go for any financial incentives to apply technology more broadly and miss the "bigger win" possibilities that technology can offer.

If best practice instructional design principles are adopted, then the focus becomes the learning objectives. The learning objectives then drive the design of learning assessment, experiences, and resources. By applying new technologies in the implementation of disciplined instructional design, the true benefits of technology can begin to be realized: not only can the costs of instruction be reduced, but more importantly, the quality of education can be improved. This approach, however, requires the coordination of subject matter experts, instructional design experts, and technology experts.

Teaching and Learning Model
(ideal)

| Learning Objective | → | Learning Assessment |
| Learning Experience | → | Learning Resource |
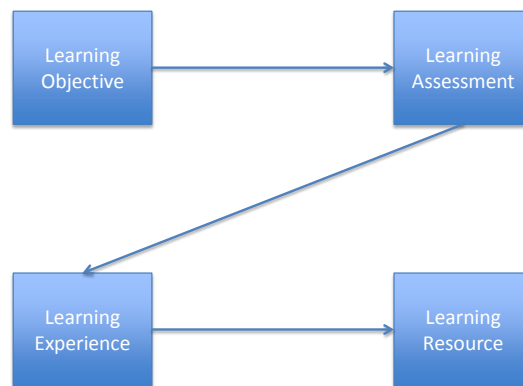
Without attention first being turned to this fundamental unit of analysis it is virtually impossible to see improvements at the course, degree, or overall curricular level.

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[3] http://chronicle.com/blogs/wiredcampus/new-study-shows-e-textbooks-saved-many-students-only-1/34793)

Appendix C: USHE Institutions' Technology Innovations that Increase Learning

Utah System of Higher Education

En"TICE"ing: Technology-Intensive Concurrent Enrollment (TICE):

One of the most exciting cross-system and K-16 initiatives is the development of technology-intensive concurrent enrollment courses. Utilizing best practices, the Utah System of Higher Education (USHE) faculty from all campuses and experts from the Utah State Office of Education are creating six new technology-intensive concurrent enrollment (TICE) courses that institutions can use in partnership with Utah school districts for offering college-level courses to students throughout the state.

All of the courses satisfy General Education requirements (or prerequisites) at Utah colleges and universities, and thereby accelerate students' progress to graduation. The courses utilize hybrid instruction (on-line and face to face delivery), common assessments based on essential learning outcomes, and open access course materials.

With the support of the state, the USHE can create 18 TICE courses over a three-year period to create a complete set of high-quality General Education courses that high-achieving high school students can take in order to prepare themselves to transition to college and earn their degrees.

CANVAS: Improved Classroom Management Using Technology

CANVAS is the latest technology-based learning management tool available to all of the USHE institutions through the Utah Education Network (UEN). While CANVAS is important because it provides tools that make total online delivery possible, it is even more important in enhancing classes that are delivered face-to-face. CANVAS makes it possible to easily:

- Embed videos, audio and photos into the online course materials
- Provide online testing
- Track student achievement of learning outcomes
- Notify students of important deadlines and materials via email, Facebook or text message (as the student prefers)
- Use chat/video to connect with a student face-to-face
- Provide for electronic submission of assignments by students
- Monitor student progress and course activity via a real-time reporting feature

University of Utah

Hybrid Course Support

2012 will be the year of the hybrid course at the University of Utah because of the ability to leverage the best aspects of online instruction (24/7 availability, instant response) and face-to-face instruction (deep engagement, critical analysis, personal attention). Fully online courses now account for about 10% of total enrollments, and an estimated 60% of courses make significant use of online instructional tools in combination with classroom instruction. New support for hybrid course development includes:

1. Publication of a research-based curriculum development guide for online and hybrid courses:
   http://www.tacc.utah.edu/instructor_resources/bestpractices.html

2. Consolidation of Instructional Media Services and the Technology Assisted Curriculum Center to provide a unified source of support for online and classroom technologies for faculty and students.

3. Extensive investment in online and hybrid course development grants that provide incentives for faculty to consult with instructional design professionals as they develop new teaching methods and skills.

4. Two dedicated courses (Cyber Pedagogy and Advanced Cyber Pedagogy) offered by the Center for Teaching and Learning Excellence for graduate students and faculty to learn and hone online teaching skills.

Utah State University

Regional Degree Programs

Presently, USU has 72 complete degree programs offered via regional campuses and distance education efforts. This significant achievement could not be accomplished without technology being applied by creative and innovative faculty and administrators. The current offerings are only a beginning. Of course, geographic and demographic reach is a goal of this initiative; but it has required USU to change teaching methods in very fundamental ways in order to be effective in this initiative. Enrollments at USU regional campuses continue to rise as students discover the programs they need are offered in a format and location that meets their needs.

Helping High School Teachers to Prepare Students "College-Ready" for STEM Careers

UMEP delivers sequences of university-level mathematics courses specifically designed for Utah teachers so that the teachers

A. learn mathematics that is meaningful to them;

B. learn mathematics in a way that will help them teach mathematics to their own students in a manner consistent with the recommendations of the National Council of Teachers of Mathematics' Principles and Standards for School Mathematics;

C. engage in these course sequences through distance delivery in a teacher-friendly atmosphere at times, at places, and under circumstances that are generally compatible with busy year-long professional teaching schedules;

D. (depending on their individual needs) are afforded the opportunity to (1) raise their Utah mathematics teaching endorsement, (2) earn university credit, and (3) progress toward the "highly-qualified in mathematics" designation under provisions of NCLB.

Source: http://umep.usu.edu/doc/flyer01.pdf

A Compendium of Technology Strategies to Enhance Learning

Utah State University has provided a compendium of various technology-enhanced and distance learning examples of the work of their faculty. Many of these strategies are being successfully applied on the other USHE campuses as well.

Recorded Broadcasts

Several programs at USU, including the Computer Science program and Master's of Science in Human Resources (MSHR) program - are using the UEN-provided Tandberg IP Video system to broadcast lectures real-time to students and capture the lectures for students for later review. Other programs, including Mechanical and Electrical Engineering, Teacher Education and Leadership, and Special Education are capturing lectures using industry leading web conferencing software, including Adobe Connect and Wimba Live Classroom.

Cross-Location Student Engagement

Paul Wolf, professor of Biology 3060, is using clicker technology to enhance the interactivity of his class sessions by polling his students simultaneously at locations in Logan, Roosevelt, and Vernal. Using Canvas, he is also connecting students at all three locations virtually and utilizing class time to have them work collaboratively on projects. These technology-integrated approaches have been used successfully by other faculty in other disciplines.

Distance Polling, Live FAQs, and Open Resources

Angie Minichiello, is using Clicker technology as well as live discussion through the Piazza real-time FAQ tool to add interactivity to her engineering courses. See https://piazza.com/usu . She is also connecting her students to quality free learning resources through the "open content" sponsored by the Carnegie Open Learning Initiative.

Live Discussion Using Google Technology

While teaching his course over the Tandberg Interactive Video System, Aaron posts links via his PowerPoint to a shared Google document, where he facilitates questions, answers, and live discussion to engage his students, who are located throughout the state at USU's various regional campuses.

Interactive Content, Instructor Accessibility, Student Participation, and Multiple Learning Styles

Camille Fairbourn teaches STAT 1040 and 2300 via broadcast and in fully online format, provide significant introductory resources. She has been using video, virtual manipulatives (math learning objects), and text to help students learn according to their preferred learning style. Courses orient students through interactive, branching video lectures. The instructor connects with students through regularly updated podcasts, virtual office hours, and well-monitored discussion forums. Students are engaged in the teaching process by answering each others' questions through FAQ forums and through the submission of worked problem demos using screencasting technology.

Immersive Online Sign Language Instruction

Curt Radford, a faculty member in the Communicative Disorders and Deaf Education program, offers an immersive, fully online deaf education program that is the best in the world. Offered over the Instructure/Canvas learning management system, the course utilizes asynchronous video discussions, video-based receptive and expressive assignments and quizzes, and real-time online sign-language labs using the Adobe Connect web conferencing software. The program provides one of the most extensive online and publicly available sign-language dictionaries in the world, covering more than just single word vocabulary, but also phrases to help students identify the nuances of the language. Courses push the boundaries of the learning management system by integrating signed navigation to make the course more immersive.

Collaborative Arguments and Class Voting

Global economics becomes more meaningful to students in Shannon Peterson's ECN 3400 as they take the role of complainant or respondent with their colleagues in response to current cases laid before the World Trade Organization. Students are organized into groups and given a case and a side to argue. They first formulate their own arguments, and then, using Canvas's built-in wiki technology, work with their classmates to formulate a group argument. At the conclusion of the activity, students come together to vote on each case given the arguments presented.

Online Professional Development for Deaf-Blind Educators

The Communicative Disorders and Deaf Education Sky High program, in collaboration with the Hadley School for the Blind, has developed an entire

program for deaf-blind educators that is fully accessible online, utilizing audio and video content, transcripts, and more.

Course Evaluation and Faculty Development through Peer Mentorship

In its efforts to encourage teaching excellence, USU has implemented a course evaluation effort for its fully online courses, and from that effort has selected exceptional instructors as peer mentors. This "Online Teaching Fellows" program hosts a series of webinars each semester on best practices in online and distance teaching. It also provides a peer-monitored faculty discussion forum where teachers can ask questions of their peers and find training resources. See https://learn-usu.uen.org/courses/62298

Rewarding Technology Innovation in Teaching

The Regional Campuses and Distance Education department has recently announced a Technology Innovation Grant, inviting faculty to submit project proposals for innovative teaching initiatives utilizing gaming and simulations or mobile learning. Recipients of the grant will receive funding for their efforts and technical support to make sure their ideas make it to implementation in teaching/learning settings.

AggieCast Live Event Streaming

Anything from a class lecture to a departmental or college event can be professionally recorded, edited live, streamed live, archived, and podcasted using USU's AggieCast system. Examples of this system in use include the Science department's Science Unwrapped public informational series: http://www.usu.edu/unwrapped/

Virtual Manipulatives

One of the highest producing pages of web hits on the USU domain is the Math department's National Library of Virtual Manipulatives, which includes a large repository of Java applets demonstrating mathematical concepts. These manipulatives are used worldwide at the K-12 and university level. The eNLVM project provides a freely accessible location where instructors can embed manipulative objects into complete learning modules and grade students on their performance. There, they can also find lessons created by instructional designers and other teachers. See http://nlvm.usu.edu

Weber State University

Developmental Mathematics Program

Weber State University was an early innovator in using the "Emporium" model for developmental mathematics. In the wake of national and Weber's early successes with student learning in mathematics using this model, other USHE institutions are adopting the model as well. The result? Students can use the successful hybrid model, combining online and face-to-face instruction targeted to their learning needs, for accelerating mathematics learning. Weber is using

the Emporium model as presented by the National Center for Academic Transformation (NCAT) for Pre-Algebra (Math 0950), Beginning Algebra (Math 0990), and Intermediate Algebra (Math 1010).

Weber State University, along with other colleges and universities in Utah and across the United States, teach developmental math in this format because the results show that students experience:

1. higher course pass rates
2. higher levels of math learning
3. increased math confidence and enjoyment
4. decreased math anxiety and frustration
5. ability to work ahead and complete more than one course each semester
6. reduced time to earn a college degree

Southern Utah University

Artists in "Residence" Via Technology

The Theatre Department accesses nationally renowned directors who conduct "remote production meetings" via interactive video with student designers and technicians prior to their on-campus residency. This technology significantly reduces costs associated with artist-in-residence programs.

Using the Web to Experience SUU Artistic Productions

Webcasts provide access to every live recital or concert produced by the music department at SUU. If you can't get a ticket or aren't able to travel to the live performance, you can enjoy it from your home or office.

Providing Audio Feedback on Written Projects

Todd Peterson, in English, reads student written works and uses a five dollar iPhone application to record his comments in audio format. Using the audio feedback, students must process it into a revision plan on their own as they are unable to "copyedit" as they would be able to do from written feedback. Students can replay comments as many times as required as they work to revise their writing.

Health Simulator that Talks

Noelle, a "pregnant" mannequin, delivers a baby and can be used to simulate hemorrhage and other complications of the birth process for nursing students. Noelle has heart and lung sounds and talks to the students while they work on her.

Using Cell Phones (Productively!) in Class

Biology professor Jon Karpel uses the website polleverywhere.com as an alternative to clickers in the classroom to facilitate discussion on certain topics like stem cells (in General Biology 1610).   This website allows students to use their cell phones to text answers to instant polls given in class.

Student-developed Games Assist in Student Recruitment

One successful Information Systems (IS) student project has been to construct and administer gaming tournaments. High school students are invited to participate and learn about the SUU IS program in the process.

Faculty Learning to Use High-interest Student Technologies to Teach

The College of Education and Human Development's faculty professional development has focused on the use of Blogs and Wikis, Podcasting and Video Casting, iPads and Interactive Devices for teaching.

Language and Cultural Learning Using Skype

Students enrolled in Michiko Kobayashi's English as Second Language course complete cultural chat activities with Japanese students at Hokkaido University of Education using Skype. Education students develop shared lesson plans in the multicultural course with counterparts around the world.

Podcasts for Lecture Plans

Camille Thomas's College of Education Exercise Science students watch podcasts of lectures prior to attending class, where time is then used to extend and apply gained knowledge.

Real-world Business Simulation

The School of Business' capstone, The Business Strategy Game (BSG), is a PC-based exercise, modeled to reflect the real-world character of the globally competitive athletic footwear industry. Company operations are patterned after those of an athletic footwear company that produces its shoes at company-operated plants rather than outsourcing production to contract manufacturers. In the BSG, 1 to 5 students are assigned to teams to operate the company. Students may access all aspects of the simulation at any time from any internet-connected computer (http://www.bsg-online.com/).

Utah Valley University

Hybrid Course Development

UVU has launched the Hybrid Teaching Initiative (HTI) for faculty. Hybrids transform one or more face-to-face sessions from a regular class into online experiences, reducing physical seat time without diminishing educational outcomes. HTI consists of 12 hours of training that covers a wide range of topics, from objectives to innovative technology use. Since its inception, the HTI initiative has assisted in the development of roughly 30 courses, including topics such as English and Accounting.

Human Simulators and Scenario Capture for Assessment at Utah Valley University

UVU is using simulation technology in business and science disciplines. For example, UVU's nursing program is using the Laerdal system which allows integration of data captured during hands-on scenarios from high-fidelity human simulators with information captured by advanced video systems. The simulators provide immediate feedback to the students and faculty during the scenario and model real-world situations. Faculty then review the recorded scenarios with the students and provide feedback. Learning thus takes place in a safe environment, which enhances patient safety and ultimately student confidence and skill. To view an example of this type of simulation technology in use, see http://www.youtube.com/watch?v=xG4987YGyug .

Enhancing Face-to-Face Courses

Some key initiatives at UVU that have enhanced face-to-face classroom delivery include:

- CANVAS implementation (see USHE section).
- Classroom technology updates and additions include over 70 classrooms. UVU is on target to replace aging classroom technology in about 60 rooms per year as funds are available. Document cameras are being deployed at a greater rate so that materials can be viewed more easily by all in the room. Annotation systems allow the emphasis of material during a lecture. Integrated media, computing, and lighting controls are standard in most rooms.
- The use of Student Response Systems (SRS or "clickers") in the classroom to gauge student understanding has increased.

Student learning has been improved in a variety of ways through these innovations. For example, Dr. Robert Palais incorporates the use of computer animations of mathematical concepts, and provides examples of real-world applications in class and on CANVAS. Dr. Palais also uses technology to access WeBWorK (http://webwork.maa.org), a highly acclaimed online mathematical problem library system hosted by the Mathematical Association of America through the use of the classroom media systems

UVU and iTunesU

UVU recently became the first institution in the Utah System of Higher Education to provide course content and other information free of charge via the popular iTunes platform. Through iTunesU, anyone can access the content whenever they wish, using anything from a laptop to a mobile phone to a tablet device. Content currently includes full course video for select courses, and podcasts on topics ranging from CANVAS (UVU's Learning Management System) tutorials for faculty to in-depth discussions on topics such as the Genetics of Autism from the College of Science and Health.

Dixie State College

Partnering with the University of Utah to Serve Students in Junior and Senior Years

Rapid student growth, a limited adjunct pool, and underfunded state support in the last few years created an opportunity for Dixie State College of Utah (DSC) to expand the role of technology on its campus. As early as 2006, DSC faced bottleneck classes that needed more sections taught by well qualified instructors to aid students toward timely completion of their degrees. As DSC expands its baccalaureate offerings, the question of how to offer sufficient sections of upper division (major) courses for students arises. DSC began a partnership with the University of Utah (U of U) in a technology-based initiative, supported through specific legislative funds.

Implementation of the partnership allows department chairs at Dixie State College and the University of Utah to identify potential course needs and opportunities. University of Utah faculty teach courses on the main campus in Salt Lake City that gather DSC students into the virtual classroom through the use of interactive video and online coursework. By combining the DSC and U of U students in a single learning situation, the expertise of the U of U faculty reaches more students. DSC and the U of U more effectively deploy faculty resources.

The next step for DSC is to expand this model through partnerships for upper division course offerings from the top institutions in the United States, as well as in Utah and abroad, in the four-year programs most needed by their students. It will optimize the individualization of degree completion since DSC will become a "broker" and a "portal" to high quality learning experiences from other providers on a per-student need. This model will allow students to take upper division courses as needed for their course sequence rather than on the extended on-campus rotation, which might delay offerings to once a year or every two years.

Technology Delivered Mathematics

Several years ago, Dixie State College developed modules that helped students address specific developmental needs in mathematics. This successful, individualized approach is available to all DSC students including those participating in Utah College of Applied Technology programs. DSC also recognizes the enhanced success of students in the "Emporium" math model at Weber and across the nation; therefore, it has created the infrastructure and facilities to begin offering Math 1010 using this model in Fall 2012.

Interprofessional Collaboration and Education in the Health Sciences Using High-Fidelity Simulation

Like other USHE institutions, Dixie State uses high-fidelity simulation experiences in the health sciences. (High-fidelity simulation enhances student clinical reasoning through the application of realistic patient care scenarios, debriefing, and guided reflection in a safe environment.) The simulation

experiences provide opportunities for interdisciplinary collaboration and training among Dixie State College nursing and respiratory therapy students. Additionally, Intermountain Healthcare-Dixie Regional Medical Center utilizes the Dixie State College nursing program high-fidelity labs for training nurse interns and recently requested use of the simulation labs for training physicians. School of Nursing and Allied Health faculty are strategically planning to expand partnerships for high-fidelity simulation learning experiences to other health science students and will continue to work with Intermountain Healthcare in meeting its needs for high-fidelity simulation training.

Undergraduate Research Opportunities

Technology at DSC provides students with opportunities to do actual hands-on research for agencies such as NASA. Partnerships with industry experts allow selected students at DSC to take real-time, streaming data from space and analyze it for specific patterns and anomalies. This type of experience would not be available for DSC students without technology. The researcher connects to the student, the institution, and the multi-institutional consortia members via technology.

Salt Lake Community College

GenEd Step Ahead

Students who participate in this program can complete all of their General Education requirements and earn a General Education Letter of Completion in two consecutive semesters by taking 6-7 classes each semester. They can then be eligible to continue on to an Associate Degree at Salt Lake Community College or transfer to one of Utah's four-year institutions. Hybrid GenEd Step Ahead cohorts are being developed for Fall 2012, with the possible launch of a fully online cohort later in the year. Students in this program, are placed into peer learning cohorts, where they learn together online and in-person.

- All online learning activities are managed in the Canvas LMS, allowing students and faculty to share learning activities and outcomes, and be better able to communicate with one another;
- Faculty to work closely together to easily communicate with one another and to better align signature assignments surrounding a central theme;
- Students to add selected signature assignments into their ePortfolios.

The Learning Emporium

Salt Lake Community College (SLCC) opened its first Learning Emporium on the Taylorsville-Redwood Campus in the Markosian Library. The Learning Emporium includes approximately 160 thin-client computers, three technology-enhanced classrooms, open-lab space, an assessment center, tutoring facilities, and academic and student support service space. The Learning Emporium is initially offering modularized Developmental Mathematics courses, and will begin offering English and ESL instruction later in 2012.

Unique Elements Leveraging Technology to Enhance Learning:

- Co-located with other learning resources to provide an environment that leverages the combination of instruction, tutoring services, library and learning resources, and instructional and student support personnel.
- Faculty developed modularized curriculum.
- Mandatory face-to-face instructional time with a full-time faculty member, Web-based instructional software, mandatory laboratory time (with access to faculty and tutors who provide instructional support in the Learning Emporium), and mandatory personal study time using instructional software to assist and prepare students to progress through the curriculum.

The Center for Independent Learning (CIL)

The physical space for the CIL is within the Learning Emporium. The CIL Model employs a Web-based platform for delivering the curricular content to students. The curriculum is enhanced through the use of interactive materials, video, audio, and other Web materials. Students self-pace, and work directly with faculty members as they need and/or want to do so. Students have the option of connecting with faculty either in-person, or through technology enhanced communication. The CILs are also support accelerated programs from across the College.

Unique Elements Leveraging Technology to Enhance Learning:

- Open access to materials.
- No physical textbooks or learning resources—all instructional support tools are online.
- Helps relieve physical space demands.
- Allows faculty expertise to be maximized, while simultaneously maximizing flexible instruction options.

Electronic Library and Information Environment (ELIE)
http://www.libweb.slcc.edu

ELIE is a unified digital resource for students, faculty, administrators, and staff that includes an integrated library catalog and a wide array of full-text electronic resources (80+ electronic databases, 81 electronic reference titles, over 40,000 E-books, nearly 3,000 E-journals, and a vast collection of on-demand streaming educational videos). ELIE has been twice recognized by the Center for Digital Education for being an innovative educational tool.

Unique Elements Leveraging Technology to Enhance Learning:

- Fully tagged online instructional modules for each subject area taught at the College (LibGuides); an institutional repository (ContentDM); an online calendar and registration system for ePortfolio training workshops; a searchable database of technology-enhanced classrooms (searchable by campus and by specific type of equipment); online tutorials focused on

how to use the equipment in the technology-enhanced classrooms; an online Inter-Library Loan system (ILLiad); an electronic reserve system (E-Res); social networking spaces; RSS feeds; an institutional knowledgebase and thesaurus; remote reference services; and a set of community resources (focusing on services, resources, and amenities of the greater Salt Lake City region).

- Each individual item in the library catalog has been coded with its own QR (Quick Response) code that enables users to use their smartphones to collect and store item-specific bibliographic and content information.
- In the first two years of ELIE's deployment, online research sessions increased 33%, online library resource usage increased 1,300%, general library Web page hits skyrocketed to approximately 2.5 million, and research sessions exceeded 1.5 million. Over the past year, ELIE was accessed over 4.1 million times.

School of Professional and Economic Development and Continuing Education

Fully Online Certificate Programs

Programs include: genealogy, event and meeting planning, competitive intelligence, knowledge management, and library and information science.

The Lineworker, Metering and Substation Apprenticeship Program is offered in a hybrid format, with much of the curriculum online, and in-person laboratory work is used to reinforce learning, practice skills and assess competencies. This delivery model is in the process of being replicated in a non-apprenticeship program called the Electric Power Technology Certificate.

The Statewide Energy Sector Partnership (SESP) offers a statewide Basic Energy Certificate online.

Unique Elements Leveraging Technology to Enhance Learning:

- This Basic Energy Certificate is 209 hours of training, designed to provide students with foundational knowledge necessary for success in the energy industry.
- Upon completion, students may pursue specialized training in certificate tracks that include: green construction, energy efficiency, renewable energy and transmission, and alternative fuels (offered in a hybrid format).

Transition to Teaching is a program that provides pathways to a Utah Professional Educator License, and is a partnership with the Utah State Office of Education (USOE.) SLCC began delivery of the courses through live teacher guided webinars.

- Greater access to learning opportunities is enhanced by the use of Web conferencing technology.
- Online orientation and an online student manual are available;

Snow College

Using Technology to Enhance the Residential Learning Experience

Snow College serves a student population that is largely a resident population. They are utilizing on-line teaching to reach more of their non-resident students and to enhance learning (via hybrid classes) for their resident students. The on-line experience for resident and non-resident students started with 16 faculty members in fall 2006 teaching 31 courses (212 students) and has expanded to 39 courses offered in 16 different programs of study reaching 736 students.

On-line instruction has targeted Snow College's General Education offerings so that all general education classes have an on-line course offering in addition to face-to-face and hybrid sections. The availability of online GE courses has provided accessibility, affordability, and efficiency to all students. Whether learning at a distance or in residence, students can fulfill their GE graduation requirements by avoiding weather and/or road conditions that impede travel to and from class, untimely class offerings with regard to work and family schedules, and limited class availability that can postpone graduation and transfer. And the cost of on-line course enrollment is competitive with the per credit cost of traditional instruction.

Applied Business Statistics using the Canvas Infrastructure

Using CANVAS, students learn and progress through simple and complex statistical analysis in a manner that reaches all learning modalities. Through CANVAS students can access supplementary text materials (datasets, lecture slides), complete practice and graded tests, link to external statistical resources, and experience the use of statistics in "real-time" (video, text, and podcast taken from current events that highlight the use of statistics). Students use the free web-conferencing, discussion boards, and collaborative links (GoogleDocs) provided by CANVAS to work in groups on applied research projects throughout the semester. In addition, the class is portable! An on-line textbook can be purchased and downloaded to an iPhone or iPad and with the use of several note taking applications (Notability), lecture notes can be taken directly on the i-device. Instructor access to the course (grading) and to students (communication, tutoring) is also enhanced through CANVAS' web-conferencing tool and the iPhone/iPad's face time calling feature.

On-Line Learning in History

Students wishing to take an online history course have three courses from which to choose: HIST 1700 American Civilizations, HIST 2700 US History to 1877 and

HIST 2710 US History from 1877. All three classes are fully online. Students have access to lectures, chapter summaries and other course materials. Students are encouraged to take responsibility for their learning, and the instructor, rather than being the "sage on the stage" acts a guide, directing the student to find a greater understanding of the subject. Students who have taken the courses range in age from high school to retirees. Many have been on-campus traditional students, however, there have also been "non-traditional" students such as those who are employed full-time, stay-at-home parents, or students needing a few credits to complete their associate degree. Most have appreciated the convenience of the option for online courses

Appendix D: Technology Innovations: Operations

Web-based Advising, Audit, and Transfer Articulation Tools

Key to student retention and completion are advising, transfer articulation and degree audit. Every USHE campus is employing a technology interface for assisting with these tasks. DegreeWorks is the most common software being used and, like other tools of its kind, it provides a comprehensive set of Web-based academic advising, degree audit, and transfer articulation tools to help students and their advisors negotiate curriculum requirements.

Some campuses, like SUU, provide student access through a "portal" (mySUU) where a student can safely view his/her individual record. The student is able to see the curriculum s/he has selected and the courses taken and how they match with the curriculum requirements. There is a "what if" function that allows students to consider other curricula and choices that will lead to graduation and how courses already taken match with that curriculum choice. Valuable face-to-face advisor time can be spent on key questions about career choice and progress and NOT on registration and degree requirement check-off activities. The student planner element of this software allows students to plan out course-taking to graduation. Data gathered from student plans allow the institutions to better plan for course and sections needed to meet student demand.

Unique Elements Leveraging Technology to Enhance Learning:

- Real-time advice and counsel to students
- Interactive "what if" scenario planning
- More transparent course and credit transfer
- More personalized advising
- More timely degree certification

Early Alert

The **Student Assessment Notification System (**SANS) at Southern Utah University is just one of the examples of the various "early alert" systems being employed on the USHE campuses. Unlike many early alert models that focus on a specific time of semester, and are only concerned with academic performance issues, SANS provides an electronic, intuitive interface that allows faculty and staff to make electronic referrals for both academic and non-academic issues. Additionally, multiple referrals for individual students from the same referrer can be made over the course of semester allowing for ongoing assessment and tracking of student progress. Once a referral is sent, an electronic notification is posted within minutes to a student's online SUU portal and an email is generated and sent to their preferred email account. Timely feedback empowers students to make informed decisions about how to engage faculty members, seek supportive services and identify helpful campus resources. In addition, peer mentors are automatically assigned through SANS to work with students who have received a notification. Mentors can also provide information through SANS to the referrer to close the feedback loop. During its first semester of implementation, 1021

alerts were received for 729 students. Regarding academic performance, more than half of students who were referred for poor academic performance and received some level of intervention, were able to successfully complete the course for which they were referred.

Technology Applications to Support Student Success (UVU)

Several additional technology-based initiatives for improving operations are underway at UVU. Several of these applications are also being used by other USHE institutions.

"Hot Bunking" – Originally a term used by the Navy to describe utilizing sleeping bunks around the clock, this scheduling innovation (made manageable by technology) is now being applied to UVU classes. For those classes that are utilizing online and in-person (hybrid) instruction, UVU schedules two or three classes during the same time frame as one normal class with the certain day(s) being designated as "in-classroom" for one class and "on-line" for others. The result: classrooms used to their maximum capacity for the necessary faculty/student interaction that makes hybrid classes so effective.

Advising "Remote" Students Video Conferencing - The MOVI technology is used to make main campus-based advisors available "face-to-face" (via interactive video) to students at Wasatch Campus in Heber City. Basically, the familiar "Skype" type of technology to provide advice and expertise while avoiding the costs and time of travel.

Automated Determination of Residency for Admissions Applications - Utah law requires that higher education institutions verify the residency of students and technology allows that screening to be done using software. What could take as many as four or five people is now done part-time by one.

Enrollment Management Dashboards - Tracking the courses that students will need and want in upcoming semesters so that instructors and facilities are appropriately scheduled to meet demand is a challenge. Technology applied in this circumstance has students thinking and planning ahead and recording the courses for which they will enroll in the upcoming semester so that the university can fit more students in classes needed and more into the facilities space available.

One-stop: Getting the Answer Needed With Only One Call - The consolidated one-stop call center uses an automated operator and technology-stored knowledge base to handle more phone calls without transferring callers needlessly between offices.

Emergency Messaging - Students, faculty and staff opt in to receive emergency messaging on their computer desktops and mobile devices. In the case of an emergency, an automated message to direct individuals to safe actions pops up electronically.

Tracking Graduate Student Progress (U of U)

The work of graduate students is often fairly independent as it is guided by a committee of graduate faculty. Keeping track of student progress and changes was a challenge when it was department-based and tracked with a paper and pencil system. The Graduate Tracking System combines PeopleSoft and Web applications so that departments can create an online student database, accessible by the department, college, and Graduate School, as needed. Departments enter the names of students seeking a graduate degree, and details regarding the oversight Committee, the student's Program of Study (including required exams and other requirements to achieve the degree sought). A program automatically sends emails to faculty members who need to approve changes. A web-based program allows the faculty members to do these approvals directly off a link on the employee page in Campus Information System (CIS). Students can see their key data in the Graduate Tracking System via links on the Student page in CIS. Departments and the Graduate School can run a host of reports to help track and spot issues early to make sure students can meet their deadline dates and graduate on time. This system replaces the slow and error-prone paper-based system with a fully electronic system that is quick and easy while also providing easy access and visibility of the data to Departments, the Graduate School, the Faculty, and the students.

Digital Course Approval and Signature Systems (USU)

Distance Education at Utah State has developed partnerships with Academic departments to coordinate the offerings of courses and programs statewide and throughout the world. As part of the partnership we have developed a customized Course Approval System that allows departments to see what courses are being scheduled through RCDE. Departments can review and approve courses before students are allowed to register. Additionally we have an in house Digital Signature solution for managing instructor contracts, allowing departments to approve payments and detailing expectations. These systems have provided an efficient method of tracking courses and instructor payments required by state auditors and accreditation standards.

Improving Accounting Through eJournal Entry (U of U)

e-Journal Entry (aka e-Journal) is a web application in the CIS (Campus Information System) that replaces the General Journal Entry PDF, providing for all-electronic submission, approval, review and storage of journal entries and supporting backup documentation. The e-Journal Entry web application was developed to make the journal entry process more efficient by eliminating dual data entry and the need for paper, among many other benefits. The new application provides for more transparency throughout the process, giving users the ability to track their journals as they change hands, making their way to the General Ledger, and after posting as a permanent record of the transaction.

Streamlining the Sponsored Research Submission Process Through eProposal (U of U)

eProposal is the beginning mechanism by which the Office of Sponsored Research manages faculty research proposals for sponsored research. The information collected in eProposal summarizes the purposes, people, funding, and organizations responsible for the proposed research. eProposal has been received with great acclaim across the campus and the health sciences for its innovative approaches in both usability and electronic approvals. The application was built to accommodate the unique approval processes throughout the different organizations on campus that must sign-off on being financially responsible for the research and other related costs. The approval roles and corresponding approvers are maintained within eProposal by (or delegates of) each college dean, department chair, and center/institute director. This distributed method of maintaining approvals drastically reduces overhead and places the responsibility of updating ever-changing lists of approvers with the 15 colleges and hundreds of other organizations. Principal investigators and their administrative staff can actively track the progress of an eProposal and get notified when the final approval has been satisfied and that it has been received in the Office of Sponsored Projects where it is reviewed prior to the actual proposal being submitted to a sponsoring agency.

Snow College: Technology Enhanced Accreditation through TracDat

The college manages its assessment and on-going accreditation efforts by collecting data and information via TracDat (a Nuventive product). From the institution's core themes to individual courses, evidence regarding student learning, innovation, and community engagement is easily uploaded into TracDat to form comprehensive reports that link curricular offerings to educational outcomes as well as co-curricular experiences to aligned institutional goals. These reports and the on-line access facilitates the assessment-improvement cycle with easy access to supporting data/evidence that has been embraced by faculty and staff. Document collection and reporting deadlines established in TracDat alert the responsible reporting parties via email of their responsibility in order to maintain the college's timely accreditation preparation and reporting. The information housed in TracDat also supports program review documentation and new program development. The technology of TracDat has truly enabled the college to approach accreditation and assessment as daily action natural to the institution at all levels.

Appendix E: Change Management Paradigm

Six Sources of Influence

	Motivation	Ability
Personal	*1* Make the Undesirable Desirable	*2* Over Invest in Skill Building
Social	*3* Harness Peer Pressure	*4* Find Strength in Numbers
Structural	*5* Design Rewards and Demand Accountability	*6* Change the Environment

There are six sources of influence that drive behavior, and the ability to successfully make change requires employing these sources in combination.

Motivation and ability are the foundation of the six-source model. They are subdivided into three distinct categories: personal, social, and structural, which in turn reflect separate and highly developed bodies of literature: psychology, sociology, and organization theory.

The first two domains, Personal Motivation and Ability, relate to sources of influence within an individual (motives and abilities) that determine their behavioral choices.

The next two, Social Motivation and Ability, relate to how other people affect an individual's choices.

The final two, Structural Motivation and Ability, encompass the role for nonhuman factors, such as compensation systems, space, and technology.

When four or more sources of influence are used in combination, behavior change is ten times more likely to occur than when only one source is employed.

From: Grenny, J., Maxfield, D.; Shimberg, A. How *to 10X Your Influence* VitalSmarts. 2008.

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