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## Course Summary

Campuses are shifting to new and exciting learning space models that provide real opportunities for design innovation, built around new pedagogies and enabling technologies. This course will explore some of these emerging technologies.

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#### Learning Objectives

At the completion of the course, participants will be able to:

- Describe how student demographics and new pedagogies have changed expectations for higher education facilities
- + List three emerging technologies that are applicable to your projects
- Identify how emerging technologies impact the design of forward-thinking educational facilities
- Describe how to adapting architectural and interior design to meet new pedagogical options
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#### Agenda

- Framework for Transformation
- Pedagogical Shifts
- Didactic to active/engaged
- Emerging Technologies
  - Smaller, lighter, faster, cheaper, smarter ... way more better
- Trends and Developments in Learning Space
- Flexible, technology-rich, collaboration-focused
- Discussion throughout, please

























#### Student of the future

- · Always on, connected
- Active, social and visual learners
- Expect full and immediate access to personalized media, information and course materials
- Reckless with technology
- Create and consume
- Visual, multi-sensory
- Connect living & learning
- Learning any time, any place
- Value the on-grounds, campus experience
- Environmentally conscious

Consumer orientation towards their

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- educational experiences Impatience with inefficiencies
- Want to collaborate
- Want alone time for study and personal
- Want to use technology to express their creativity
- Prefer practical applications, authentic
- experiences Global thinkers; want to connect globally
- "Design" thinkers Gamers
- Blend their social and academic lives
  - Participation and Personalization







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Name -		Engagement	Attended?	Video views	Pres. views	Questions	Activity part. / correct	Notes (word count)
۲	Emily Hunter	20%	42%	з	7	0	33% / 50%	o
-	Stacy Van Dusen	44%	68%	45	39	4	89% / 95%	90
1	Roger Michaels	48%	77%	43	32	з	67% / 100%	85
4	Chris Rodriguez	54%	81%	54	14	5	74% / 68%	0
	Mano Gerard	68%	89%	21	55	21	100% / 73%	13
0	Steve Lee	69%	94%	31	42	2	100% / 45%	-41
1	Jennifer Gardner	75%	94%	44	29	0	60%/94%	38



















# Technologies to Transform Education ...

- Printed word
- Paper
- Ballpoint Pens
- Phonograph
- Educational Radio
- Motion Pictures / FilmstripsEducational TV
- Computers
- Internet



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#### Technologies to Transform Education ...

- Printed word
- Paper
- Ballpoint Pens
- Phonograph
- Educational Radio
- Motion Pictures / Filmstrips
- Educational TVComputers
- computers
- Internet
- "I believe that the motion picture is destined to revolutionize our educational system and that in a few years it will supplant largely, if not entirely, the use of textbooks."

Thomas Edison, 1922

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#### Technologies to Transform Education ...

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"Students today depend too much on paper. They don't know how to write on slate without getting chalk dust all over themselves. They can't clean a slate properly. What will they do when they run out of paper?"

Principals Association, 1815



















































Levels of "lecture capture"					
Information Captured	Audio Capture	Presentation Capture	Room Capture	Rich Media Capture	
Instructor Voice	-	-	-	-	
Instructor Graphics		-	-	•	
Classroom Audio			-	-	
Video of Instructor					
Resources Required	Low	Low - Medium	Medium	High	





















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Systems that may be ir	ncluded in an Intelligen	t Building
Access Control     Acoustics - Physically Adjustable     Asset Tracking	Guest Services     Hearing Impaired/Interpreter     Systems	<ul> <li>Patient Entertainment / Education Systems</li> <li>Point-of-Sale Systems (POS)</li> </ul>
Audiovisual Systems     Background Music System (BGM)	+ HVAC Systems + Integrated Control Interface	+ Property Management Systems (PMS)
Building Management/ Automation BMS/BAS	<ul> <li>Integrated Operating Room Systems Intercom Systems</li> </ul>	+ Radio Communication Systems     + Real-time Transcription Systems
Broadcast	+ Intrusion Detection System - Physica	al + Robotic Delivery Systems
Cellular Reinforcement	+ Klosks	+ Room Scheduling Systems
Closed Circuit TV (CCTV)	+ Lighting Control	+ SCADA/PLC
Data Network	+ Mass Notification MATV/CATV/DSS	+ Sound Masking Systems
<ul> <li>Digital Signage Distributed Antenna Systems (DAS)</li> </ul>	Systems + Motorized Shades	+ Structured Cabling System + Sub-metering Systems
Electronic Concierge Services	+ Multimedia Systems	+ Valet Services
Electronic Medical Record Systems	+ Nurse Call System	+ Visitor Management System
Environmental Sensors and Alarms	+ Paging Systems	+ Way Finding
Fire/Life Safety	+ Parking Management System	







Bandwidth, The 4 <sup>th</sup> Utility			
		Copper	Fiber
	Bandwidth	10 Gbps	100 Tbps and beyond
	Future-proof	CAT 7 for 10G networks	Excellent
	Distance	300 ft. @ 1,000 Mbps	12+ Miles @ 10,000 Mbps
	Security & Noise	Susceptible to both	Nearly immune to both
	Weight / 1,000 ft.	~ 40 lbs.	~ 4 lbs.













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# So confusing ...

#### Wi-Fi 6 / 802.11ax

- Wireless networking
- Local area connection
- Primarily indoors
- Typically free for end user, but the site owner ultimate pays for Interest service it is connected to
- Should be 4x faster than Wi Fi 5 • Will be faster to implement

- X
- Mobile phones
- Wide area connection, deployed
- across cities, towns and rural areas
- Primarily outdoors

5G Cellular

- AT&T, Verizon ,etc.
- We pay for each connected device
- Should be 10x faster than 4G • Will take many years to build out the
- network

## Distributed Antenna System (DAS)

- Public Safety DAS
- First Responder communications
- Intra-building and inter-building
  Stairwells, mechanical rooms, lower levels
- Fairly straightforward
- Cellular DAS
- Messy, can be expensive
- $\,\circ\,$  Will be complicated by 5G



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## Li-Fi – wireless networking through LED light

- Li-Fi uses common LED lightbulbs to enable wireless data transfer, boasting speeds of 250+ Mbps
- IEEE 802.11BB
- Does not penetrate opaque objects, so more secure
- Operates on different spectrums than other electronic equipment
- Early in development, but ... Signify, formerly Philips Lighting, started shipping in Summer 2019











# Raspberry Pi • Control an AV System in a classroom or meeting room • Room Scheduler • Drive a kiosk • CPU, touch panel, back box, etc. < \$150 • CPU, touch panel, back box, etc. < \$150

Ty Pi 4 Mode



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## Active Learning Decisions

- Number of students per group
- Define the flexibility needed
- Define the adaptability needed
- Students at tables, armchairs or hybrid
  Size / shape /configuration of furnishings
- Space for instructor at each student group
- Campus-provided tools per student group
- Writing surfaces per student group
- Role of lecture component
- Location of instructor "home base"
- Role of Teaching Assistants









