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*Image from Ringling
College of Art and Design
student Michelle E. Graves'
animated short film "Wet
Paint," featured in the
SIGGRAPH Computer
Animation Festival.*

July 2011 • A supplement to

Beyond
the Basics

Faculty and industry combine efforts and resources to deliver novel, nontraditional tools for an advanced educational experience

By Courtney E. Howard

A basic, or general, education is no longer enough. As the computer graphics industry and its various market segments—from visual effects, animation and its many nuances, and game development, to computer-aided design, digital art, motion graphics, and more—continue to evolve, educational facilities are keeping pace through the adoption of novel, nontraditional tools and techniques.

Talent and the mastery of a few key software and hardware systems are not enough to solidify a lucrative job or guarantee a career in the increasingly competitive CG landscape. As a result, educators at virtually all levels, from high school to graduate school, are proactively partnering with those in the industry to provide unique opportunities and invest in future generations of digital artists.

"We provide computer graphics training aimed at giving aspiring CG artists the skills and tools they need to get straight to work in the VFX and CG industries," explains Dominic Davenport, CEO and founder of Escape Studios. Escape Studios has added mentored distance-learning courses, online self-directed modules, and recruitment services to its classroom course portfolio to fit what the students need and the industry requires of aspiring artists.

Students in Savannah College of Art and Design's (SCAD's) Visual Effects program take full advantage of the school's motion-capture studio.

Stuart Robertson—SCAD Visual Effects Department chair, professor, and Academy Award winner—employs projection technology to engage and instruct students.

Stereoscopic 3D

Three-dimensional imagery is the hottest trend in the CG industry today and one destined to continue to consume industry and consumer attention well into the foreseeable future.

Savannah College of Art and Design (SCAD) was one of the first accredited colleges to introduce a course on stereoscopic image making, says Peter Weishar, dean of the college's School of Film, Digital Media, and Performing Arts. SCAD offers two different stereoscopic classes, for which the school acquired multiple 55-inch Samsung 3D LED TVs, 100 pairs of active glasses, and rigs, including a Genus Hurricane 3D Mirror rig. "This was our first year running a Stereoscopic in Film class, for which we bought a 3D rig, but we have been running stereo visual effects classes for years. The holiday cards we sent out this year even had a stereoscopic image with the anaglyph red-and-green glasses," he quips.

Stereoscopic 3D Production students at The Digital Animation and Visual Effects (DAVE) School in Orlando, Florida, use Imagineer Systems' Mocha and The Foundry's Ocula and Nuke. "Many of our graduates are now working as stereo artists, and several are working as stereoscopic supervisors on feature films," says Steve Warner, executive director. For the school's latest student production, titled "Nazi Robots," students worked in conjunction with Emmy Award-winning producer Doug Stanley using two Element Technica Neutron rigs; four SI-2K cameras; Linos, Schneider, and Zeiss prime lenses; the Cmotion lens control package; a Cinedeck; and 1 Beyond's Data Wrangler Dude and Wrangler Mini.

"We teach a variety of tools and techniques that prepare students for the real world of production," adds Daniel Smith, stereoscopic 3D production instructor at The DAVE School, which promotes immersive, problem-solving teamwork focused on producing a group project with all the pressures and deadlines found in real-world production. "We leverage the cutting edge of stereoscopic 3D production, so you can learn about it in an immersive environment, producing a fully 3D film that captivates and taps into the emotional and physiological aspects of this new wave in cinema. Teaching the right ways to apply 3D and problem-solve though production ebb and flow prepares students with the right tool set to work in this exploding market."

3D and Interactivity

Temasek Polytechnic in Singapore now offers a diploma in 3D Interactive Media Technology (3D IMT), for which Yan Seow Chiang is course manager. The three-year program is designed to equip students with a foundation in engineering knowledge, digital media design concepts, and interactive 3D visualization and simulation in the interactive digital media (IDM) market.

"This course, as its name implies, focuses on teaching the skills needed for creating

digital 3D content for not just standard display and Web media, but also for new and exciting 3D displays," explains Seow Chiang. "The course also covers the many techniques used to create interactivity in digital content, allowing viewers/users to manipulate various digital 3D objects using different displays, as well as immerse themselves in a 3D virtual environment."

The school's goal is to enable students to go through a complete workflow—from conceptualization, modeling, and animation to building a physical prototype—as part of their training. To ensure that students are exposed to a real-life working environment, the course has facilities equipped with high-end 3D graphics workstations, 3D stereoscopic (from Zalman) and auto-stereoscopic (from Alioscopy, TechXpert, and Phillips) displays, and 3D software tools, such as Maxon's Cinema 4D, Adobe's Master Collection, and EON Reality's Studio, which are made available to all students working on projects and assignments. All workstations are linked to a dedicated renderfarm comprising blade hardware and queuing software to support computationally intensive applications.

In addition, 3D IMT students have access to camera and lighting equipment, a greenscreen for audio/video editing and composition, and computer-aided engineering (CAE) design and 3D prototyping facilities, as well as such game-engine tools as Act-3D's Quest3D and Unity Technologies' Unity 3D to develop interactive applications using 3D digital assets created with Cinema 4D.

"Students also gain real-life project experience working in collaboration with our industry partners, as well as the Interactive Digital Centre (IDC) Asia, our one-stop, high-tech interactive digital center," Seow Chiang continues. IDC Asia houses a Solution Centre with state-of-the-art 3D display equipment, a three-sided CAVE environment, gesture-based interactive display, and HD-quality videoconferencing setup.

IDC Asia is a strategic partnership founded by Temasek Polytechnic, IM Innovations Pte Ltd., and EON Reality, and supported by the Infocomm Development Authority of Singapore (IDA). The facility's mission is to provide leadership in user-inspired research, application development, and systems integration to support 3D visualization technolo-

Temasek Polytechnic students and instructors study the inner workings of a jet engine in the school's CAVE.

gies; to help various industry sectors, such as health care, education, aerospace, architecture, and engineering, gain a competitive advantage by adopting IDM solutions; and to serve as a virtual and physical hub for connectivity, innovation, and collaboration in the IDM community, especially in Singapore and the Asia-Pacific region.

Nontraditional and Notable

The 3D Animation and Interactive Media program at Boston University Center for

Digital Imaging Arts in Massachusetts uses numerous software programs and tools to teach students the most useful and practical methods of 3D art and animation, says Kiran Patwardhan, associate director of the 3D Animation and Interactive Media department there. The department's primary 3D software application is Autodesk's Maya, which is used to teach the basics in advanced modeling, texturing, lighting, rendering, rigging, and animation. In addition to Maya, Autodesk's 3ds Max as well as other software are popular, essential educational tools; however, many more nontraditional software solutions are increasingly being adopted in curriculums worldwide.

"We also use Pixologic ZBrush, a high-frequency sculpting application, and teach our students how to seamlessly work between Maya and ZBrush, as the two are built to work together," Patwardhan adds. "For those students who are interested in gaming, we have Unity, a common game engine that can output to many platforms, such as [Google's] Android, [Apple's] iPhone, and [Microsoft's] Xbox 360."

Unity and Unreal Technology's Unreal Development Kit (UDK) both allow students to build complete playable games with their libraries of tools and pipeline interfaces, affirms Dave Warfield, head of Game Design at Vancouver Film School (VFS). "These have allowed us to create embedded Web games as well as distributable games; an example of this is the hit title *Aurora*, which had more than 350,000 plays on Kongregate.com." VFS students completed their first iPad project using Unity, and have several projects under way using Unity and UDK that can be exported to iOS devices. iOS, formerly known as iPhone OS, is Apple's mobile operating system, which supports the iPhone, iPad and iPad Touch, and Apple TV.

"We're doing a lot with mobile handheld devices," says Weishar. "We've been teaching a class in designing for the iPhone; now we're doing iPad."

SCAD is holding collaborative classes, whereby students in the Interactive Design and Game Development department and Graphic Design department work together on both mobile-device and interface design. Students who are experts in interactivity can create applications, games, and client-side services, code in C++ and action script, and who do processing in different languages, for example, will work with graphics designers whose expertise is typography and hierarchy. "It is a natural collaboration and one that would be duplicated in the professional arena, as well," Weishar points out.

VFS's Game Design program implements several capable, yet somewhat nontraditional, software tools to enable its students to stay ahead of the curve and create dynamic interactive gameplay experiences, Warfield explains. Adobe's Flash, along with the use of staff-created tools and engines, such as Flashpunk, allow for quick prototypes of both 2D games and interfaces, he adds.

The Baden-Württemberg Film Academy (Filmakademie) and its Institute of Animation, Visual Effects, and Digital Postproduction (Institut für Animation, Visual Effects, und digitale Postproduktion) in Germany equips students with special tools that are rarely available at academic institutions, including the school's own Royal-Render, AquaTree, and Facial Animation Toolset software solutions, explains Viet Nguyen, information technology engineer at the school.

Motion Studio

Full Sail's Computer Animation bachelor of science degree program, offered on campus and online, was designed to prepare students for a career in this exciting field, according to Pete Bandstra, program director of 3D Arts at Full Sail University in Winter Park, Florida. To that end, Project LaunchBox was born. The Full Sail initiative " provides—at a deep, institutional discount—all Full Sail students with Apple technology to help them create music, film, game, animation, and design projects," he says.

Project LaunchBox complements Full Sail's programs by providing students with access to a complete mobile studio for use throughout their school career and after graduation. Students of all levels use their own personal MacBook Pro computer loaded with Apple's complete line of creative software tools as well as degree-specific sets of professional-level applications.

"With this unique combination of professional software and hardware, Full Sail students now have uninterrupted access to the tools they need," says Bandstra. "This mobile studio also allows them to have their portfolio conveniently at their fingertips at all times."

Students in both the on-campus and online degree programs learn to utilize a variety of current tools, including: Autodesk's Softimage, Maya, MotionBuilder, Mudbox, and Sketchbook Pro, in addition to ZBrush for the Mac, Side Effects Software's Houdini, Adobe's Creative Suite, and Apple's Final Cut Studio. "These tools are used to build content for use in games, films, or other broadcast media," Bandstra explains. "The students spend time developing their abilities in both traditional and technical applications, generating photorealistic assets to show their strengths as artists.

"By expanding their abilities as an artist and learning the latest tools, applications, and design theory used to create 3D content for different media, students will not only

Students study 3D animation at the Boston University Center for Digital Imaging Arts, where they use tried-and-true and some fairly new industry tools, including the Unity game engine.

be able to take their art in new directions, but also put their skills to work realizing— and sometimes even improving—the creative vision of others," Bandstra notes.

Scanning for Stereoscopy

As is the case with VFS and Filmakademie staff, Rubén Möller, sessional faculty in the animation and film department at Emily Carr University (ECUAD) in Vancouver, British Columbia, develops his own educational and practical tools. Möller, who does research in the Intersections Digital Studios at ECUAD and runs his company Rue Productions, has fabricated a motion-control system, called the RUEbot, integrating computer animation with digitally captured elements, such as puppets and handmade background structures. He has presented his work at conferences and in ECUAD undergraduate and graduate programs.

"My research at the school involves stereoscopic imagery, and I just completed a four-minute work titled 'CHAOS:touch' using a Polhemus FastSCAN Scorpion 3D scanner to construct a model that would blend correctly into a real, handmade set of melted wire," describes Möller. He generated and animated characters for his short stereoscopic works, as well as used the 3D scanning method to capture the texture of metal accurately and meld the CG elements into the real props. It is an extremely involved method, but one that worked out quite nicely, he says. Graduate students at ECUAD also have used the 3D scanner for design and modeling projects, which are later output as prototypes using the university's CNC machine.

Geert Melis, a teacher at the High School of the Arts in Antwerp, Belgium, is setting up classrooms with PCs running ZBrush and testing a NextEngine 3D laser scanner. Students aged 14 through 18 at the school are producing quality artistic work, which is displayed in the hallways and exhibition area of the main building. "Our school is no ordinary high school," he describes. "Our students spend an average of 12 to 18 hours a week in art classes, where they are getting a no-nonsense visual education."

Melis is using ZBrush as a didactic aid to complement life drawing classes, an

essential part of the student's curriculum. ZBrush is used during class to discuss the model's anatomy and underlying structure. "Construction/measurement lines and plane breaks can be drawn directly onto the head—a big advantage of having a digital copy available," Melis says.

The school aims to provide its students a curriculum that teaches traditional and digital two- and three-dimensional techniques side by side, with NextEngine's 3D scanner and ZBrush forming the digital cornerstones. "NextEngine and Pixologic are helping to bring our student's art education to a higher level," Melis explains. "We have real human skeletons for our drawing classes, but ZBrush helps out when we need to discuss and show the basic shapes and planes that can be found in each bone and in the skeleton as a whole. The added construction cage and guidelines offer an extra visual indicator: Projected on a wall at roughly the same size as the real skeleton, the digital one can be rotated to match each student's point of view to aid in working out main shape and perspective issues."

3D Printing and Prototypes

Over a 10-year period, the number of students enrolled in the University of Alabama's Department of Aerospace and Engineering in Huntsville increased from 200 to 1000, prompting the need for advanced 3D printing and production technology. The number of prototypes increased, as did the geometric complexity of the models.

Stephen Collins, prototype development specialist at the university, oversees a 12,000-square-foot student fabrication shop housing computer equipment the students use to produce various prototypes for their own projects and those sponsored by public- and private-sector partners, including NASA, the US Army, and prime contractor BAE Systems. These partnerships are valuable in terms of the student impact, he says; they provide a great opportunity for students to work with engineers from outside the university, and perhaps get a foot in the door with a potential future employer.

Purchase of a 3D printer for prototyping was "a one-time funding opportunity, and we had to get it right," recalls Collins, who turned to Fortus 3D Production Systems for a solution to his output issues. "We looked at every other manufacturer and system out there. The Fortus system offered the right balance of part functionality, material choices, and operating cost that met our needs best."

Not long ago, the high cost of 3D printers prohibited schools, especially those publically funded, from acquiring the technology. Today, it's a different story. Affordable 3D printers remove budgetary barriers to adoption and bring 3D printing within the reach of myriad educational establishments.

Bit from Bytes, acquired by 3D Systems in 2010, donated a BFB-3000 3D printer to North Somerset education authority in the UK to enable students studying design technology to print their ideas. "It's vital that students have access to equipment like this in order for them to learn the processes that take place in industry," says Dave White, a teacher at Clevedon School and one of North Somerset's Advanced Skills teachers. "The cost-prohibitive nature of 3D printers meant they were losing out on a key element of their learning, but this donation will ensure that tomorrow's designers and manufacturers will not get left behind."

Students are also discovering the power of 3D printing at the Rochester Institute of Technology (RIT) in New York. A Dimension 3D printer is providing students in RIT's Manufacturing Engineering Technology program with a unique, hands-on learning experience. "Our Dimension 3D Printer is our workhorse. It runs nearly all day long; it just goes, and goes, and goes," says RIT student Kyle Manchester. "It's great to have. You have an idea and need a part made, and an hour later, you're holding the part in your hand. It's easy enough that any student can use it."

Mocap

Motion capture is an important aspect of this industry, says Dave West, animation/motion-capture instructor at The DAVE School. "Giving students experience in every step—from character rigging, system setup, and directing the capture session, to
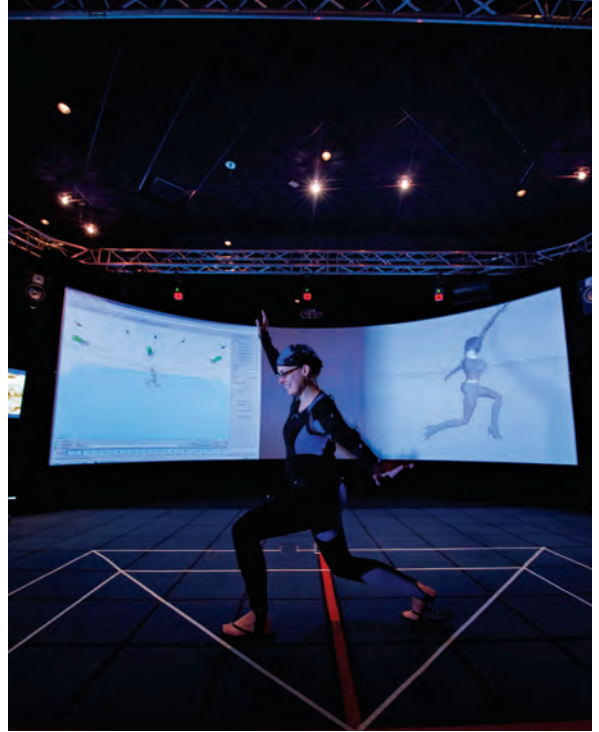
Full Sail University's students learn how to direct a professional motion-capture session using the on-campus studio. A number of schools are now teaching mocap, an important technology used in the VFX and game industries.

data cleanup and motion manipulation—is invaluable," he says. Roughly the final month of The Dave School's Animation semester is dedicated to the mocap process.

"We start off by rigging a character in [NewTek's] LightWave and exporting it out for use in Autodesk's MotionBuilder. Then, it's down to our stage area to go over the motion-capture pipeline with our own 12-camera Vicon optical system," says West. "This training also dovetails well in the new gaming portion of the curriculum. Students can gather different player movements and piece them together in the Unreal game engine to ensure a smooth transition from move to move."

As their animation skills grow, students in Full Sail's on-campus program move on to the university's motion-capture studio. "In this facility, they learn how to run a professional motion-capture session, as they direct the action of performers wearing a sensor-monitored bodysuit, and use that data to create even more lifelike movements in their digital characters," Bandstra describes.

SCAD students, meanwhile, have enjoyed a motion-capture studio for the past six years, according to Weishar. A 12-camera, HD Vicon system that rests within the school's digital media building is utilized by VFX, animation, gaming, and, to some degree, motion graphics students. Each one of those departments has a different motion-capture class, and students work with the data differently depending on their discipline.. "We got into high-def years ago and bought three full RED rigs [from RED Digital Cinema] with Zeiss lens packages and Sachtler tripods. We are buying another two this year," Weishar adds. "They've been wildly successful. We're also utilizing a lot of Canon 5D and 7D DSLRs in the freshman classes now. You can put a beautiful 35mm lens on them and shoot at very high resolution; I've seen some student work done on these models that is indiscernible from some higher-end cameras."

Previs Practice

SCAD is teaching previsualization, this after Weishar and other officials consulted with DreamWorks and other major studios, and previs supervisors spent more than a week at SCAD working with students, lecturing, and helping develop previs classes.

"I love the discipline because it involves filmmaking, animation, lighting, and modeling," says Weishar, "and it enables our students to work loosely and develop ideas quickly. It helps them to think more about dozens of options to a scene, rather than a single one that was locked into a storyboard. I believe it is going to have a significant impact on the kind of work they're going to be doing, and it also brings a
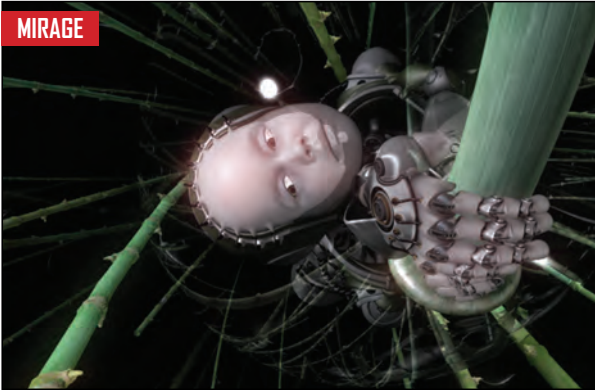
S V A — School of VISUAL ARTS — MFA COMPUTER ART

6 STUDENT ACADEMY AWARDS

MIRAGE
YoungWoong Jang, 2006
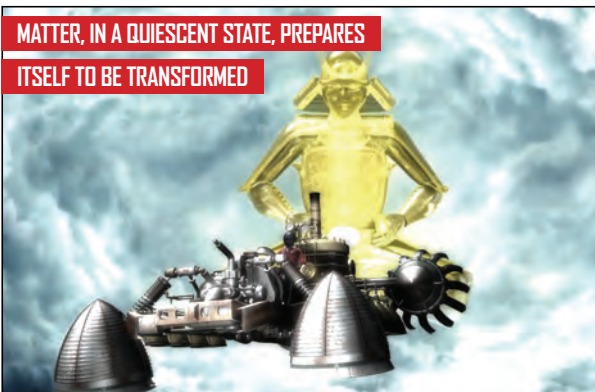
FISSION
Kun-I Chang, 2007

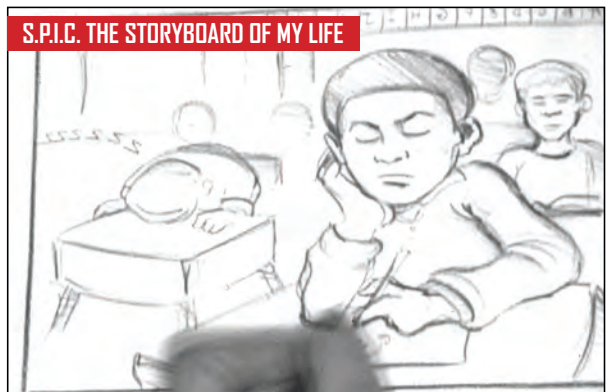SIMULACRA
Tatchapon Lertwirojkul, 2007

ROCK THE WORLD
Sukwon Shin, 2004

MATTER, IN A QUIESCENT STATE, PREPARES ITSELF TO BE TRANSFORMED
Kwibum Chung, 2008

S.P.I.C. THE STORYBOARD OF MY LIFE
Robert Castillo, 2004

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Teacher Geert Melis uses technology tools, such as Pixologic's ZBrush and a NextEngine 3D laser scanner, at the High School of the Arts in Belgium. ZBrush complements the drawing of plaster busts in life drawing classes. From left to right, an original Dante bust is made digital; hair and clothes are removed; skin is removed to expose the facial muscles; muscles are removed; and transparency is used in ZBrush to show the underlying structure.

lot of the filmmakers into the digital world of working in 3D."

Loyola Marymount University (LMU) in Los Angeles enables students to gain hands-on, real-world virtual camera experience in the Animation 410: Previsualization and Virtual Cinematography course using the NaturalPoint OptiTrack Insight VSC virtual camera system. LMU's animation department this summer is moving to a new building with an actor capture space featuring OptiTrack technology.

Swarthmore College in Pennsylvania employs virtual environments to simulate large-scale scenes, helping students understand known biases in slant perception. Large-scale surfaces can be manipulated using virtual reality to study what affects people's perception. Similarly, Swarthmore students use panoramic HD to study a process called spatial updating, described as how people keep track of where they are in the world when they walk. In one study, students control the speed of the world, making it move faster than normal, to study how people adapt.

Production Pipeline

"Our whole reason for existing is getting people up to production standard, so we use the tools and technology that the industry uses," says Escape Studio's Davenport. "The equipment our students use is the same hardware and software that artists in postproduction studios use when working on the latest film and TV releases. So when their courses finish, our students have used the latest kit and have the tools to be able to fit seamlessly into a project."

Davenport and his Escape Studios colleagues stay up to date on the latest production techniques and hardware/software tools via the facility's industry advisory board, made up of experts in the field from studios such as The Mill, Double Negative, and The Moving Picture Company. "At the moment, our students learn how to make the most of software, such as ZBrush, Maya, and Nuke, on the latest hardware from the likes of Boxx Technologies."

The same can be said for SCAD. "We're very much teaching a process and a pipeline, and about how to integrate software into a solution," Weishar says. "Complete workflow integration is important." All students in SCAD's Visual Effects program take required classes on Houdini, Maya, Pixar's RenderMan, and Massive Software's Massive; students pursuing SCAD's accredited Master of Fine Arts degree in Visual Effects are also involved in sophisticated pipeline integration work.

Full Facility

Innovative institutions are providing students with a graphics lab learning environment that mimics a true production studio. "In order to make sure our graduates have good career opportunities after receiving their degree, we try to make available the most recent technical resources covering state-of-the-art hardware and software solutions," says a Filmakademie spokesperson. Students at Filmakademie enjoy access to a facility complete with Z Corporation's Zprinter 450 3D printer, an Optitrack

motion-capture system, the Unity 3D game development tool, stereoscopic displays, a projector, Nvidia 3D Vision sets, high-end workstations, a Gigabit Ethernet network, and a wide range of 2D and 3D DDC software applications.

The school's portfolio includes software for 2D (Toon Boom Digital Pro and Storyboard), 3D (Cinema 4D, LightWave, Houdini), compositing (Adobe After Effects, Autodesk Toxic and Combustion, Eyeon Digital Fusion, Nuke), games (CS5 Flash, Crytek CryEngine 3, NaturalMotion Endorphin and Morpheme, Unity Pro Game Development), interface design (Arduino boards, Meso Digital vvvv, TroikaTronix Isadora), rendering (Chaos Group V-Ray, Mental Images Mental Ray, RenderMan, Solid Angle/Imageworks Arnold), software development (Microsoft Visual Studio 2008, The MathWorks Matlab, Xoreax Incredibuild), and more (Apple DVD Studio Pro, The Pixel Farm PFTrack, ZBrush, Autodesk RealViz Studio, Red Giant Software Magic Bullet, and Autodesk Movimento, Mudbox, and MotionBuilder).

In addition to a full digital theater with stereo 3D, a screening room in stereo 3D, and classrooms with HD, Filmakademie provides postproduction systems, such as As-

Technology is an integral part of the classrooms at Vancouver Film School, particularly within the realm of game design, animation, and visual effects.

similate Scratch, Autodesk Flame and Smoke 2K, Avid Symphony Nitris HD and DX, Avid DS Nitris, Cliprecoder Xtreme HD, and Final Cut Pro Studio 3.

Decision makers at the University of Central Florida's Florida Interactive Entertainment Academy take a similar tack, delivering its students access to: a 48-camera Vicon motion-capture facility with MX-F40 4-megapixel, high-speed infrared/red-light cameras, Blade capture, and processing software; 10 Vicon cameras reserved for facial and hand motion capture; Emotiv EPOC brainwave-reading headset and tool kit; a 3D TV and game system; virtual-reality, head-mounted display (HMD) for visualization and gaming; a Nexus 120-degree curved projection wall; several multi-touch surfaces and systems; Kinect gesture-based games; RFID tags and a reader system to wirelessly trigger in-game events; and virtual camera systems, including use of an iPad to see into the 3D world and a Hasbro My3D iPhone 3D display that is fed real-time mocap data.

Educating with ESPN

Full Sail University unveiled not only a new bachelor of science degree in Sports

Gnomon School of Visual Effects provides hands-on, interactive instruction within a studio-style atmosphere.

Marketing and Media, but also the Full Sail University Sports Lab powered by ESPN. Students selected to work in the lab gain the opportunity to design and execute new studio and remote technologies for ESPN.

"The mission of this joint collaboration is to not only develop new technology enhancements such as virtual applications, but to provide students at Full Sail the opportunity to work alongside ESPN's emerging technology team to gain real-world experience," explains Erik Noteboom, vice president of Education Operations at the university. "There are tremendous benefits for students to be working on challenging real-world projects while facing actual deadlines. As an educational facility, we provide students with the opportunity to apply their knowledge and skills by merging simulated assignments with real-world projects."

"Full Sail has always believed that a close, engaging relationship with industry leaders drives optimal student and graduate outcomes because it aligns our curriculum with industry expectations," says Ken Goldstone, chief operating officer. "The opening of the Full Sail University Sports Lab powered by ESPN, a global entertainment industry leader, is a prime example of our educational approach in action and it is a compliment to our students that ESPN has chosen Full Sail to help guide the development of future sports technology."

Students in the Digital Art & Design, Graphic Design, and Computer Animation degree programs are an integral part of the research and production in the Sports Lab, Noteboom continues. The concepts are carried out in the Full Sail Virtual Stage and Motion Capture Studio, which are both powered by HP workstations, and the Interactive, 3D, and Motion Graphic Labs using various professional applications on Apple and HP workstations. "Ultimately, the greatest benefit for students is to understand the elements that were required to see their work presented on air and the gratification of seeing audiences being engaged and entertained," he says.

Industry Involvement

Collaboration between students and industry is an invaluable component of an effective curriculum. A number of schools employ full- and part-time instructors who are actively working in the computer graphics industry, while other facilities host various events, including hands-on and collaborative workshops, with key industry players.

"To help develop that 'industry feel,' we have people working in postproduction houses at senior levels coaching entire classes, giving students the chance to have their work critiqued by the sort of people who would employ them," Davenport mentions. "We often have workshops and events where people from the likes of Framestore and Double Negative come and speak to our students about how they use

different techniques and tools to create the images we see in cinemas and on TV."

"Electronic Arts recently had our students design the new gameplay mechanics for one of its AAA games," explains Aaron Jeromin, research associate (art faculty) and motion-capture lead at the Florida Interactive Entertainment Academy. The school has also hosted industry guest speakers and critique sessions with such professionals as Steven Stahlberg, Don Seegmiller, Nick Zuccarello, Chris George, Barontieri, and others.

Gnomon equips students to be successful artists by putting them in close proximity with successful artists, says a spokesperson at the school. Officials invested heavily in creating an environment where passionate, professional entertainment artists can come together, share, and learn. Gnomon is located in Hollywood within the old Technicolor building, a richly historical site where the faculty provide hands-on, interactive teaching within a studio-style atmosphere, adds Alex Alvarez, founder/president of Gnomon School of Visual Effects.

Gnomon students receive instruction from leading artists at top studios in the industry, such as Blizzard, DreamWorks, and Naughty Dog, learning how professional production pipelines operate, as well as how the latest techniques and software tools are used in a real-world, professional setting, says Alvarez. In addition to educational opportunities, Gnomon is devoted to supporting the arts community at large and building networking opportunities for students and artists from some of the industry's leading studios, hosting multiple on-campus events throughout the year that feature key artists from blockbuster films and award-winning video games.

Collaboration, Contests, and Critiques

Using ConceptShare Inc.'s ConceptShare collaboration tool, students at Full Sail University can set up a secure online workspace for sharing their designs, videos, and documents; classmates and instructors can then view the projects and give feedback.

"After 20 weeks of advanced training in Maya, Mudbox, Nuke, and other high-level production tools, we launch into two team productions: live action with CGI and all-CG short films," explains James Cunningham, 3D course leader at the Media Design School in New Zealand. "Now that they have learned quality and the production process, they are let loose to bring their own vision and skills to the screen. We, the tutors, take a strong role in these, producing and directing, as our students are here to learn how to produce great VFX shots. They are crewed by industry professionals and are high-quality productions, from cinematography and actors to music and sound design. Each film has unique challenges, and the tutors run the teams of students like teams of artists at a postproduction house and deliver all the CGI effects."

A recent student film, "First Contact," included a large amount of digital head replacement, for which the students were tracking heads with helmets and Andersson Tech-

nologies' SynthEyes camera-tracking/matchmoving and stabilization software, as well as animating to match the actor's performances. The school's popular 3D course has won international awards over the years; just recently, two student films were nominated for awards from the Visual Effects Society (VES) and Aspen Shortsfest in Colorado.

SCAD hosts several events, including competitions, which are well attended by industry. "We just held a motion-graphics symposium, called INSPIRE, that was a big success, with industry giants coming from all over the world," says Weishar. "We also have a game developer's exchange for the Gaming Development and Interactive Design department. We had roughly 600 people at that conference; it was a huge success, with major names from huge studios coming and talking to the students."

Animation is the largest undergraduate department at SCAD, "and this is one of the largest schools of art and design in the world," Weishar adds. "It's exciting that it is that popular and that well received. We have animation programs in Savannah and Atlanta, and we've started one in Hong Kong." In September, SCAD will hold its Animate show and "best of" competition.

Also held by SCAD in the fall, the Savannah Film Festival draws a wealth of people who work behind the camera as well as in front of it. Past honored guests include Sir Ian McKellen, Liam Neeson, Tommy Lee Jones, Sydney Pollack, Alan Cumming, and more. "We had visual effects superstars and Rick Baker, six-time Academy Award-winner for makeup design. Scott Ferraro, Rob Lagato, Syd Mead, and Scott Ross—major names from VFX—were all on the same panel, and that's an opportunity that doesn't exist for most college students."

Escape Studios makes a point to employ the same tools and technologies the industry uses, thereby enabling graduates to more easily step into a professional studio environment.

Industry Investment

Industry technology firms have long provided discounted educational pricing on hardware and software for students and schools; today, vendors are increasingly donating solutions to enhance students' education, abilities, and experience.

Dassault Systemes' 3DVIA brand holds an annual Web-based, student game development contest called "The Z." "The Z is a cutting-edge game development curriculum in the form of a contest," says a 3DVIA representative. "Students compete to build and publish the best one-level 3D browser game on the new 3DVIA Studio engine for cash, prizes, and promotion. This structure gives students the technical skills typical of a class setting, while teaching best practices for building an audience through marketing and promotion."

In March, Boston University Center for Digital Imaging Arts' (CDIA's) Team ZPZ (Matthew McCarthy, Andrew Collins, and Matthew Thompson) won for their third-person shooter, *Zombie Park Zoo*. Team ZPZ received $2000 and promotion at the 2011 Game Developer's Conference.

"The Z competition was one of the best things I've done in my 3D career," says McCarthy, team lead. "From beginning design work to final promotion, The Z taught every aspect of building and publishing successful casual games. I'm thrilled with what we accomplished in three and a half months and would recommend The Z to any student looking to break into the video game industry."

"By leveraging the new 3DVIA Studio engine, The Z allowed faculty to teach game design, not code, enhancing CDIA's 3D animation curriculum while providing real-world experience for students," says Emmy Jonassen, game development marketing manager for 3DVIA. "We are looking forward to continuing to help CDIA, as well as nine other schools, accomplish this next year with the 2012 Z contest."

The competition ran like a curriculum, teaching students the principles of good game design, as well as how to promote and attract audiences to games once published. Several teams, consisting of both current students and alumni, participated in creating their own one-level 3D game using the new 3DVIA Studio engine.

Early Education

If ever there was an argument for investing in education, it's Riley Lewis, a 13-year-old student at The Discovery Charter School (K–8) in San Jose/Cupertino, California.

As he was finishing seventh grade last month, Lewis was setting up a design lab at his school. Already an experienced user of Dassault Systemes' SolidWorks, Lewis started out the Design Lab with a gutted HP workstation. Nvidia gave the school high-end graphics cards, which Lewis says changed the rendering experience. In fact, the Design Lab has several notable sponsors, including Dassault Systems, Nvidia, Boxx Technologies, HSM Works, 3Dconnexion, and 3D Systems.

Easily rattling off brand names, model numbers, and hardware specs as though they were the digits of his phone number, Lewis excitedly describes the Design Lab inventory. The lab now boasts: a once-gutted HP workstation, now powered by an Intel Core 2 Duo processor and Nvidia Quadro graphics board; a Boxx Technologies GoBoxx mobile workstation (which he describes as "amazing to use" for all his projects) equipped with an Nvidia Quadro graphics card; SolidWorks and CSWA (Certified SolidWorks Associate) tutorials; Nvidia graphics cards; a 3D mouse from 3dconnexion; and a 3D printer from 3D Systems. Excited about how the lab is progressing, Lewis has no plans to rest on his laurels, however; he is working on designing and developing an iPod stand "to sell to get more stuff" for the Design Lab, he says. "I am always on the lookout for tools to help me with my design work."

Riley is using PCs with advanced graphics cards to run SolidWorks to design 3D models of prototype parts, such as a pick-proof lock that he imagined. With the high-end cards, Riley can easily create a virtual model of what he "sees" and then validate the operation of even a complicated lock set. He and his friend are also using the tools to design high-performance air-rifle pellets for use underwater. This type of design work employs hydrodynamic modeling and requires a high-end graphics system and card to speed the rendering time and let them try out different designs, discard those that have obvious flaws, and focus on the ones that have decent potential.

All this will culminate with the 3D printer, enabling Riley and the other students to design 3D models quickly in SolidWorks, render them with a variety of textures and finishes, and output them on the 3D printer.

What is on his and his peers' current wish list? Adobe's After Effects. "One of my friends, Vernon, and I make short movies, mostly comedies, with open-source photo and video software. After Effects would be really cool for the small stuff I work on extracurricularly."

The most important message Lewis wishes to convey concerns young students worldwide. "A fairly large number of young people want to design out there. It's filtering down to the middle-school level; there's a large amount of interest there—if other kids could just get their hands on [hardware and software] and get rolling with it. We [at the Discovery School] are just more on the map because someone with Dassault Systemes came to talk to us." ●

Courtney E. Howard is a contributing editor for Computer Graphics World. She can be reached at cehoward@twitchinc.net.

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