Henry Ford Community College
Technology Investment Fund
Project Funding Request

This application form with original signatures must be received by the Vice President/Controller's office by 4:00 p.m. on either **the first Friday after Labor Day** (Fall semester) **or the third Friday in January** (Winter semester) in order to be eligible for funding. Applications will only be accepted on this form. Applications must include an Executive Summary which will be shared with the Campus Community. ***(Attach additional sheets for any section needed.)***

Date of Application:	**Project Type: [X] New**	**[ ] Upgrade/Expansion**
Project Director: Cynthia Scheuer / Stephen Pedley **Department/Division: Physical Therapist Assistant Program / Health Careers**	**How many students will *directly* benefit from the project?** 50-60 per semester	**Total TIF Funds Requested:** $45,000

Problem Statement

Define the problem/idea. *(What do you want to do? Why?)*	The PTA program consists of 13 courses for 38 credits, not including clinical education courses. There are 9 courses that have a significant lab or full lab component, making up at least 19 credit hours. The lab experiences consist of demonstrations by the instructor or students, hands on lab activities, patient assessment techniques, and patient treatment activities or skills. Students in the PTA program are assessed on their performance of skills and application of techniques prior to entering the clinical environment to treat patients. For students to be proficient in these skills they need to practice. We provide multiple opportunities for open lab during instructor office hours, by appointment and with tutors. Many of our students are limited in their time for the open labs and practice on their own in places outside of the school and program. When they do this they have limited resources for feedback and rely on books or handouts. The nature of patient care is not a formula or rigid process and varies based upon the patient response. Therefore the text does not provide sufficient examples of the applications. Students have requested more open lab time with instructors available or more resources for practice. Some of them have used u-tube resources, which are unreliable in accuracy of content. The students will benefit from the instructional video capabilities for use before, during and after class. The plan includes a number of cameras for recording the procedures from multiple angles and close up. Many of the techniques and procedures require the use of manual skills and small pieces of equipment. Also, needed are a projector, screen, and a computer to link to the internet for resources. The plan is to integrate this with the lecture capture system in order to have this information available to the student anytime, on any device. The addition of this equipment and updated technology will enhance the learning experience before the class by preparing videos and information for review ahead of time. It will enhance the course during class, making more efficient and effective use of the instructor's time and offering flexibility of pacing to meet the needs of each student. Additionally when integrated with lecture capture it will provide the students with accurate information and flexibility of learning and practice on their own following formal class time. This will create the opportunity for additional scenario based learning in the classroom, integrating clinical application with the theoretical components of the course.

Evidence for Project Validity
(What is the current situation?)

What resources do you have/use now?	VCR camera with tripod, VCR, tapes of some procedures and Health Career division flip cameras.

Why can't you use your existing resources to do this project?	Not compatible with new technology. The intent is to provide access to Moodle courses and integrate to the Lecture Capture System.
What evidence do you have that this project will be successful? *(Cite specific information.)* • **Current research** • **Examples from other schools or teachers** • **Letters of support from experts in the field** • **Your own past experience.**	Students in the PTA program utilize the lab during all open lab times and constantly request more open lab time. They have on multiple occasions asked to video the instructor performing the procedure for personal use. The videos that we have on VCR have been used frequently by instructors and by students. This is the logical step in providing the students with the flexibility and opportunity of ongoing access to the instruction. This will lead to increased success and improved quality patient care. There is significant research supporting the use of this type of technology in health care fields. Here are a few samples. The full articles are attached **Wojciechowski, M. (2011). How technology is being used in PT and PTA education. *PT In Motion*, *3*(9), 18-24.** This article illustrates several technologies used in Physical Therapy and Physical Therapist Assistant programs. The authors point out the benefits to the students and educators including immediate feedback, more hands on time with prior review and additional practice opportunities. She also notes the value of carrying this technology into the clinical setting with patient care. This article provides areas of growth for the students in preparing them for patient care in a technology rich health care system. **Grady, M., & Yates, V. M. (2007). Portable media Ppayers in the skills laboratory. *Nursing Education Perspectives*, *28*(2), 62-63.** This was a pilot study in a Nursing program providing video clips of skills to the nursing students for review in the clinical setting and before the skill assessment along with the traditional teaching. They found a positive response from the students and favorable outcomes on the skill checks of the students even for ones that missed the in-class demonstration due to illness. This provided self pacing and multiple opportunities for review to enhance learning outcomes. **Rutz, E., Eckart, R., Wade, J. E., Maltbie, C., Rafter, C., & Elkins, V. (2003). Student performance and acceptance of instructional technology: Comparing technology-enhanced and traditional instruction for a course in statics. *Journal Of Engineering Education*, *92*(2), 133-140.** This researcher compared 4 methods of instruction in an engineering program. They found the use of technology improved student performance. They also found that student satisfaction was the highest in a web assisted format, which utilized the on-line format integrated with the in-class format. Class time was utilized discussion working of the problems. This is relevant in the respect that working of problems is the skill in the statics class. Students reported a preference of in class practice with feedback as opposed to individual practice with feedback at a later time. We will be using the system to enhance the efficiency of the instruction time to engage more with students in the class/lab. **Fertleman, C., Gibbs, J., & Eisen, S. (2005). Video improved role play for teaching communication skills. *Medical Education*, *39*(11), 1155-1156. doi:10.1111/j.1365-2929.2005.02283.x** This article provides an example of how video can be used in teaching of things that are not easily found in books, like affective behaviors and compassionate care to assist students in gaining insight from other perspectives. We can use this equipment for more that just what the student or instructor does, for incorporation of scenario based learning. **Lin, M., Wilkinson, J., & Teherani, A. (2005). Wound closure: an instructional DVD. *Medical Education*, *39*(11), 1149-1150. doi:10.1111/j.1365-2929.2005.02304.x** This article provides an example of the effective use of a procedure that was recorded and available to the students to view and learn over time at their pace and during practice. Students in this study demonstrated better competency and rated their comfort level higher

	in performing the procedure on patients. This is one of the ways this technology will be implemented in the PTA program. **Epstein, CD, et al. (2003) Lights! Camera! Action!: Video projects in the classroom. *Journal of Nursing Education,* 42(12), 558-561.** This is an example of how students use video technology for a project in the classroom. This demonstrates the flexibility of this technology beyond instructor use.

Relevance to Technology Investment Committee Guidelines *(Address only those that apply.)*	
INNOVATION:	
Is the proposal innovative to the field of Instructional Technology?	
Is the proposal innovative to HFCC?	Yes, it is to be integrated into the lecture capture system as that is implemented at the college. This is innovative to the extent that student will have extended access and flexibility in learning, along with the opportunity for feedback and self reflection. This is minimally used at HFCC.
Is the proposal innovative to the specific discipline?	To some degree, there are Physical Therapy programs in the state and across the country that use similar technology. However, I was not able to locate PTA programs in community colleges that are using the technology in this way along with the lecture capture.
NEED:	
Is the proposal essential for the instructional design?	Yes. Many of the PTA courses have lab components and students are assessed based on performance. To maximize the effectiveness in using lecture capture capabilities is essential to have this technology in the lab. This will meet the individual needs of students as they transition into a new and different style of learning and assessment.
Does it create new programs or courses with the potential for increased student enrollment?	No, not in the immediate future. But, it will provide the opportunity to enhance the problem solving and scenario based learning in the lab courses. This will also allow the instructor to cover material in more depth.
Is it necessary to remain competitive with post-secondary institutions?	Yes, there have been a number of new PTA programs open in the state recently. HFCC has maintained an outstanding reputation for the students we graduate from the program. In order to continue this reputation, and provide our graduates an advantage in the job market, this will be an important tool. Student are willing to wait on a list to get into the program due to the reputation, we need to continue to attract students.
Does it provide skills that are transferable to the workplace?	Yes, as illustrated in the article by Wojciechowski (2011). When students are familiar with the use of video for enhancing learning they may apply it to patient education and professional development in the work environment.
Does it prepare students for transfer to upper-level curriculum?	

Relevance to Technology Investment Committee Guidelines (continued) *(Address only those that apply.)*	
Does it keep the course or program current in the related technology?	The technology will be used throughout the entire program in all of the lab courses. Students are assessed in a practical environment in a cumulative basis at the end of the second and third semesters. This will provide the opportunity for review of all lab experiences in an ongoing manner. Healthcare is entrenched with technology and is moving even more in that direction, with electronic medical records and e- home (electronic home) visits. Students need to utilize this type of technology to stay current and provide the highest quality care.
NATURE OF PROPOSAL:	
Is the proposal a component of curricular revision?	No, this will not result in any changes to learning outcomes. It will enhance learning process by meeting the needs of the diverse student population through a variety of teaching styles and flexibility of learning.
Is it the next logical step in the evolution of the course/curriculum?	
Will it help attract students to HFCC?	This can be used to market the program demonstrating the commitment to learning. The intent is to enhance learning therefore improving retention which in turn is used for marketing the program. Those statistics are published in the college catalog as well as through the APTA.
Will it support HFCC community outreach/public relations activities?	
Will it support student retention activities at HFCC?	Yes, by providing flexibility of information and reinforcement of information as the student needs, will result in improved outcomes and higher retention.
Will it become an integral part of the course, program or curriculum?	This technology will be used though out the entire program in all lab courses and integrated with the lecture capture system in the classroom. This will provide the integration of theory with practice.

Resources		
Where will the project hardware be installed?	H 307	
Who will do the job? • **List the personnel** • **List their duties**	The installation prices are included with the quote. It will be provided by a variety of personnel. Also may require the installation of hardware for the lecture capture component.	
Who will use the hardware?	All PTA Instructors	
Who will conduct any necessary project-hardware training?	None are required beyond what the vendor will provide with installation	
Who will handle any spring and summer semester duties related to hardware installation?	Program Director of PTA Program along with the Associate Dean of Health Careers	
Do you have commitment from your administration for personnel support? *(Be specific, include documentation.)*	NA	
Is release time required to complete this project? **If yes, has it been approved at this time by your Associate Dean?**	**[ ] Yes [X] No** **[ ] Yes [ ] No**	*TIF does not fund release time. If you are requesting release time, it must be approved by the appropriate administrators prior to proposal submission.*

Evaluation

(How will you know if it worked?)

How will you demonstrate to the college that this was an effective use of funds? *(How will you evaluate the goals listed as Expected Outcomes?)*	• Increase program retention as well as course retention rates. • Improve grades on cumulative lab practical given at the completion of the second semester • Improve first time pass rate on the comprehensive lab practical given at the end of the third semester. • Positive student feedback on use and value of this technology in the learning process. • Track usage of technology by course and student
How will you determine the success or shortcomings of the project?	The above assessments will be measured and compared to the current year without the use of this technology. Also feedback from the instructors for quality of learning, and the clinical partners on perception of improvement in quality of patient care.

Budget

(You must also include an itemized budget statement.)

What do you need to complete this project? *(Be specific about equipment, software, and training.)*	See itemized statement attached
What is the TOTAL COST? *(You must attach an itemized cost analysis with this proposal.)*	Total cost is $45,000.00 The cost from Thalner Electronic Laboratories (TEL) is dated 10/25/2010, I have requested an update on the pricing and it is in process. I added 5% to the cost to adjust for this. I will have the accurate cost upon presentation to the committee. This will be integrated with the lecture capture system and may require the installation and purchase of additional equipment.
How recent is your quote?	TEL 10/25/2010 an updated one is in process. Other 7/23/2012 through HFCC Data and Voice
Are changes to the college infrastructure necessary to support this project?	**[ ] Yes [X] No** *If "yes" provide an explanation from the Directors of Data & Voice and Buildings & Grounds, and from the Administrator in charge of the affected room(s).*
What other monetary commitments exist? *(Department/Division/ External) Please be specific; include*	This will be integrated with the lecture capture system and may require the installation and purchase of additional equipment.

documentation wherever possible.	
If other sources of funding are not available, why? • **Doesn't have the support?** • **Not viewed as feasible?** • **Not a priority?** • **Other?**	TIF is the most appropriate funding source due to the nature of the project. The use is to improve student success through flexibility in delivery, and performance based learning.

Strategic Plan

Include with your application a document that indicates the ways in which your project addresses the goals and objectives of the Henry Ford Community College Strategic Plan. Also, indicate how your project addresses your Division or Department plan. Be as specific as possible.

See Attached Health Career Operational Plan

The operational plan reflects only part of the project, because the plan was to do it in phases to reduce costs. But, with the implementation of the lecture capture system it would be more beneficial to student learning to fully implement the video technology in the lab at this time.

If your proposal is Non-Instructional (Library Services, Learning Lab, Counseling, Placement Services), please skip this section and complete the information in the Non-Instructional section.

Instructional Proposals

Complete this section if this is an Instructional Proposal, directly impacting student teaching and learning.

Expected Outcomes *(Project Objectives)*	
What is your current teaching method? How will this project fit into your current plan?	Currently the teaching method for many of the lab skills, procedures assessment techniques and treatment techniques is instructor demonstration while students watch then practice. They are expected to practice during open lab times and seek out additional feedback if they feel it is needed. Students frequently work in groups and learn from each other. This project will enhance that process in multiple ways. One, the students can be practicing while watching the demonstration and checking themselves for accuracy. The instructor can replay the demonstration multiple times while they provide direct feedback to students. Two, this provides an opportunity for the student to access the video during open lab times with a tutor or at home for review and additional practice. Lastly, there is potential to have videos available prior to the lab with some of the content so the student arrives prepared to learn the skill and integrate the theory into practice. This will provide an opportunity to use the lab time for more scenario based learning integrating techniques, as opposed to practice of the skill in isolation.
How will this improve student learning? *(List specific goals.)*	*As a result of this project students will:* • Successfully complete the program with a retention rate of 75% or higher. • Demonstrate competence in basic assessment, exercise selection, and application, by 85% of students passing on the first attempt with an 80% or better on the final lab practical at the end of the second semester (winter). • Demonstrate competence in basic assessment, exercise selection and application by a class average of a B or higher (85%) on the final lab practical at the end of the second semester (winter). • Demonstrate clinical preparedness by 100 % of the students passing the comprehensive lab practical, on the first attempt, given at the end of the third semester (fall). • Report that the use of video technology enhanced the learning experience and their comfort in providing care to patients.

Instructional Proposals (continued)

State how the project addresses the Seven Principles of Good Practice in Undergraduate Education. *(Address only the relevant criteria.)*	
Supports student-faculty contact	The faculty –student contact in the PTA program is currently very high. Full time faculty spend time with students well beyond the posted office hours and are available by e-mail and phone regularly. This technology will assist the student to maximize their time with the faculty member. This will allow the student to review and formulate questions to target their specific gaps of knowledge and individual needs.
Supports cooperation among students	The lab environment is currently a collaborative learning environment. Students need to practice with another person and most continue to do so out of class. This additional technology will give them the opportunity to use group study with the videos when the instructor and/or the lab are not available.
Supports active learning	Having the videos for students to continuously review provides the opportunity for the structured lab time and even the open lab time to be used for scenarios to integrate the application of the skills with the theory.
Supports prompt feedback	This technology will give the student an example to work from to allow for self evaluate and give quality peer feedback. We will also be able to use the technology for assessment and feedback on an individual basis for students who need that level of guidance. This technology will provide the faculty the flexibility to meet the needs of the students.
Supports time on task	The videos produced as a result will provide the students with the amount of time a skill or activity should take and they have the opportunity to practice with the video for self reflection. This technology will give the students the opportunity to spend the amount of time they need to learn, since this varies among students.
Supports high expectations	The program already has high expectations of performance and standards of practice. The video technology will provide ideal examples of the quality of performance students are expected to meet.
Supports diverse talents and ways of learning	This technology, in the PTA environment, will provide opportunities for the student to master the skills both in and out of the classroom. This will enhance the instructors' ability to provide information to students visually, auditorily, and kinesthetically. Performance based assessment is new to most students. This technology will increase student confidence in the performance of patient care activities. There are many other possibilities for the use of this video technology integrated into the lecture capture system.

SIGNATURES:

1/17/13 **Project Director — Date

Debra A. Szymanski 1/17/13 *Associate Dean/Department Head — Date

1/17/13 *Vice President — Date

**Director of Building & Grounds — Date

1/17/2013 *Director of Data & Voice — Date

* For notification purposes only
* * For project feasibility

Henry Ford Community College

Technology Investment Fund
Project Funding Request

Executive Summary

DATE OF APPLICATION	PROJECT TYPE	
1/11/2013	X New	☐ Upgrade/Expansion
NAME OF PROJECT DIRECTOR OR PRESENTER	**DEPARTMENT/DIVISION**	
Cynthia Scheuer PT, MS	Physical Therapist Assistant Program Health Careers Division	
COST OF PROPOSED PROJECT	**NUMBER OF STUDENTS SERVED ANNUALLY**	
$45,000.00	50-60 over the course of the two year program in multiple courses	

SUMMARY

The PTA program consists of 13 courses for 38 credits, not including clinical education courses. There are 9 courses that have a significant lab or full lab component, making up at least 19 credit hours. The lab experiences consist of demonstrations by the instructor or students, hands on lab activities, patient assessment techniques, and patient treatment activities or skills. Students in the PTA program are assessed on their performance of skills and application of techniques prior to entering the clinical environment to treat patients. For students to be proficient in these skills they need to practice. We provide multiple opportunities for open lab during instructor office hours, by appointment and with tutors.

Many of our students are limited in their time for the open labs and practice on their own in places outside of the school and program. When they do this they have limited resources for feedback and rely on books or handouts. The nature of patient care is not a formula or rigid process and varies based upon the patient response. Therefore the text does not provide sufficient examples of the applications. Students have requested more open lab time with instructors available or more resources for practice. Some of them have used u-tube resources, which are unreliable in accuracy of content.

The students will benefit from the instructional video capabilities for use before, during and after class. The plan includes a number of cameras for recording the procedures from multiple angles and close up. Many of the techniques and procedures require the use of manual skills and small pieces of equipment. Also, needed are a projector, screen, and a computer to link to the internet for resources. The plan is to integrate this with the lecture capture system in order to have this information available to the student anytime, on any device.

The addition of this equipment and updated technology will enhance the learning experience before the class by preparing videos and information for review ahead of time. It will enhance the course during class, making more efficient and effective use of the instructor's time and offering flexibility of pacing to meet the needs of each student. Additionally when integrated with lecture capture it will provide the students with accurate information and flexibility of learning and practice on their own following formal class time. This will create the opportunity for additional scenario based learning in the classroom, integrating clinical application with the theoretical components of the course.

(Attach additional sheets if needed.)

Thalner
Electronic
Laboratories
SYSTEMS

Henry Ford Community College
Physical Therapy Lab Camera System

SCOPE OF WORK

This document will detail the systems and equipment proposed for the Henry Ford Community College Physical Therapy Department.

The scope of work as presented by Stephen Pedley consists of a large classroom for Physical Therapy training. The room is approximately 60 ft long by 30 ft across with 10 ft ceilings. This room will contain state-of-the-art audiovisual equipment for viewing classroom training procedures.

Objective:

- Propose a classroom video control system as cost-effectively as possible with an intuitive, user-friendly control touch pad interface that makes sense for recording training presentations.
- Provide and install four HD LCD screens in the room for viewing presentations. The 42" monitors will be ceiling mounted and will show the same image at all times.
- Provide and Install a total of four (4) cameras. Two will be in-ceiling cameras and two wall-mounted.
- The wall cameras will allow for pan, tilt and zoom control utilizing a Vaddio ProductionVIEW Controller and added as presets on the touchpanel. The ceiling cameras will also have PTZ capability and control/preset capabilities.
- The output of the Vaddio Controller will be distributed to the flat panels, projector, DVD recorder and the switcher/scaler.
- Install OFE projector, new electronic screen and professional connection panels.
- Provide and install speakers, DVD recorder/player, microphone and audio systems.
- Ensure that the entire AV system in the classroom room is working and reliable and has the functionality required for important presentations.

Solution:
Our solution will be itemized in quotation form. We would like to discuss other options after your review, as there may be cost savings to be had by using alternates. But to start, we are proposing the best

possible system for you. We note some of the important system elements here.

The system we will be proposing will be centered on a Crestron control system. The Crestron will control the source-select switching. The control panel will be a 8" touchpanel which will reside on a docking station when not in use, but will be totally portable. Through this touchpanel, you will be able to control on/off functions as well as switching sources (Cameras, Projector, Screen, DVD Recorder, laptops, etc) and volume control.

A Middle Atlantic Rack will reside on top of the desk, unless there is a better place to keep the equipment (maybe the storage room?)

Cameras will be used one at a time and and positions will be fixed using a Vaddio joystick controller. When the system turns on you will have the opportunity to pick the camera and what position you want it to be in.

An owner supplied projector will be installed in the ceiling approximately 15' from the projection screen. The cabling from the projector input will be run above and across the ceiling grids and over to the side wall. All source units for these projectors, the client supplied computers and document camera, PTZ Cameras, the DVD recorder/player, the amplifier, mixer etc... will live in the Middle Atlantic rack.

As noted above, the room controls will be administered via a Crestron control system. The control system will be controlled via a wireless touch panel. The panel shall be programmed for basic control and selection of the cameras or VGA input, DVD control, volume control, and system power. All switching/routing will pass through a controller/switcher that will be rack mounted inside the rack. The room will also be supplied with a wireless lavaliere microphone system utilizing the necessary flush mounted ceiling speakers. All electric is to be supplied by Henry Ford Community College.

A 110" electric ceiling recessed diagonal screen will be located at the front of the each room with six JBL ceiling mounted speakers located to provide uniform sound.

The system installation comes with a one-year system warranty.

In addition to the standard system warranty, TeL Systems can offer various emergency support and or maintenance packages and extended warranties.

The proposal will provide a turn-key complete solution. Relative price breakouts will be provided so that changes can be made based upon budget requirements and relative functionality costs. We are happy to modify the system configuration and functionality based upon client requirements.

Thalner Electronic Laboratories
SYSTEMS

7235 Jackson Road
Ann Arbor, MI 48103
734-761-4506
1-800-686-7235
Fax 734-761-9776
www.thalner.com

Client Proposal
Physical Therapy Lab Camera System

Proposal #:

Customer:

Estimate

Henry Ford Community College
ATTN: Stephen Pedley

Proposal Date: 10/25/2010
Account Manager: Diane Rydzewski

Item Qty.	Manufacturer	Model	Description	Unit	Amount
			Monitors & Mounts		
4	Sharp	PN-E421	42" Professional LCD Monitor	$ 1,160.00	$ 4,640.00
4	Chief	PRO2534	Lockable Tilt Mount	$ 150.00	$ 600.00
4	Chief	PAC125	Lateral Shift Wall Bracket	$ 50.00	$ 200.00
1	Chief	RPAU	Projector Mount for OFE Pprojector	$ 125.00	$ 125.00
1	Chief	CMS-440	Ceiling Kit	#REF!	#REF!
			Camera Systems		
1	Vaddio	999-2304-000	CeilingVIEW 70 PTZ System	$ 1,670.00	$ 1,670.00
1	Vaddio	999-9100-070	DomeVIEW 70 Indoor Pendant Camera System	$ 1,520.00	$ 1,520.00
2	Vaddio	998-1105-002	Rack Mount for 3 Quick Connect Boxes	45.00	90.00
2	Vaddio	999-2704-000	WallVIEW 70 PTZ Camera System -white	1,275.00	2,550.00
1	Vaddio	999-5300-000	Super Joystick Controller	1,465.00	1,465.00
			Video Recording,Switching & Distribution		
1	Extron	60-1027-01	Four Input Video & RGB Scaler w/ DVI output	1,450.00	1,450.00
1	Panasonic	DMREA18K	DVD Recorder/Player	150.00	150.00
1	Extron	RSH4A	2U Rackmount Enclosure 11.5"D	89.00	89.00
1	Extron	60-490-01	1 X 6 Distribution Amplifier, DA6RGBHV	742.00	742.00
1	Extron	60-554-22	MAV 84 SVA 8x4 Composite Video & Stereo Audio	660.00	660.00
			Audio		
6	JBL	Control 24CT	Control 24CT Micro Ceiling Speaker	92.00	552.00
1	Shure	ULXP14/85	Wireless Lavalier Mic System	790.00	790.00
1	Crown	180MA	Mixer-Amplifier	350.00	350.00
			Control System		
1	Crestron	CP2E	Control System with ethernet	990.00	990.00
1	Crestron	TPMC-8X	8.4" WiFi Touchpanel	2,090.00	2,090.00
1	Crestron	TPMC-8X-DS	Touchpanel Docking Station	275.00	275.00
1	Crestron	PW-2420Ru	Power Pack	140.00	140.00
2	Crestron	ST-COM	2 Com Port Module	390.00	780.00
1	Crestron	IRP2	Emitter Probe	30.00	30.00
1	Crestron	C2N-VEQ4	4 Channel Volume Control Module	495.00	495.00
1	Crestron	ST-PC	Dual Power Control Module	165.00	165.00
1	Crestron	STRMK	Rack Mount Kit	85.00	85.00

1	Linksys	Switch	Linksys 5-Port Smart Gigabit Ethernet Switch	100.00	100.00
			Rack Storage		
1	Middle Atlan	BRK 20	Equipment rack consisting of 20 Rus, blanks, power strip, 2 RU drawer, shelf and rack hardware	350.00	350.00
			Infrastructure, Programming & Integration		
1	TeL Systems	MATERIALS	Cable, Connectors and Misc. Hardware, including Rack Power, Shelving, etc.	$ 2,003.00	$ 2,003.00
1	TeL Systems	Programming	Control System Programming	$ 1,985.00	$ 1,985.00
1	TeL Systems	Installation	Installation Labor Charges for all of the Above. Base Project Regular Shift Hours Apply (for TeL Systems - 8am to 4:30pm).	$ 7,010.00	7,010.00
1	TeL Systems	Engineering	Design and Engineering for Installation	$ 865.00	$ 865.00
1	TeL Systems	CAD	CAD Labor and Materials for Installation	$ 865.00	$ 865.00
1	TeL Systems	Freight	Freight	$ 400.00	$ 400.00
1	TeL Systems	Close-Out	System Documentation - All Manuals including System Operation	No Charge	
1	TeL Systems	Warranty	One Year Warranty	No Charge	
			TOTAL ESTIMATE FOR PROJECT		**#REF!**

Total estimate = $38,175.00
($36,271 + 5%)

Multimedia and LCD Data Projector Installations
Order Checklist

✓	Item Description	Recommended Product	Recommended Vendor	Contact	Estimated Unit Cost
	REQ 1:				
☑	Electrical Work: Upgrade electrical service in the following Room(s): <*specify building and room number(s)*>. New equipment to be installed includes: <*list all items included in the project; e.g., Ceiling-mounted LCD Data Projector, DVD/VCR Player, Document Camera, Computer and Monitor, Powered Speaker(s), etc.*>.		Bid	Anthony Parker	$ 2500/Room
	REQ 2:				
☐	Data Drop(s) for Computer, Printer, etc. (11-2)		Enertron	Sandro Silvestri	$ 200/Drop
	REQ 3:				
☑	Lockdown Devices for Computer. Note: Lockdown for LCD Data Projector is included in the projector installation bid below.	Computer Lockdown, parts Computer Lockdown, labor	Business Machine Security	Sandro Silvestri	$ 220/parts $ 30/labor
☑	Lockdown Devices for Document Camera. Note: Lockdown for LCD Data Projector is included in the projector installation bid below.	Doc Cam Lockdown, parts Doc Cam Lockdown, labor			$ 165/parts $ 25/labor
	REQ 4:				
☐	Instructor's Desk for Computer, Monitor, Document Camera, DVD/VCR Player, etc.	Steelcase Custom Configuration	Lincoln Office Solutions	Fred Steiner	$ 1,500.00
	REQ 5:				
☑	Computer and Monitor	per Data & Voice spec's	Bid	Sandro Silvestri	$ 1,000.00
	REQ 6:				
	AV Equipment and Installation:				
☑	Projector, 4000 Lumen, XGA, 3000:1	Hitachi Model CP-X4014WN	Bid	Anthony Bitonti	$ 1,050.00
☑	Replacement Lamp #CPX2010LAMP for Hitachi CP-X4014WN Projector	Hitachi Model DT01021			$ 270.00
☐	StarBoard 17" Interactive LCD Display	Hitachi Model T-17SXLG			$ 1,500.00
☐	Elmo P30S Visual Presenter (Document Camera)	Elmo Model 1301			$ 2,050.00
☑	Da-Lite Projector Screen, Model C, Square Format, 84" x 84", Matte White (Tech Bldg: Da-Lite Projector Screen, Model C, Squate Format, 8'x8', Matte White)	Da-Lite Part 75912 (Da-Lite Part 40252)			240.00 (290.00)
☑	Da-Lite No.6 Wall Bracket, 6", non-adjustable	Da-Lite Part 40932			$ 15.00
☐	Amplified In-ceiling Powered Speaker System, Four Speakers (Note: The college has adopted a standard of four (4) ceiling-mounted speakers installed in each room.	OWI Model AMP1S64			$ 375.00
☐	Amplified In-ceiling Powered Speaker System, Two Speakers (Note: Two additional speakers (for a total of 6) would be needed only for large rooms.)	OWI Model AMP1S62			$ 250.00
☐	Automatic Standby Switcher, 4x1, XGA, w/Stereo Audio	Kramer Model VP411DS			$ 420.00
☑	Wall Plate; Stainless Steel with etched input labels; double-gang; with inputs for: VGA, 3.5mm jack (for PC audio), 3 RCA (yellow, white, red), and HDMI.	Custom			$ 80.00
☑	Locking LCD Projector Mount, small 12.0"W x 13.5"D	Business Machine Security Model LCD LOC II			$ 110.00
☑	Ceiling Plate and Extension Column for above LCD Projector Mount (for rooms without a drop ceiling)	Business Machine Security			$ 20.00
☐	ButtonMate XLP Media Controller, White	MediaTech # MT-XLP-BM-100-W			$ 150.00
☐	Cable, 3 Pin, RS232 DBF to Blunt 50' (for above ButtonMate XLP Controller)	Covid Model CSP-329B-22-50			$ 60.00
☑	Cables and Miscellaneous Installation Material				$ 500/Room
☑	Installation Labor				$ 600/Room

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FEATURE

How Technology is Being Used In PT and PTA Education

Many faculty members in physical therapist and physical therapist assistant education programs are using technology to teach their students. They report benefits not only for the students and educators, but also for the entire profession.

By Michele Wojciechowski
October 2011

Barb Belyea, PT, DPT, CSCS, clinical associate professor at Ithaca College, and her colleagues were looking for ways to allow students to practice clinical decision-making while maintaining the quality of the patients' care and the confidence of the students.

"Our students are bright kids. They can study the information. They can learn the hands-on skills. But the piece that they struggle with, particularly early on, is integrating the different courses that they're taking and applying all that to making a decision about a patient in a clinical setting," says Belyea.

After much thought and discussion, Belyea and her colleagues—Michael Eugene Buck, PT, PhD, and Christine A. McNamara, PT, DPT—developed an interactive computer program. The program allows students to listen to a physical therapist (PT) interviewing actual patients about their symptoms and medical history. The students can access the patients' X-rays or MRIs if applicable, and listen to the patients' responses to questions. The program also allows the students to click on the patient's photos or video clips.

Armed with this information, students receive 3 chances to make the correct diagnosis. If they're unable to, the computer program provides it.

"The primary goal of the program is to give students practice at interpreting the results of an exam and coming up with a diagnosis, then ultimately setting the treatment plan. But they don't ask the questions. They don't physically do the tests. And there's no interaction with the patient," explains Belyea. "So this would never actually replace working directly with patients."

But what it does is expose students to real-life situations with real patients with real maladies. And it employs multiple technologies to give the students a richer, more complete experience than could be achieved in the classroom.

The Growing Presence Of Technology

Technology is an important part of everyday life. Whether it's smart phones or iPads, computers or Flip cameras, technology is taking on a larger—and in some cases vital—role in many people's day-to-day lives.

So it's not surprising that technology would be used in education, especially as today's students have been brought up with computers, video games, multimedia MP3 players, and other devices. But if you think that using technology in education—in particular physical therapy education—is new, think again.

"We've been using multimedia in PT education for years," says Jody Frost, PT, DPT, PhD, APTA's director of academic/clinical education affairs. "Years ago it was a mimeograph or a carousel slideshow. It's no different today; only the level of technology has been augmented. It's still a mechanism to provide visual, auditory, and—in some cases—multi-sensory experience."

While a wide an array of advanced technology is available to educators and their students, that doesn't necessarily mean that they must use it. Karen Huhn, PT, PhD, assistant professor at the University of Medicine and Dentistry in New Jersey, urges faculty members to evaluate why they want to use technology. "In education, you have to be sure you're using it because it's meeting a need, and not just because it's 'cool.'"

Frost poses some key questions to ask before implementing technology. "What am I really trying to have the student learn? What are the various alternative methods available? What's the cost/benefit analysis of using the different technologies? What training is required of faculty or a curriculum instructional design person to appropriately use the technology? What will it cost to train and teach people how to use that particular technology?" Further, what is the long-term viability of the technology?

After determining if using a particular family of technology is beneficial, educators need to focus on its strengths and weaknesses. Huhn poses these questions: "What do they need from the technology? Do they need multimedia? Do they need video and audio? Do they need to be Web-based? Do they want it to be accessible on the Internet, on a computer in their classrooms, on their phones, or on their iPads? Then test it. Just like any educational tool, the technology should be evaluated to see if it's meeting the need you designed it for."

Many instructors already have asked these questions, arrived at a determination that technology can be beneficial, and have moved on to making the technology work.

Build It or Buy It?

Belyea and her colleagues did all the work themselves—from shooting the video footage and recording the audio of the patients to putting together all the other elements in the program. While she acknowledges that she and her colleagues faced a learning curve, it was worth it. "We really wanted to learn to do it on our own," she says. And after seeing how it benefits the students, she says, "I think it was worth it."

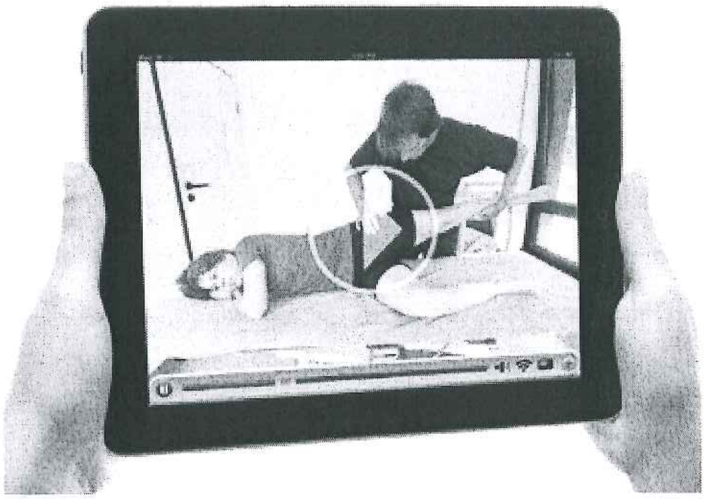
Karen Huhn, along with colleague Judith E. Deutsch, PT, PhD, also wanted to develop a virtual physical therapy clinic. But they decided to take another path, working with DXR Development Group Inc. Huhn and Deutsch told the company what they wanted, and the designers came up with VirtualPT Clinician, a Web-based simulation program.

"Students can go online and access the patient case. They can complete a history, do an examination, diagnose, and treat a patient online," explains Huhn. Students access a database of images, video, and audio of the patient, history questions, and all the tools that a physical therapist would use. "The beauty is that the computer tracks everything the student does. The computer knows when the student has asked a question and what question was asked. It knows when and why a student conducted an exam because when students do one, they have to explain why they did it. The program lets us get in and see their actual thinking while working on a patient's case."

Huhn adds that the program is used to supplement classwork. For example, when she delivers a lecture on spinal cord injury, she will assign the students a spinal cord injury case on VirtualPT Clinician. "It's a nice way for us to expose them to more realistic cases, rather than giving them a piece of paper with information on it."

Flipping Out

As part of a kinesiology class in the physical therapist assistant (PTA) program at Penn State, Mont Alto, Senior Instructor Renee Borromeo, PT, DPT, has her students use Flip cameras—an inexpensive and easy-to-use line of video cameras—to videotape a specified movement, such as hitting a ball with a tennis racket or squatting to pick something off the floor. The students create a 5-to-10 minute mini-documentary using iMovie—a video editing software program—to show the movement analysis from different angles. The students also have to use slow motion and include still photos to explain what is happening to the joints and muscles inside the body.



Borromeo says that she's assigned students this project since she began at Mont Alto in 1993. Back then, though, the final work product was a typed paper. That project evolved—first with photos, then with short 30-second videos. Today, students produce creative videos that they put on YouTube.

While the project is fun, Borromeo says, it also is educational. "The nice thing with video is that the students can watch the same movement over and over again. They can see where a movement changed from eccentric to concentric," says Borromeo. "They spend a lot of time doing the movement analysis and getting it exactly right before they put the video up for everyone to see."

Student Susan Tome says that her group's video project allows "anybody to go on YouTube and watch our project about a tennis swing." That's one reason why she and the other students put so much effort into the project—because they knew their audience wouldn't just be their classmates. "So much goes into any simple movement. We were making changes constantly," she says. "It was a lot of work, but there was a lot of learning in the process."

Borromeo adds: "I think you tend to put more time into any project you have fun with."

Immediate Feedback

Katrin Mattern-Baxter, PT, DPT, PCS, assistant professor of physical therapy at the University of the Pacific, says that audience response systems—handheld remote devices often referred to as "clickers"—are great to use during lectures.

The clickers are used to anonymously poll students, either individually or as a group, about a question Mattern-Baxter has posed during a PowerPoint presentation. After she asks the question, students select their responses. The aggregate results are presented on screen in the form of a graph, identifying how many students got it right and how many got it wrong, without identifying individuals.

Mattern-Baxter calls this technology "great" because students receive instant feedback. They know right away if they understand a concept. Similarly, the technology helps the professors gauge whether the students understand the information. If so, instruction can move on to the next point. If not, the professors can spend more time explaining it.

"It's a powerful tool," says Mattern-Baxter. "It's non-threatening to students because even if they give a wrong answer, no one will know."

Student Kristen Galione says that using clickers helped her greatly. "It's helpful during a lecture to get a check on whether you're following along with what's being taught. It really enhanced my retention of concepts," she says. "It made studying for exams easier because you've already quizzed yourself on the material. The clicker questions stick with you when you come across the concept again."

In addition, Mattern-Baxter's students use Flip cameras and the iPod Touch. When students are learning a new psycho-motor skill, she has them videotape each another. They put the videos onto their laptops and are able to view their performances instantly and receive immediate feedback.

"If I teach more complicated psycho-motor skills, I will put an instructor example on our educational Web page. The clips can be downloaded onto the students' iPods, so they can take them wherever they go. The students have the opportunity to view these clips over and over to learn the skills," Mattern-Baxter explains. She also will demonstrate a skill when she teaches it. Again, technology comes in. "I will let those same iTunes clips run consecutively during the students' practice time so they can keep checking their performance against that of the instructor."

Another technology Mattern-Baxter uses is the Wii videogame system. Students learn the basics about the Wii, and then apply them with balance training and vestibular rehabilitation. Both pediatric and adult patients use the Wii in their clinic. "It's motivational," says Mattern-Baxter.

Capturing Classes

Huhn and her colleagues also use class capture. When a class is in a lecture hall, the entire lecture—including students' questions and responses—can be recorded with both audio and video. "We use this technology if a lecture needs to be reviewed, if a student misses a class, or if a student wants to listen to it again," says Huhn. Class capture also has been used with guest speakers. The presentation can be shown to classes that weren't able to attend the live presentation. "It's like archiving the lecture," she says.

Huhn also uses podcasting to preserve a lecture. She and other faculty will post a lecture with PowerPoint slides to iTunes University. She cites various benefits. For example, it allows students to listen to the lecture before they come to class so that all the class can be devoted to lab instruction. "Our students are always saying they want more hands-on time, and this gives it to them."

Reaping the Rewards

The hope in using new technologies, Huhn says, is that the school can produce better-prepared graduates. "We know that there's a large gap between experts and novices. It takes a new graduate several years to get good at the clinical reasoning process. They gain that skill, in part, by practicing with patient cases. Our hope is that if we can expose them to a variety of cases via the VirtualPT Clinician and other technologies, then we can shorten that gap," Huhn says.

"As we become more autonomous practitioners, technology is only going to help new professionals be ready to enter the profession and be capable of deferential diagnosis," says Belyea.

Belyea points out that most of today's students have grown up learning with the help of technology. "They're used to using computers, and they're used to having access to a learning module when they want it—and not necessarily something that's only available in the classroom or in the lab," she says. "This kind of learning is going to become more in demand by students. That's how they want to learn. We're in no way ready to get away from textbooks, but technology gives students responsibility and motivation in a different way than can be found in traditional textbooks."

Mattern-Baxter believes technology benefits schools, too: "Future students may see in our blogs, on our Web site, how we use technology in the classroom and during community service activities. Some of them might be motivated to apply to our program because they see that we are up-to-date on technology."

Using video and audio through telehealth and telemedicine also will help future clinicians consult with other PTs worldwide, says Borromeo. This will be especially helpful to physical therapists in rural areas. Previously, they may have been on their own. Now they can collaborate with others.

Borromeo adds that being able to videotape patients and show their progression one day may even help with reimbursement. "Photos and video don't lie," she says.

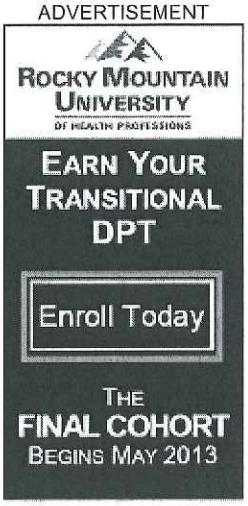
In the end, though, it's about the patients. They will be the ultimate beneficiaries of the new technology, those interviewed for this article say. Mattern-Baxter tells her students that they should be videotaping their patients for a number of reasons: to show the patients what they are doing right or wrong and to show them how their movements look. For privacy, she even will record the videos with the patients' own smart phones or use a dedicated clinic camera, with the video going only into the patients' files.

Huhn says that technology also affects patient education. When she is explaining something to a patient about his or her pain or what muscle she is trying to address, she often will pull up a picture or video on her phone to visually convey the information.

"I wish we had this technology when I went to school," Huhn says.

***Michele Wojciechowski** is an award-winning freelance writer and a frequent contributor to PT in Motion.*

PT in Motion, APTA's official member magazine, is the successor to *PT—Magazine of Physical Therapy*, which published 1993-2009. All links within articles reflect the URLs at the time of publication and may have expired.



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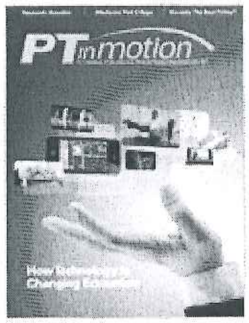

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What is new at your school of nursing?

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Portable Media Players in the Skills Laboratory

Once nurse educators have presented and demonstrated skills to students, they may not always be available to reinforce newly learned material during laboratory practice sessions. In certain nursing programs, skills laboratories are crowded with large numbers of students, and many students complain that they find it difficult to learn during designated practice sessions. Alternatives to face-to-face instruction are needed.

The nursing skills laboratory coordinator at Lorain County Community College in Ohio has been working on an innovative teaching-learning strategy that makes use of portable media players, such as the iPod®. A grant to the technology committee for the college allowed for the purchase of 10 video iPods for nursing education and provided an opportunity to try something new.

A plan was formulated to produce short clips in which the lab coordinator would demonstrate some of the skills that students are required to know. To identify appropriate skills, the coordinator questioned faculty and surveyed senior nursing students. Out of 120 forms distributed to students, 90 were returned with valuable information. It was found that the students wanted to review skills learned in their first nursing lab classes and to reinforce new and more complex skills. The college's Instructional Television Department was available to offer production support.

The original plan was to place clips on iPods that would be given to 10 different clinical instructors. Students would review appropriate clips in the clinical setting before performing certain procedures. The goal was to collect data as students viewed the clips to see if this type of review would help students feel more at ease while caring for clients.

The project was started in late April 2006, and the goal was to have the clips ready for use during the fall semester. However, it became apparent after filming began that production would be more difficult than anticipated. Although the clips were intended to be 20 minutes long, each took at least two hours to film. Each skill was filmed with a wide angle as well as close-up shots. Editing the material was also time consuming as the film quality had to be good enough to fit a tiny iPod screen. All told, there were numerous equipment problems and setbacks in editing.

Because the clips would not be ready for the fall semester, another plan was put into place. Ten senior nursing students were given iPods to use in clinicals and in the college lab for the remainder of the fall semester and were asked to report on how they used the clips.

The students stated that they found that the clips were helpful for reviewing procedures before a senior skills check-off session. They were also useful for two students who were ill and missed class. These students were asked to watch the clips for procedures they missed in class and then demonstrate the procedures to see if the clips alone would teach them how to perform. Both students passed on their first attempt. As a whole, the response to the iPods was favorable, with students stating that the clips provided a good review of skills learned early in their clinical education.

To date, 30 clips are complete and more are in the works. The iPod project is continuing through spring 2007 with three components for students at all levels. First, iPods are available for practicing skills in the skills laboratory. There, iPod boom boxes allow clips to be viewed by more than one student at a time, eliminating the need to purchase earpieces for all students. The boom boxes also serve as recharging stations for the equipment.

Two, the clips are being made available on the college's iTunes U site, which is available to all colleges and universities through Apple Computers. From this website, students can download video clips to their personal iPods, or the clips can be viewed on the computer at the student's convenience. Apple will supply a detailed list of how many times each clip is viewed by each student.

Finally, eight iPods will be given to senior nursing students to use in clinical settings and the skills lab. These students have agreed to have their nursing performance closely monitored so that more data can be gathered. The participating students will also complete a survey detailing their opinions about the program and its effectiveness.

Does watching a video iPod help nursing students learn and feel more comfortable with procedures? The students in the fall pilot study all stated yes, but the data collected over time will lead to a more definitive answer. As we consider uses for portable media players in nursing education, it is worthwhile to think about future applications. Imagine the day when clients and families are provided with portable media players at discharge to reinforce the learning of procedures required in the home setting.

CONTRIBUTED BY *Mary Grady, BSN, RN, nursing skills laboratory coordinator, Lorain County Community College, Elyria, Ohio, and Vivian M. Yates, MSN, RN, CNS, a professor in the associate degree nursing program, Lorain County Community College. For more information, contact Ms. Grady at mgrady@loraincc.edu.*

Beads for Books

Seeking a personal way to offer relief to victims of Hurricane Katrina, Lynda Nauright, EdD, RN, professor at Emory University's Nell Hodgson Woodruff School of Nursing, launched the Beads for Books drive to support Dillard University, located in the heart of New Orleans. Last summer, Dr. Nauright invited Emory nursing school faculty and students to donate used textbooks for Dillard's nursing school. In exchange for books, she gave them authentic Mardi Gras beads donated by a New Orleans businesswoman.

Dr. Nauright made her first road trip to New Orleans in October to deliver 12 boxes of books. Since then, she has added 22 boxes of textbooks to the collection, including a range of nursing specialty books, and plans to make a second trip to drop them off later this spring. NLN

Student Performance and Acceptance of Instructional Technology: Comparing Technology-Enhanced and Traditional Instruction for a Course in Statics

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ABSTRACT

The College of Engineering at the University of Cincinnati has evaluated the use of instructional technologies to improve the learning process for students in fundamental engineering science courses. The goal of this effort was to both retain more students in engineering programs and improve student performance through appropriate use of technology. Four modes of instruction were used to teach an engineering fundamentals course in statics. A traditional instructor-led course, a Web-assisted course, a streaming media course, and an interactive video course were all presented using a common syllabus, homework, tests, and grading regimen. Evaluations of final course grades indicate that use of instructional technology improved student performance when compared with traditional teaching methods. Student satisfaction with technology varied considerably with the Web-assisted format having the highest student approval rating of the technologies. The results indicate that time on task and interest in content can be improved through the appropriate use of technology.

I. INTRODUCTION

It has long been recognized that individuals display a variety of learning styles and preferences for receiving and processing information. Educational research has also indicated that the traditional methods used to teach students are not congruent with many students' preferred method for receiving information [7]. In particular, we have seen that undergraduate engineering education has failed to provide instruction in a manner that is consistent with prevalent learning styles of undergraduates [5]. One indication of this is the significant rate of attrition engineering colleges experience in the first two years of study. One explanation is that these students are simply not suited to engineering. Another possibility exists that suggests our traditional educational paradigm has failed significant numbers of students [2, 11]. The implications of this learning discontinuity are that students do not perform as well as possible and that students leave engineering to study other areas. If colleges of engineering are to increase the number of well-prepared practicing engineers, especially given flat enrollments, the learning paradigm must shift.

Many academic institutions are utilizing instructional technologies as one means for delivering materials that accommodate a variety of learning styles. Much has been written on the ability of technology to improve visualization and exploration, and while some question the efficacy of technology, results from educational research suggest that improvements in student performance can be achieved with appropriate use of technology [9, 10].

The University of Cincinnati's College of Engineering received a grant from the GE Fund to evaluate the relationship between student learning styles, use of instructional technology, student performance, and student acceptance of instructional technology. The goal of this project is to determine how to use these instructional technologies to optimize the learning process for students with different learning styles and personality types. The College hopes to both retain more students in engineering programs and improve student performance through appropriate use of technology. There was not an *a priori* expectation that certain technologies would accommodate certain learning styles and no attempt was (purposefully) made to design one course to more fully meet the need of any group of learners. The project sought to expand the body of knowledge on learning style and student performance by including the use of instructional technologies as a major variable. Through this project, we have begun to evaluate student learning styles and personality types, measure student satisfaction with technology, and correlate student performance with technology and learning style [8, 4].

This paper presents results on one aspect of the overall project, the use of instructional technologies to teach an engineering fundamentals course in statics. Descriptions of the technologies are provided, results of student performance and satisfaction are presented, and implications for improving engineering education are discussed.

As the project continues we will provide results on other elements of the study including learning style and personality type measurements, and correlations between performance and learning style.

II. Modes of Instruction

As a means to study the efficacy of instructional technologies, five sections of Engineering Mechanics I were created, each with a separate instructor. Except for the Interactive Video Receiving (see discussion below) the same faculty member taught the same section (same instructional technology) during both years of the study. Instructors selected the instructional format they wished to use. The traditional Instructor-led class using overheads and a chalkboard for presentation of materials served as a control group. The other sections used these instructional technologies:

- Interactive video originating
- Interactive video receiving
- Web-assisted presentation
- Streaming media presentation

Students enrolled in the course with no prior knowledge of the study and were randomly assigned to each of the sections. During the first class meeting, the project was described to the students, they were informed of the type of instructional format they would experience and asked to participate in the study. Participation was voluntary but after the first week of classes students were discouraged from changing sections. The number of students in the interactive video sections was constrained due to size of the rooms available. Each class followed the same syllabus, held in-person sessions the same dates and times, and used common tests and exams. Teaching assistants (TAs) were used to grade the tests and exams. To ensure consistent grading across the sections, each TA graded one specific question for all students enrolled in all sections. The project used the engineering mechanics course as the platform for investigation during the 1999–2000 and 2000–2001 academic years. Each technology and its implementation are discussed in the sections that follow.

A. Traditional Class

The traditional class was an instructor led class that met for three contact hours per week. The instructor presented material through oral presentations, use of overheads, and material written on a whiteboard. Typical class sessions consisted of a mixture of lecture, example problems worked by the instructor or the TA on the chalkboard, and questions and answers. Students had experienced this class setting in many other college courses. They were familiar with the setting, presentation techniques and mode of instructor interaction.

B. Interactive Video Class

The interactive video class used a classroom equipped with video and audio transmission/receiving equipment connected to a remote classroom similarly equipped. Typically, a presentation originated from one site and was transmitted to the other site. The students in the remote classroom could both see and hear the instructor real-time, and the instructor could see and hear students from the remote site. The instructor would lecture and present materials using the same media as in a traditional course. In most respects the interactive video presentation was comparable to a traditional classroom with a remote site added. The classes met for three contact hours per week. A typical class consisted of lecture and presentation of material by the instructor, questions and answers related to homework, and working of example problems. Interaction between instructor and students (at both sites) was frequent and encouraged. This was the first experience for students using this instructional technology. During the first year of the study, the class originated at the University of Cincinnati and was received by an instructor-facilitated class at Wright State University. During the second year of the study, the same instructor presented the course in the same video classroom, but the receiving site was another video classroom on the University of Cincinnati campus.

C. Web-Assisted Class

The Web-assisted class was developed as instructional content formatted for efficient delivery over the World Wide Web and was structured to promote interaction with the content [12]. Interaction with the content includes reading of text, viewing graphic images, following links to related topics, and downloading materials. This interaction is facilitated by the computer-mediated delivery with some aspects of the interaction not possible in a traditional classroom. Content was developed during the months preceding the actual course. The instructor developed PowerPoint presentations of material, example problems, graphics, solutions to homework problems, solutions to test problems, and navigation tools between the various elements. The instructor also included a number of brief, on-line assessments that would evaluate the students' comprehension of the content. If the assessment was not completed satisfactorily, a student was directed to review specific materials. These assessments did not form part of the students' grades.

Expectations for the Web-assisted class were that students viewed the content for a particular lesson on the Web and came to an in-person class session prepared to discuss the content. The class met the same dates and times as all other sections of the course to review the material, supplement the Web-based content with further explanations and problems, and to answer student questions. A typical in-person session included a brief explanation by the instructor of the important points of the lesson, working of problems, and answering student questions. This was the first experience for many students using the Web as an instructional technology.

D. Streaming Media Class

Streaming is a technique whereby information is provided by a Web server in a "just in time" format to a user requesting a large file [1]. Rather than downloading an entire audio or video file then playing the file, streaming sends a portion of the file, begins playing the file, while continuing to send successive portions of the file. As a method for delivery of instruction, the process that incorporates streaming media includes:

- presentation of material via lecture and visual presentation materials;
- "capturing" the presentation (both audio and video) on videotape or to a hard drive;

- converting the audio and video to digital formats that are capable of being streamed;
- storing these files on an appropriate server; and
- files streamed to a student when requested by a Web browser.

The instructor can lecture and present materials using the same media as in a traditional classroom (chalk, overheads, video tapes, computer generated images, demonstrations). All aspects of the presentation are captured. In one sense, providing instruction via streaming media is a re-creation of the classroom experience in an on-line delivery format.

The instructor for the streaming media course taught an equivalent class of engineering mechanics in the preceding quarter. This course was taught in a traditional classroom with equations and graphs developed on a whiteboard. During this in-person presentation, video cameras were used to record the instructor. This signal was digitized and saved as a computer file. Material that was on the whiteboard was also photographed with a digital camera and saved as computer files [13].

After the presentation of an individual class session, the file containing the audio and video presentation was linked with the files containing the images on the whiteboard. This information was then made available through a Web page. A specific Web page was developed for each individual class session and stored on a Web server. Students in this class were given instructions on the location of the Web pages and how to access the content.

Expectations for the streaming media class were that students viewed the content for a particular lesson on the Web and came to an in-person class session prepared to discuss the content. The class met the same dates and times as the other sections to review the material, supplement the streaming media content with further explanations and problems, and to answer student questions. A typical in-person session included explanation by the instructor of the important points of the lesson, working of problems, and answering student questions. While most students were familiar with streaming audio and video, this was the first experience for most of them with the use of streaming media as an instructional technology.

III. Faculty Preparation

The instructors for this program were purposefully selected based on their experience teaching the course material and their performance on teaching evaluations from students. All instructors had previously taught the entire array of mechanics courses—Mechanics I (statics), Mechanics II (kinematics), and Mechanics III (rigid body dynamics)—and all had consistently received excellent evaluations from the students. The senior faculty member also served as the Director of the Mechanics Program and provided oversight in the development of consistent lesson plans, homework and exams.

Regular project meetings were held with the faculty to inform them about the project goals and the important role that they had in the project. The faculty understood the importance of working together to provide a consistent learning experience for the students who would utilize different instructional technologies in the various sections.

The faculty received extensive training for the project that was designed to equip them to use the technologies effectively. All of the faculty, their graduate assistants, and some members of the project team participated in the following workshops: Fundamentals of Video Presentations, Video Production for Interactive Video, and Streaming Video Production. In addition, the instructor for the interactive video section and the instructor for the streaming media section received additional training in these two technologies since they had not used these modes of instruction. They produced several pilot productions in the specific technologies that were critiqued by other faculty experienced with the technology. The pilot productions continued to improve through this process until the faculty felt ready for the actual classroom delivery.

IV. Results

The results from the study are presented in terms of student performance and student satisfaction. Final course grades were used as the measure of student performance since these are directly coupled with the students' experience for that course, they are readily quantifiable, and this measure is consistent with other published studies (e.g., [3, 6]).

Surveys were designed to help quantify student satisfaction and acceptance of the various technologies and to determine if these instructional technologies resonated with a particular student learning style or personality type. The surveys provided information regarding student interest, engagement, and satisfaction with the instructional technologies. The surveys also provided a mechanism to identify potential problems in the implementation and delivery of the course using the instructional technologies. For example, if large numbers of students were having problems finding and navigating Web material, the surveys would identify this problem. The project team could then make modifications or improvements so that the problem was eliminated or at least minimized.

The number of students participating in each section each year is shown in Table 1 (note that the "format designator" is used in all figures presented).

A. Student Performance

The mean course grade for each instructional format averaged over the two years of the study is shown in Figure 1 along with the standard deviation. One-way analysis of variance indicates that there are overall significant differences between final course grades for some of the instructional formats. A least significant difference post-hoc analysis indicates that the differences in course grades are significant at the 95% confidence interval in the following pairings:

- Streaming video is significantly higher than traditional lecture.
- Web-assisted is significantly higher than traditional lecture.
- Interactive video originating is significantly higher than traditional lecture.

There were no significant differences when evaluating one technology-based format against another.

B. Student Satisfaction

Surveys were developed for each section of students, corresponding to each instructional technology. The survey for each section contained questions common to all sections, and questions specific

Instructional Format	Format Designator	Number of Students in Mechanics I	
		Year '00	Year '01
Streaming Media	SV	28	22
Web Assisted	Web	34	24
Interactive Video - Originating	IVO	23	27
Interactive Video - Receiving	IVR	15	14
Traditional	Tr	35	18

Table 1. Number of students in study.

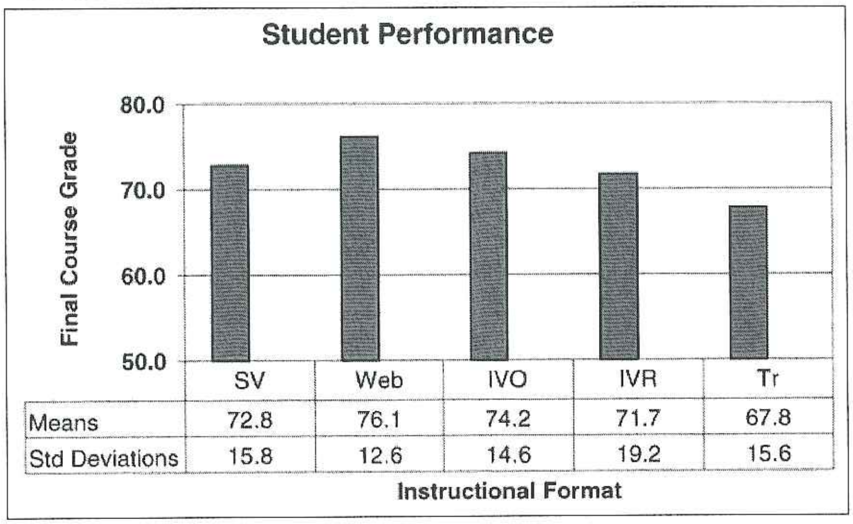


Figure 1. Final course grade by instructional format.

to the instructional technology being used for that section. The common questions allowed the project team to qualitatively compare the various technologies. The questions specific to each technology allowed us to more accurately quantify student satisfaction with various aspects of the particular technology.

Students used a modified Liekert scale to respond to survey questions. A response of "1" indicated strong disagreement; "3" was neutral; and "5" indicated strong agreement. Figure 2 shows student response by instructional technology to the statement "I learned the concepts effectively using this instructional format." Figure 3 shows student response to the statement "Compared to a traditional classroom setting, this format is more effective." A neutral response of "3" is shown for the traditional setting for point of reference. Figure 4 provides the student response to the statement "Given a choice, I would enroll in another course using this instructional format rather than a traditional lecture course." Again, a neutral response of "3" is shown for the traditional setting. Figure 5 provides student response to the statement "Compared with other instructors I have had, the instructor for this course was effective."

For the streaming media section and the Web-assisted section, materials were available on-line and available anytime to the students. Table 2 provides responses to several survey questions regarding this aspect of the course. Responses are averages for the two years.

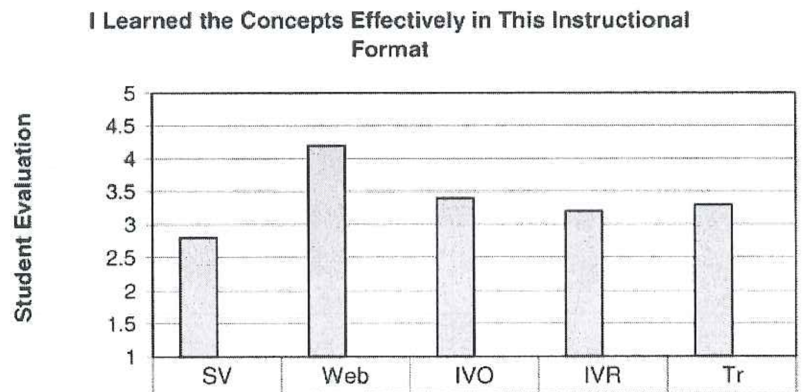
V. Conclusion

Based on final grades in the various sections of the course, the use of instructional technologies improved student performance compared with the traditional classroom setting. The authors attribute this to several factors.

Time on Task—the students in the streaming media section and Web-assisted section were required to view the on-line materials prior to the in-person part of the presentation. The time students spent with the content appeared to be more than an individual would spend reading the text in preparation for a traditional course.

Student Interest—the technology-supported sections of the course represented a new type of experience for these students (all freshmen). While the technologies are not without problems, students tended to be more engaged with the content presentation compared with the traditional classroom setting. Students of this age with an interest in engineering tend to be fairly technologically savvy and generally are not intimidated by the use of technology.

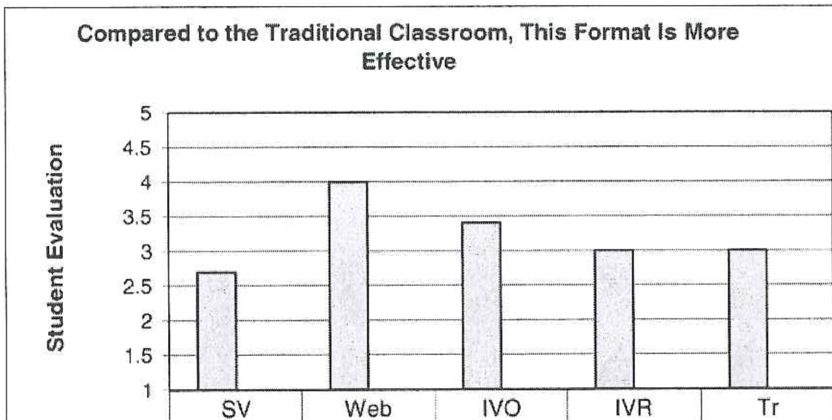
Instructor Interest—the instructors participating in this project were supported monetarily and with additional graduate student help. Given their reputation as excellent instructors and their professionalism, they were motivated to provide a superior learning experience for students in their respective classes.



	SV	Web	IVO	IVR	Tr
Mean	2.8	4.2	3.4	3.2	3.3
Std Deviation	1.2	1	0.9	1.1	1

Instructional Format

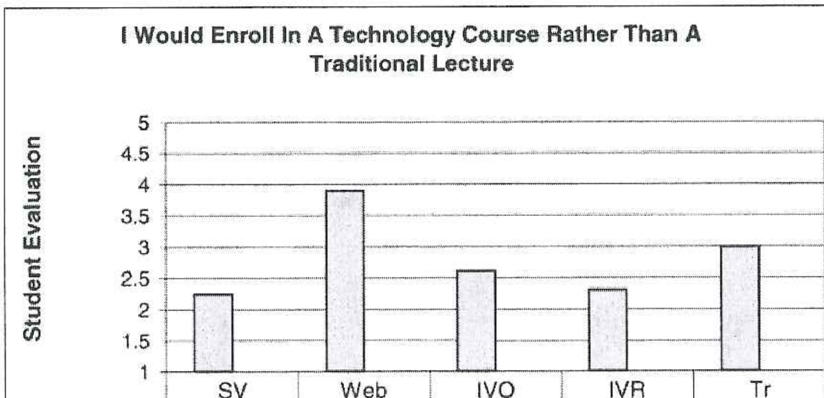
Figure 2. Student response to learning.



	SV	Web	IVO	IVR	Tr
Mean	2.7	4	3.4	3	3
Std Deviation	1.2	1.1	0.9	1.3	0

Instructional Format

Figure 3. Student response to effectiveness of technology.



	SV	Web	IVO	IVR	Tr
Mean	2.3	3.9	2.6	2.3	3
Std Deviation	1.3	1.1	1.1	1.2	0

Instructional Format

Figure 4. Student response to choice of format.

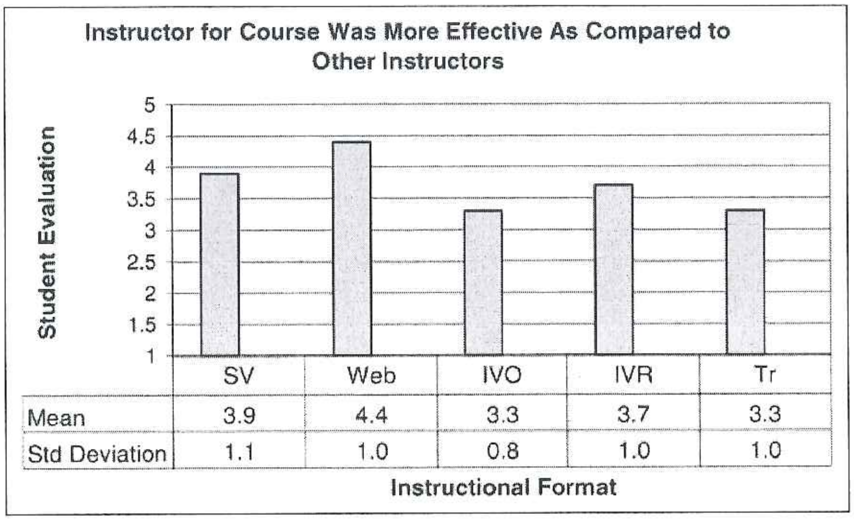


Figure 5. Student response to instructor effectiveness.

Survey Question	SV	Web
The ability to view the material on-line at my convenience was an advantage versus a traditional course	2.9	4.0
The ability to review material instantly if a question arises aided my understanding of the concepts	3.1	3.8
The ability to review previous lectures anytime was an advantage versus a traditional course	3.1	4.0

Table 2. Questions specific to web and streaming media.

Except for the Web-assisted course, students did not feel that the instructional formats were more effective than the traditional classroom setting. A similar sentiment is also clearly illustrated by Figure 4 in the students' interest in enrolling in other technology-assisted courses. Based on student evaluations of the instructional technologies, this implementation of a Web-assisted course was a success. It is interesting to note however, that there are no statistically significant differences in student performance between the technology-assisted courses. Although the study has been designed and conducted to establish relationships between instructional technology and student performance, it is not possible to completely remove the influence of other variables. One variable worth noting is the influence of the instructor on student performance. While all instructors participating in the study were selected based on their knowledge of the subject matter and their reputation for teaching excellence, and all instructors followed a common syllabus and used common evaluation instruments, they still differ in teaching style and approach to student interaction. It is our opinion that the instructor influence likely contributed to the higher ratings of the Web-assisted course in the student satisfaction surveys but did not contribute significantly to student performance.

Another variable that must be addressed is the expected performance of students in each particular section. It is possible that the students enrolled in the Web-assisted course, for instance, were simply better students than those in the traditional course. To control for this possibility, students were randomly assigned to each section with no prior knowledge of how that section would be taught. We also examined the expected performance of the students by using two measures that had been shown to be positively correlated with performance in the mechanics course, grades in Physics I and grades in Calculus I. This examination predicted no bias in any of the sections, that is, there was no statistically significant difference in expected performance.

The project has been a rich learning experience not only in terms of student learning but also in developing and implementing effective teaching using technology. Items of particular importance regarding the instructional technologies include:

- Use of technology helps to keep students engaged in the presentation of content compared to a lecture only class setting.
- Developing materials to be used with instructional technologies (both Web and streaming media) requires significant effort. Sufficient time and resources need to be allocated to have effective materials.
- A great deal of attention needs to be paid to the details of the production of the streaming media material. It is not enough to videotape an instructor teaching in a traditional classroom and then digitize the media for Web presentation. Camera placement, instructor movement, image quality, types of media used, and hearing student questions are among the many details that must be thought through.
- Technical support for interactive video must be readily available if telecommunications problems come up. In addition, it is advantageous to have a contingency plan if telecommunications problems are so severe that the classrooms cannot be connected.

- Even in well supported, frequently used video classrooms, technical difficulties or connection problems (albeit brief) occur on a fairly regular basis.
- With practice, instructors in the video classroom were able to have significant and frequent interactions with both local and remote students. Although the interactions are not the same as face-to-face meetings, they can be as effective.
- Given the opportunity and sufficient resources, faculty are quite willing to use instructional technologies for teaching. Many welcome the opportunity to enhance routine presentations in an effort to improve the learning process.

The results to date are encouraging but there are a number of issues that are not well understood. Differences in student attitudes in the interactive video sections and the traditional lecture section require more analysis before conclusions can be reached on the effectiveness of this instructional modality. Since these three sections are essentially a traditional lecture with real-time instructor-student interaction, the authors expected a more consistent response in student evaluation than was observed. Likewise student response to effectiveness of the interactive video technology (Figures 2 and 3) and their interest in participating in future video-based courses (Figure 4) appear inconsistent.

VI. Future Work

An equivalent evaluation of technology and student learning has been conducted using Basic Strength of Materials during the 2000–2001 and the 2001–2002 academic years. Data from this portion of the project will be analyzed and documented. Data for all students participating in the study will be conglomerated to evaluate:

- Correlations between technology and student performance.
- Correlations between technology and student satisfaction.
- Correlations between student learning styles and personality types and student performance.
- Correlations between student learning styles and personality types and student satisfaction.
- Correlations between instructional technology, student learning style, and student performance.

Based on these findings, the College of Engineering at the University of Cincinnati will evaluate how best to achieve the stated goal of the project—the improvement of the educational experience for students with different learning styles and personality types. The results presented here indicate that improvements can be achieved through the appropriate use of Web-based materials to supplement the in-class experience.

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A new simulator-based psychological training on crisis management

M P Mueller, A R Heller & T Koch

The context and setting In aviation, one aspect of safety improvement for over 30 years has been the implementation of crew resource management (CRM) seminars. This psychological teaching form focuses on the CRM competencies *task management, dynamic decision making, teamwork* and *situation awareness.* The same competencies can be applied to the medical field. Until now, training of these basic skills has not been established in undergraduate medical education, although they would be as helpful for medical teams as they are for people working in other complex environments.

Why the idea was necessary Full-scale patient simulators have been available for more than 15 years. Crisis resource management courses have been developed for doctors with a focus on the CRM competencies. In contrast to aviation, most medical CRM courses are held without psychologists, although the course objectives are psychological competencies. Furthermore, no psychological exercises concerning CRM skills are offered, in contrast to CRM seminars for air crews. In particular, beginners in the medical profession have difficulty applying knowledge and working effectively under stress. For this reason, non-technical skills should already be taught during undergraduate medical education.

What was done We established a curriculum for medical students to teach non-technical skills. A 3-hour pilot course with a focus on situation awareness was set up as part of the mandatory 2-week course in 'Anaesthesiology' for students between the third and the fifth year. After a lecture about human factors and error prevention (20 minutes), 1 psychologist and 2 anaesthesiologists demonstrated a short resuscitation sequence on a METI-ECS patient simulator (METI, FL, USA). The students had to observe the scenario and discuss how CRM skills were practised (40 minutes). This was followed by a 45-minute seminar about situation awareness, held by a psychologist. The exercises were designed for a medical context by a team of psychologists prior to the course. After the seminar the students completed a resuscitation scenario with the simulator, followed by a debriefing focussed on situation awareness. In all, the simulator training lasted 60 minutes. Participants were asked to complete a questionnaire at the end of the course.

Evaluation of results and impact We received 22 evaluation questionnaires from the 22 students who took part in the course. The overall mark was 1.8 ± 0.8 [marks from 1 (excellent) to 6 (poor), mean ± standard deviation (SD)]. The course was rated as suitable for linking theoretical knowledge with clinical contents (2.0 ± 1.0). The marks for the simulator training and the psychological seminar were 1.5 ± 0.7 and 2.0 ± 0.9, respectively. The lecture was marked with 1.7 ± 0.9. The content versus time ratio revealed an average mark of 4.2 ± 0.5 (1: too much content to 7: too much time; 4: ideal ratio) and the theory versus practice ratio was rated nearly perfect (3.9 ± 0.4, 1: too much theory to : too much practice).

As our students valued teaching about error prevention and crisis management, we will offer similar courses focusing on the other 3 CRM competencies within the next semester.

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Video improved role play for teaching communication skills

Caroline Fertleman, James Gibbs & Sarah Eisen

Context and setting It is widely acknowledged that communication skills are central to effective clinical practice and must be taught. Role play can give students the opportunity to gain insight into a parent's perspective as well as experiencing how the doctor may feel dealing with difficult situations, and allows the practice and exploration of appropriate responses. We have developed and evaluated a new teaching aid in communication skills for second-year clinical medical students using edited video footage. This material provides a useful starting point for learning through role play and subsequent open discussion.

Why the idea was necessary Although many medical students dislike role play, the experience can be enhanced if the students are able to develop some insight into the situations they are role playing by exposure to authentic discussion of parental circumstances beforehand. However, parents find repeated discussion of their experiences emotionally draining and time-consuming. Using recorded material overcomes this problem effectively, while preserving most of the impact of their account.

What is being done Three mothers of ill children (diabetes, cerebral palsy and complex congenital heart disease) were videoed talking about their experiences. They discuss the impact the diagnosis had on siblings and family, how the news was initially broken, their feelings of guilt, blame and anger and their experience of the health-care system and its professionals. The edited testimony of one of the mothers (lasting 30 minutes) was shown to groups of 12 medical students during their paediatric attachment. The video was a prelude to role play lasting 5 minutes. Each group consisted of a 'mother', a 'doctor' and 1 or 2 observers, and explored 1 of 3 challenging situations faced by the mother. After the role play the students fed back to each other about their performance using the Calgary–Cambridge guide for the medical consultation within their groups for a further 5 minutes. Finally there was a facilitated discussion for the whole group for 20 minutes. Students completed questionnaires with 100 dot Likert scales (0 = not useful, 100 = useful) to evaluate the session.

Evaluation of results and impact Attendance rate was 80% (n = 205) in a 6-month period. All students completed the questionnaires. Interim data suggest that this is an effective teaching approach. The following sections were felt to be useful; videos (median Likert score 84, 95% confidence intervals (CI), 20–100), role play (median score 68, 95% CI, 8–99) and discussion (median score 77, 95% CI, 7–99). Free text comments were generally constructive and encouraging, although 26 students felt that the role play was not useful. Overall, students rated the session positively (median 73, 95% CI, 23–99). Students reported that the video brought the mother's perspective to life and is an effective trigger from which to explore issues such as empathy, sensitivity and tact. Video-informed role play appears to be an effective teaching method for communication skills training in paediatrics.

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Can peer review help the marking experience?

Fiona Wood, Kamila Hawthorne, Kerenza Hood & Rebecca Cannings-John

Context and setting Assessment of a written case presentation forms the end of the general practice (GP) rotation in Year 3 of undergraduate medical education at Cardiff University. This is marked by tutors in GP who have been closely involved in the curriculum.

Why the idea was necessary Experiences of marking varied within this group, many of whom found initial calibration of their 20–30 cases difficult. Previously, tutors had double-marked cases to check reliability but had not discussed their marking decisions in any depth. Within medical education, attention is focused on the development of teaching methods, but markers (as experts in their field) are often expected to know how to assess. This study describes the introduction of a formal method of peer review of marking and its impact on the markers.

What was done Participants in the peer review process met in groups of 4 after marking their first few cases, with the purpose of discussing their marks and the marking schedule. When they had reached consensus on the marking process, they individually marked their remaining cases.

Semistructured interviews were conducted with 7 of the 16 GP tutors. The purposive sample comprised 2 new markers, 2 with moderate experience and 3 experienced markers. Each was interviewed twice, before and after the marking. All interviews were audiotaped, transcribed and analysed for emerging themes. A respondent validation exercise was conducted with all 16 tutors, which confirmed our initial analysis.

Evaluation of results and impact All markers found the process beneficial, going well beyond mere comparison of marks. Needing to explain marking decisions to their peers forced markers to interpret the marking schedule thoughtfully and to learn from each other. Additional benefits included:

- improved confidence in marking abilities;
- ensured consistency;
- shared responsibility for failing students;
- increased awareness of one's own marking style, and
- moderation of extreme views.

Tutors adopted roles within the peer review process, as chairperson, 'hawk', 'dove', expert, novice and student advocate. Exposure to others' techniques influenced marking rigour, with much of the debate relating to the interpretation of the marking schedule. One important outcome has been the subsequent remodelling of the allocation of marks by one of the tutors, allowing greater discrimination between good and bad cases.

Disadvantages to the peer review process included the additional time involved. Furthermore, peer

images (normal anatomy/X-ray diagnostic images, etc.).

Why the change was necessary In the medical school's curriculum the various discipline programmes have distinct content and teaching–learning methodologies. To improve student learning, and adjust horizontal content integration to meet standards established by the National Committee of University Evaluation and Accreditation (which demand more integrated curricula in family physician or general practitioner training models), an interdisciplinary module was implemented using case-study-based methodology.

What was done A clinical case of one pregnant/breastfeeding woman was used to trigger the learning of general embryology; reproductive, digestive and immune systems; family planning; pregnancy; prenatal control; and breastfeeding. A core faculty work group was established to: (1) develop the logic model for the design, implementation and evaluation of the project; (2) obtain horizontal integration between disciplines; and (3) construct integrated interdisciplinary objectives coherent with the assessment of skills, knowledge, group work, written abilities, comprehension and performance by the students. The module offered problem-solving sessions to 124 students over a period of 2 months, in small groups of around 8 students, facilitated by teachers who regularly used problem-solving methodology. A feedback questionnaire was administered to students to determine their perceptions of module goals, organisation, assessment and evaluation, teaching/learning sessions, teacher performance, skills acquisition, individual progress, etc. The rating scale was from 1 (completely disagree) to 9 (completely agree). Evaluation meetings rather than questionnaires were used to gauge teachers' perceptions of the module.

Evaluation of the results and impact Horizontal integration was obtained, the objectives were coherent with the assessment methods, and the assessment methods themselves were more integrated in content, shape and scoring. Eighty-four students took the examination and 60% passed in histology, embryology, molecular biology and genetics, compared to 36% of those taught by traditional methods in previous years ($P < 0.01$). However, percentage levels for PHC I (60% versus 50%) and anatomy and normal images (60% versus 61.8%) were not statistically significant. The results of the questionnaire showed the following student perceptions (percentage of ratings at or above 7): 65.7% will use the knowledge and skills obtained during the module; 51.7% thought they had gained more knowledge about the social aspects of health; 63.9% thought that group work facilitated integration; and 56.6% considered that the examinations were about important and relevant module issues. The teachers considered the module to be interesting and useful, but some had reservations.

Our results demonstrated that it is possible to integrate different disciplines with consensus, although it is challenging to sustain both a traditional and an innovative curriculum at the same time. We concluded that faculty development, involvement and commitment to curricular change, together with a carefully planned evaluation system, are essential to ensure success in applying innovative curricular practices. The practical experience of implementing the pilot module was very important in demonstrating the feasibility of curricular integration. The next step will be vertical content integration between basic and clinical courses.

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Wound closure: an instructional DVD

Michelle Lin, Justin Wilkinson & Arianne Teherani

Context and setting Millions of patients present to emergency departments worldwide with traumatic lacerations, requiring wound closure repair. Technical proficiency in wound repair is critical to reduce wound infection and improve cosmetic outcome. Although simple wound closure, such as suturing, is often considered a medical student level task, medical students receive variable training and education throughout the USA. Students are often taught by the less formal 'see one, do one, teach one' approach. Some institutions, however, provide a more formal course, comprising of a lecture and a practical, small-group workshop. To date, a standardised introduction to wound closure techniques does not exist.

Why the idea was necessary At the University of California San Francisco School of Medicine, medical students receive significant teaching on wound closure. This curriculum includes a 1-hour lecture on wound repair, followed by a small group suturing workshop using pigs' feet. Over the past 3 years, however, many student and instructor comments have suggested that a lecture alone was insufficient preparation for the workshop. Many recommended a more visual introduction to wound closure techniques beforehand. Suggested visual components

included viewing the actual equipment involved, observing the various sequential steps, and scrutinising the technical details, such as tying a surgical knot.
What was done Following suggestions to make a more visually oriented didactic curriculum, we developed a 12-chapter instructional DVD on wound closure. These chapters cover the following basic and advanced concepts: equipment; anaesthesia; irrigation; starting the procedure; simple interrupted sutures; horizontal mattress; vertical mattress; corner sutures; buried sutures; tissue adhesives; steristrips, and staples. These instructional modules incorporate digital videos of actual patients and animal models undergoing wound repair, instructional voiceover, cross-sectional diagrams, and animation. Software used included Quicktime Pro, iMovie, Photoshop, Macromedia Flash MX, and Swift 3D Animation.
Evaluation of results and impact Preliminary results from a prospective, randomised study of 46 preclinical medical students, comparing a traditional lecture to our instructional DVD, demonstrated that the DVD is superior. Those in the DVD study arm recorded higher competency test scores and reported a greater comfort level with wound closure. Further the students preferred the DVD teaching approach, because the DVD allowed for them to view chapters at their own time and pace. Chapters could be re-viewed to clarify confusing concepts, prior to attending the practical workshop. Consequently, these instructional chapters have been incorporated into the required course Preparation for Clerkships for all medical students at our institution who are starting their clinical rotations. Despite having these modules replace the traditional 'live' lecture prior to the animal model workshop, overwhelmingly positive comments make this DVD extremely promising as a resource in the global medical community of medical students, nurse practitioners and doctor assistants. This instructional DVD is a potential solution to variable wound closure education and training.

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Randomised trial of early clinical training for students

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Context and setting While there is a current impetus to provide students with clinical experiences early in medical school, the pedagogical value of these experiences is not clear and the ideal site for this exposure is unknown. The emergency department (ED) may be an ideal setting in which to provide these early clinical experiences due to its diverse patient population, wide variety of clinical problems of differing acuity, and the fact that ED patients often have yet to be diagnosed, thus giving students a frontline view of the diagnostic reasoning process.
Why the idea was necessary Although the published literature indicates that clinical experiences in the first 2 years of medical school are subjectively perceived by students and faculty to be of value, there is little evidence that these experiences improve the objectively assessed educational outcomes of students. Research in this area has been of limited methodological rigour, with study designs that lack control groups and few objective outcome measures such as objective structured clinical examinations (OSCEs).
What was done Harvard Medical School's 170 Year 1 medical students were invited to participate in a randomised controlled trial to assess the educational value of early clinical experiences in the ED. Volunteers were randomised into 2 groups:

1 emergency department physical examination teaching (intervention), in addition to standard teaching by lecture/small group, or
2 standard teaching alone (controls).

Controls had 2 sessions on pulmonary and cardiac examinations, each consisting of a 1-hour lecture followed by a 1-hour small group skills session. The ED curriculum consisted of 3 monthly, 2-hour sessions covering pulmonary and cardiac examinations, in which 3–5 students with 1 attending doctor examined ED patients. Upon conclusion, faculty and students completed an anonymous evaluative survey and all students completed an OSCE.
Evaluation of results and impact Of 77 eligible volunteers, 48 were randomly assigned to ED physical examination teaching. Survey response rates for ED faculty and students were both 75%. Faculty rated the ED to be an effective learning environment: mean 4·7 (SD 0·5) on a 5-point scale (1 = not effective, 5 = extremely effective). Students reported completing a mean 2·6 sessions and examining a mean 4·0 patients during each session. Students considered that ED sessions improved their competencies in both examinations: pulmonary examination mean 3·4 (SD 1·0), cardiac examination mean 3·7 (SD 1·1) (1 = no change, 5 = greatly increased competency). Emergency department sessions increased student

Lights! Camera! Action!: Video Projects in the Classroom

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ABSTRACT

We report on two classroom video projects intended to promote active student involvement in their classroom experience during a year-long medical-surgical nursing course. We implemented two types of projects, Nursing Grand Rounds and FPBTV. The projects are templates that can be applied to any nursing specialty and can be implemented without the use of video technology. During the course of several years, both projects have proven effective in encouraging students to promote pattern recognition of characteristic features of common illnesses, to develop teamwork strategies, and to practice their presentation skills in a safe environment among their peers. The projects appealed to students because they increased retention of information and immersed students in the experience of becoming experts about an illness or a family of medications. These projects have enabled students to become engaged and invested in their own learning in the classroom.

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Baccalaureate nursing students are often lively and interactive individuals who have a broad range of interests. Increasingly, they are pursuing double majors, participating in leadership roles in extracurricular activities, working part time, and seeking international health care experiences. In the clinical setting, they enjoy being busy and active. They yearn for hands-on experiences that enable them to "think on their feet." Students describe the unforgettable thrill of being able to accurately identify patient data relevant to a medical illness or a nursing diagnosis. Pattern recognition of essential features of common illnesses is an important component of the diagnostic reasoning process used by professionally competent nurses (Welk, 2002). Pattern recognition enables students to "put it all together" and develop appropriate nursing interventions.

In early medical-surgical nursing clinical experiences, students discover they must necessarily learn about a wide range of illnesses by assimilating a massive amount of new information. Before they can think on their feet, they must master key content areas, including integrative body functions, altered health states, pathophysiological disease processes, and the rationale behind diagnostic reasoning. To make matters more complicated, most medical-surgical nursing texts run 1,000 to 2,000 pages in length. Students also need their instructors' help in recognizing how they are using the nursing process to achieve and evaluate effective patient outcomes.

Passive Versus Active Learning

Until recently, the lecture format was considered the most efficient strategy for teaching medical-surgical nursing content, and excellence in teaching was viewed primarily as a reflection of individual teachers' mastery of the subject matter (Tanner, 2002). However, educators across many disciplines have now begun to focus on less tangible characteristics of teaching and learning (i.e., that teaching and learning are dynamic, interactive processes occurring in real time and resulting in authentic student engagement). Diekelmann (2002) described this process as a complex, lived practice, rather than simply a skill used to achieve cognitive gain in students. According to Diekelmann (2002), "Cognitive gain is only part of thinking and learning" (p. 97). Diekelmann asserted that reflective teachers learn how to "pitch or aim a lecture," "read the faces of students," and "follow a moving target," just as hunters know not only how to aim for the deer but also how deer move through the forest and react to sound. "As the target moves, the teacher will know when students 'have it' and are learning and when they are 'engaged' and thinking" (Diekelmann, 2002, p. 98).

However, even when teachers deliver a sensitively targeted lecture full of illustrative case studies, this strategy may not be sufficient. Benner (1984) clearly demonstrated how proficient and expert nurses accumulate clusters of paradigm cases that dramatically changed their approach to new patient situations. Although educators may use these examples as helpful case studies for their students, Benner emphasized the active role students need to play in making sense of these scenarios. According to Benner (1984), "...in order for students to learn from another person's paradigm case, they must actively rehearse or imagine the situation. Simulations can be even more effective because they require action and decisions from the learner. In addition, simulations provide the learner with opportunities to gain paradigm cases in a guided way" (p. 9).

Video Project

In this article, we describe a classroom video project intended to promote students' active involvement in their classroom experience during a year-long medical-surgical nursing course. The project is a template that can be applied to any specialty nursing content and implemented without the use of video technology. We implemented two types of projects: Nursing Grand Rounds and FPBTV (Frances Payne Bolton TV). Both activities have been effective in promoting students' pattern recognition of characteristic features of common illnesses, developing team-working strategies, and practicing students' presentations skills in a safe environment among their peers.

Students must arrange pieces of information into an organized whole, while sharing the responsibilities for the final presentation. After students present their projects, they turn in a written account of their work and receive individual grades. Students have consistently expressed pleasure, excitement, and satisfaction with their accomplishments, either verbally or in course evaluations. By using the assigned material, rather than simply reading it, students reported they were better able to recall valuable information. Students act out their knowledge, often in funny and memorable ways. And because student projects were videotaped, students were able to review the tapes in preparation for their final examination, and sometimes simply for the hilarity of watching them again.

Nursing Grand Rounds

Nursing Grand Rounds simulates the walking nursing rounds that occur in some hospital units, as well as medical rounds conducted by the interdisciplinary team. Although clinical instructors encourage nursing students to observe and participate in medical rounds, students are quick to observe that staff nurses usually are too busy to attend them. Nursing Grand Rounds encourages nursing students to imagine what this scenario would look like if this activity was truly patient centered.

Students in each clinical group are assigned to a specific patient problem, such as patients with myocardial infarctions, heart failure, or cirrhosis. Students decide who will play each role, while the number of roles selected depends on the patient problem. The assignment requires that there must be a client, a nurse clinician, a clinical nurse specialist, a pharmacist, a physician and/or nurse practitioner, and an expert in pathophysiology. Students may add a consultant, such as a social worker, a respiratory therapist, a physical therapist, or an occupational therapist. Nursing Grand Rounds represents both the reality students witness in the acute care setting, as well as the idealism of caring, healing, and shared responsibility among health care providers. Increasingly, the term transdisciplinary health care has been proposed as a model of health care delivery that includes the concepts of both multidisciplinary care (i.e., providing multiple skills from many professions) and interdisciplinary care (i.e., coordination of the provision of these skills) (Hall, 1999). The concept of transdisciplinary health care transcends both models because it recognizes the overlapping, collaborative, and shared roles among all health care professionals who provide collaborative, patient-focused care.

Students may stage the dramatic skits in the hospital setting, but these situations are just as likely to occur in a fast food restaurant. For example, the patient with coronary artery disease is caught in the middle of a fat-laden meal with new onset angina pectoris. As the 911 call is made, the janitor who has been sweeping the floor turns to the audience, announcing that she happens to be the pathophysiologist who will explain what these symptoms mean at the cellular level. Students often wear costumes and wigs, frequently role play the opposite gender, and bring in items such as portable radios, telephones, and food to enhance the skit.

Students responded enthusiastically to the Nursing Grand Rounds project because, for them, it was an opportunity to be creative and exert greater control over an aspect of their curriculum that is fairly structured and inflexible. Prior to the initiation of this project, students individually developed their case studies and presented them to their clinical group in postconference. Rather than discard this assignment in the clinical setting, we added the Nursing Grand Rounds group project to the classroom venue. Here students had to work as a team by assigning roles, developing a plot, designing a performance, writing a script, and even attending to set design. Students reported that they enjoyed interacting with members of their clinical group, some of whom they did not know very well. Previously unknown personalities suddenly sprang into view during these skits.

Students said they appreciated the opportunity to learn about a health condition to which they had not been exposed on their clinical specialty floors. They believed risk factors were easier to recall because of their visual impact (e.g., the character "Mr. Rotund" ballooned out with the help of pillows and ate a bag full of French fries, a depressed woman with AIDS escaped from the hospital to spend time in a local bar and lounge, looking for support while sipping pretend cocktails). Vivid character presentations not only help drive the tension of the plot but also advance the instructive purpose of the project. With such health care needs, the collaborative work of health care providers is viewed as essential. Students reported they had to define the unique and overlapping roles and responsibilities of each member of the health care team and describe how each team member would contribute to the resolution of the patients' needs.

Frances Payne Bolton TV

Frances Payne Bolton TV (FPBTV) is a project designed to help students master pharmacology content. Students are paired and asked to develop a special television feature on the nightly news about a particular class of drugs or medication. One student serves as the network anchor, while the other acts as a special correspondent. The anchor prompts the correspondent with questions, and the correspondent takes on the role of an authority in the field. Students are encouraged to be creative. For example, hand puppets served as news anchors, rock singers sang the praises of heparin, and creative dancers provided the latest information on a histamine-two blocker.

Students highlighted the learning potential of FPBTV in three major ways. The project appealed to them because it:

- Departed from the traditional style of classroom learning.
- Increased their retention of information.
- Immersed them in the experience of being an expert about a family of medications.

Tanner (2002) called attention to the nursing discipline's strongly held belief that excellence in teaching is primarily a "function of mastery of the subject matter" (p. 95). Admittedly difficult didactic information, such as pharmacology, can be most efficiently delivered via the traditional classroom lecture. However efficient educators may be in imparting information to students, educators still must consider students' learning characteristics in aiming for improved learning outcomes.

It has become apparent to master educators that offering variation in instructional methods may positively influence learning outcomes. Welk (2002) recently reported that sophomore students who were exposed to the use of pattern recognition in the presentation of clinical examples of medical-surgical problems were significantly better able to distinguish essential from nonessential characteristics of a particular health condition (e.g., myocardial infarction). Welk (2002) emphasized that "students need to have a template against which to measure their own clinical experiences" (p. 59).

Our students claimed that FPBTV made it possible for them to process complex pharmacological information because the activities complimented the material read in textbooks and the lecture presented in class. The students were aware they were being taught with a less conventional teaching style and appreciated the variation in instructional method.

Not only did the FPBTV "performers" report benefiting from increased retention of pharmacological content but the student audience did as well. Students stated that they retained many more details because of their ability to visualize the projects. Incorporated in their productions were up-to-date research findings, which furthered their knowledge and level of pharmacological sophistication.

Learning by doing has been shown to be a highly effective technique by which students master knowledge (Becker & Neuwirth, 2002). Students participating in FPBTV reported that this project was a truly experiential learning method because they assumed the role of educator. They acted as either the news anchor, asking critical and pertinent questions, or as the special correspondent, providing detailed and correct answers to the questions posed. The most effective performances provided information not only about the drug family but also about important critical thinking points surrounding nursing care of hospitalized patients receiving the particular type of drug therapy.

In addition to increased learning, students consistently reported the enjoyment they experienced as a result of participating in these projects. Almost all of the students actively brought their own strengths to the scripting and performing. They felt the projects brought life to the learning process. They applauded the creative efforts of their classmates and were proud of their own.

Discussion

Projects such as Nursing Grand Rounds and FPBTV have enabled students to become engaged and invested in their own learning in the classroom. Although clinical education and skills laboratory experiences continue to provide the primary settings through which nursing students synthesize and apply knowledge introduced in the classroom, optimal learning experiences may be compromised by several trends in nursing education and health care delivery, recently summarized by Becker and Neuwirth (2002). First, economic pressures on educational institutions have resulted in increased faculty-to-student ratios, in some cases 1 to 10, reducing the time students have to interact with their clinical instructors. Second, for at least a decade, patient acuity levels have increased, so students may encounter on a general medical-surgical floor the severely ill patients who would have been admitted to intensive care in the past. Third, nursing students report higher levels of anxiety in the clinical setting, compared to anxiety experienced in the classroom or in laboratory experiences. Finally, all of these factors may converge to generate increased faculty concerns regarding students' ability to maintain patient safety in the clinical setting. In some cases, the overall time students spend in the clinical setting may be modified by rotating students out of clinical experiences, lessening patient assignments, or omitting some aspects of clinical experiences.

Historically, clinical skills laboratories within nursing schools have formed an important link between the didactic learning environment of the classroom and the clinical learning potential of the acute care setting. Typically, students have participated in compulsory laboratory sessions designed to help them increase their repertoires of patient care skills as they progress from fundamentals of nursing to medical-surgical nursing and other specialty areas. Although the same students had experienced planned laboratory sessions in the Learning Resource Center's Clinical Teaching Center, the process of learning was reversed during their experiences with these creative projects. The students are not presented with a ready-made patient scenario, such as the care of the patients experiencing inadequate oxygenation, or expert skill demonstrations, followed by return demonstrations. Instead, a group of students is assigned a particular patient care problem (e.g., care of a patient with chronic obstructive pulmonary disease). Students must work actively as a team to generate subjective and objective data commonly associated with the problem, as well as appropriate goals and interventions. Group work and self-directed learning are examples of active learning. The participation of sophomore students in Nursing Grand Rounds and FPBTV is a case in point.

It is known that individuals learn better when they are actively involved in the process of knowledge assimilation. At Case Western Reserve University (CASE), our academic community recently adopted experiential learning as its educational philosophy for undergraduate education (President's Commission on Undergraduate Education and Life, 2001). Within this experiential framework, professors act as "coaches" or "experts" by presenting the necessary vocabulary and theory of the discipline and, at the same time, by structuring learning experiences including, but not limited to, practicums, internships, group research projects, group presentations, and performances. Students at CASE are encouraged to not only become active participants in their own learning but also "go beyond their experience by studying and reflecting upon it, producing their own ideas about it, and devising ways to articulate or test these ideas" (President's Commission on Undergraduate Education and Life, 2001, p. 18). In other words, experiential learning projects are equivalent to the raw material of learning. As students investigate ideas, they shape their own educational processes.

It was pleasantly surprising to find that students needed minimal concrete guidance from the instructors. They eagerly embraced the projects as a creative channel for their enormous energies. Learning Resource Center faculty and staff have played a supportive role to students working on these video projects. Support in the simplest form involved providing props to students (e.g., patient gowns, intravenous pumps, hospital beds, oxygen equipment) to enhance the realistic quality of their production. In addition, students have consulted with the center's clinical experts about how to effectively exhibit clinical signs of their patients' care problems, as well as how to select nursing interventions that will clearly reflect their understanding of best clinical practice.

Conclusion

Early entry of baccalaureate nursing students into the clinical area provides both challenges and opportunities to faculty who provide didactic and laboratory instruction. At a theoretical level, these supplemental projects appear to accomplish several desirable goals. They foster pattern recognition of characteristics of common illnesses, demonstrate the dynamic nature of the nursing process, and emphasize the values of collaborative, patient-focused care. The students' own words speak to the practical outcomes. These projects may enhance knowledge retention, promote acquisition of teamwork skills, develop confidence in public speaking within a safe environment, and make use of their seemingly boundless creativity and ingenuity.

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Departmental/Divisional Planning

Department/Division: Health Careers Division

Academic Year - 2013/2014

Initiatives (prioritized)	Related Strategic Goal(s) & Objective(s)	Related Needs (if any)	Estimated Cost (*List any equipment needs and/or program specific projects*)	Indicator(s) of Success
Priority #1 *Develop the health career programs to address employer expectations, exceed accreditation requirements, and position these programs as state & regional leaders.*	(2007-2012 Strategic Plan) Goal 2, Obj. A. Goal 2, Obj. E Goal 4, Obj. C Goal 4, Obj. A Goal 2, Obj. F	Continuously assess the needs of the health career programs to make certain that they remain current and in concert with the needs of the health care systems within this region.	***Health Career Programs*** *From individual program plans* **PTA program**: Upgrade lab equipment to improve student learning (Perkins) Cost: 2 skeletons $1,543.00 each $3,086 Somso model - muscles of the arm with shoulder girdle $1,710 Somso model - muscles of the leg with base of pelvis $1,890 **TOTAL: $6686** **PTA program**: Upgrade labs with improved use of technology for more efficient and effective teaching (TIF) Related needs: new technology, time to learn, security system, installation and maintenance, upgrade electrical, equipment. Cost: *PTA - Upgrade technology in the lab for improved demo and teaching* 4 42" Professional LCD Monitor $5,500 4 Lockable Tilt Mount $600 4 Lateral Shift Wall Bracket $200 Computer and Monitor $1,000 Lockdown for Computer $220 Electrical Work $3,500 2 Cameras with rolling tripod $600 **Approx. total $15,000**	Through the PROE survey system including faculty evaluations, student evaluations, and advisory committee engagement and registry results continuously monitor the needs of the health career programs and recommend adjustments to the program, curriculum and/or equipment needs. Indicators of success: improved learning of neuroanatomy and treatment techniques Indicators of success: use of scenario based learning, student performance in clinical setting