

Creating Technology Rich Learning Environments for the Classroom



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VOLUME 6E

INCREASING STUDENT ENGAGEMENT
AND RETENTION USING CLASSROOM
TECHNOLOGIES:

*CLASSROOM RESPONSE SYSTEMS AND
MEDIATED DISCOURSE TECHNOLOGIES.*

EMERALD PUBLISHING



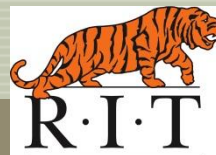
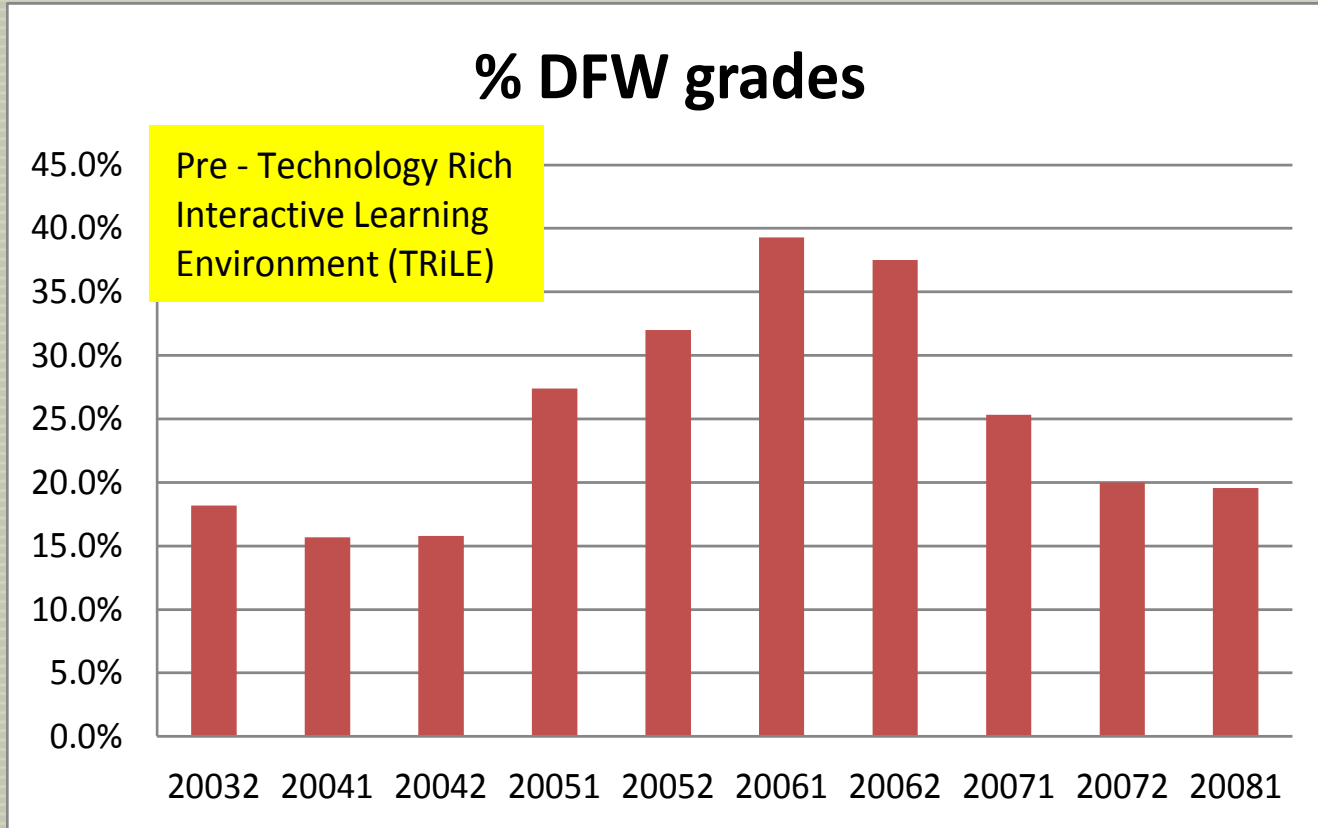
Presentation outline



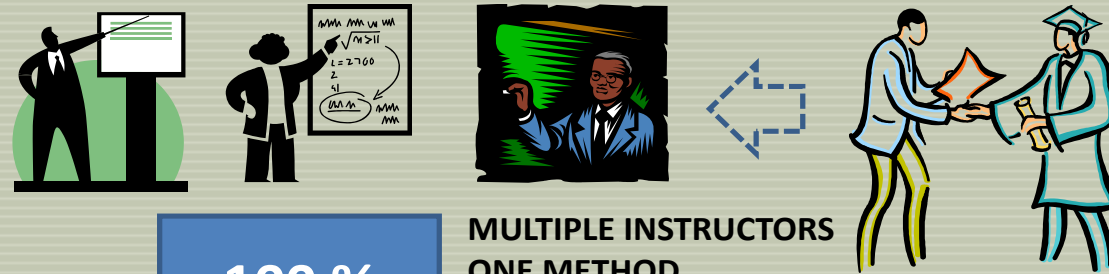
- *Education problem being addressed*
- *Learning theory basis for redesign of courses*
- *Features desired in a technology rich learning environment*
- *Examples from the classroom*
- *Assessment measures*



Education problem being addressed



Traditional class delivery method or “Pour it in”



MULTIPLE INSTRUCTORS
ONE METHOD

100 %

“PERPETUATING
THE CYCLE”

PASSIVE
ROLE

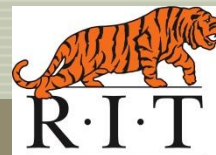


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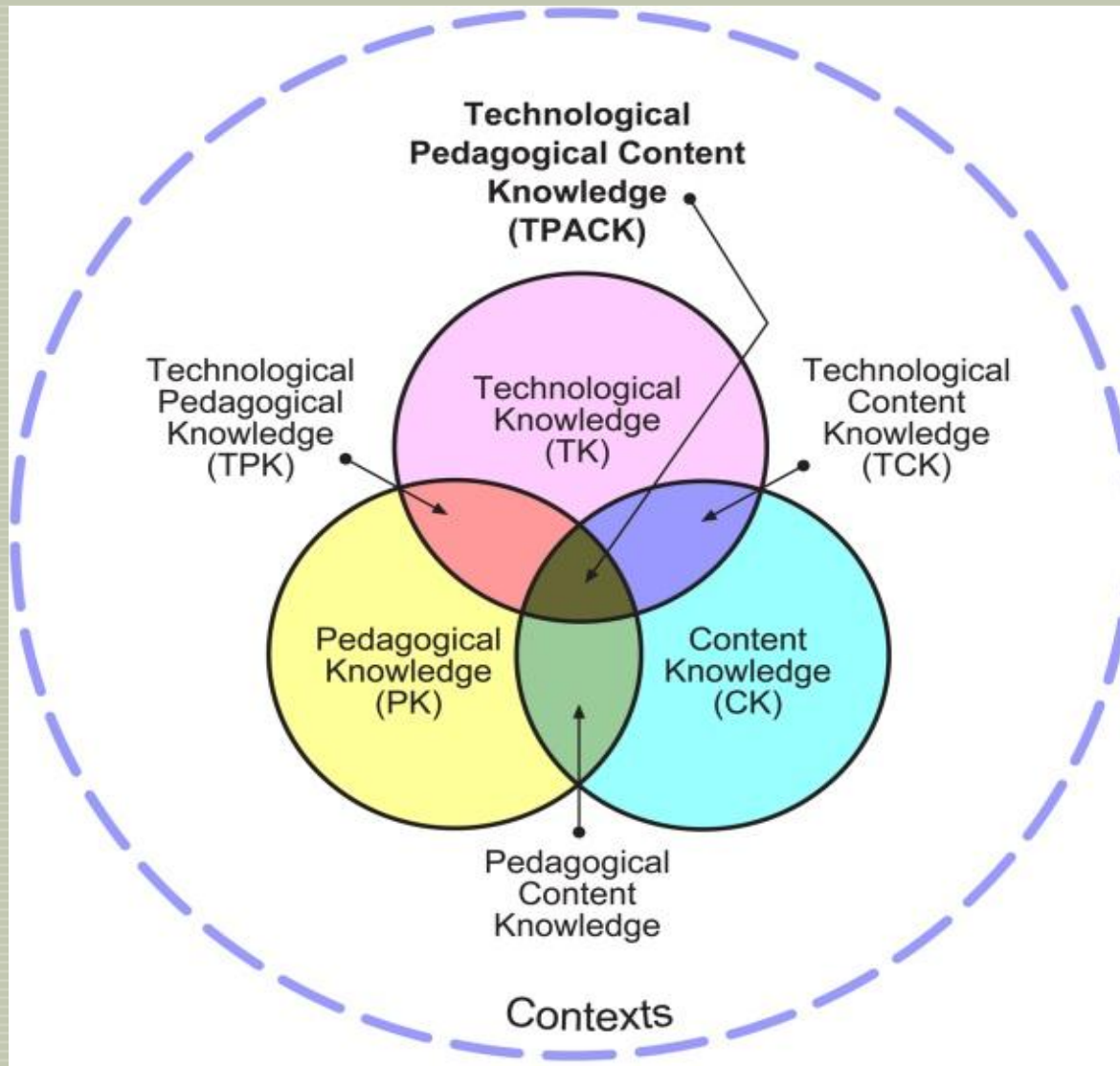
POOR
RETENTION



modeled after Lila Smith
(1975)(Karl A. Smith, et al.,
2005b)



Theoretical Basis



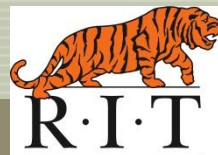
Technological Pedagogical and Content Knowledge (TPACK) (Koehler, 2012)

Key design principles



Key pedagogical design principles for creating the technology rich learning environment.

- A learning environment that emphasizes collaboration and values peer instruction
- Sufficient amount of student invention and practice with the new content to allow successful linkage and retrieval
- Timely, anonymous, and complete formative assessment feedback for both the instructor and student



Key design principles (cont.)



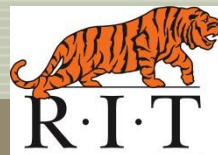
- The ability to direct the learner's attention to the critical components
- The ability to show concurrently different approaches, applications, and linkages to allow the student to make connections to the new content



Course Redesign



- Increase the use of interactive activities taking advantage of the technology
 - ✦ promote student participation
 - ✦ individual and group work
 - ✦ student-student interactions
- Increase the availability of content to the students outside of the classroom (flipping the classroom)
- Present and embed video links of real applications



Course Redesign



- Create and administer immediate feedback assessment tools
 - ✦ better manage student-learning outcomes
 - ✦ encourage students to come prepared to class
- Introduce activities that promote cooperative, collaborative and problem/project based learning



What does this class look like?



Convertible Laptops and Slates



Restart Only, Please. Do Not Log Off/On

ENERGY & POWER IN HYDRAULIC SYSTEMS

3.3 FORCE MULTIPLICATION

Pascal's Law

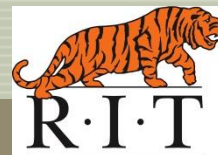
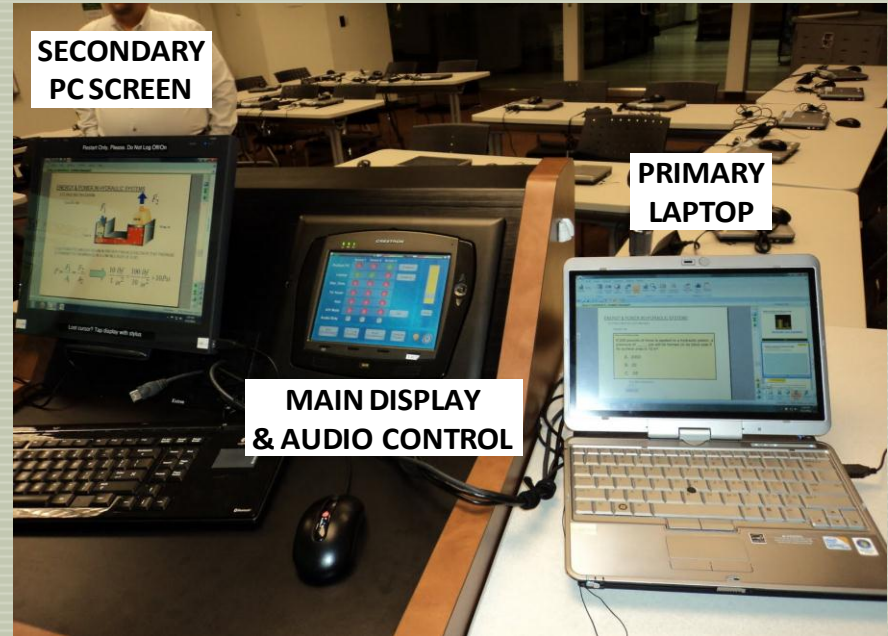
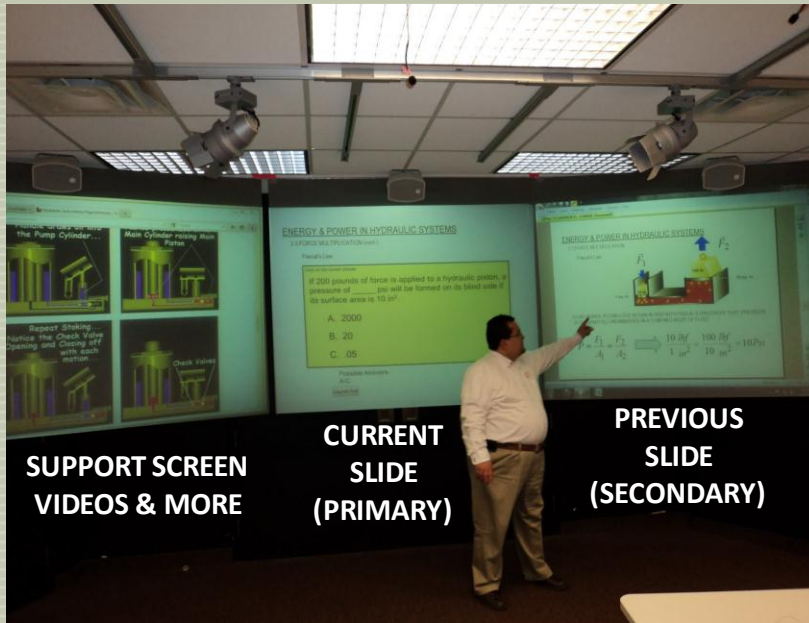
FLUID POWER TECHNOLOGY BEGAN IN 1650 WITH PASCAL'S DISCOVERY THAT PRESSURE IS TRANSMITTED UNDIMINISHED IN A CONFINED BODY OF FLUID.

$$P = \frac{F_1}{A_1} = \frac{F_2}{A_2} \Rightarrow \frac{10 \text{ lbf}}{1 \text{ in}^2} = \frac{100 \text{ lbf}}{10 \text{ in}^2} = 10 \text{ Psi}$$

Group Work



Immersive visual environment



SOFTWARE ENVIROMENT (DyKnow)



Monitor Feature

Personalized Toolbar

Previous Screen (filmstrip)

Main Screen

Chat Feature

Monitor List

Workstations in Monitor: 7

Type	Name	Status
Connected		
All Monitored Workstations Selected		
	TLT Studio 06	
	TLT Studio 09	
	TLT Studio 12	
	TLT Studio 13	
	TLT Studio 16	
	TLT Studio 21	
	TLT Studio 23	

Workstation Legend

Lab 1-To-1 Ad-Hoc

Connection History

07:55:51	CON	TLT Studio 16
07:55:51	CON	TLT Studio 13
07:56:06	CON	TLT Studio 23
07:56:17	CON	TLT Studio 12
07:56:18	CON	TLT Studio 06
07:56:41	CON	TLT Studio 09

Chat - Read Only

ms6489: yay
 mv9621: Green team
 mv9630: go brown (im colorblind)
 mv5089: Orange team is gonna win I hope
 mv9796: we got dis
 mv1518: clearly green team did not bring their A-game today: me sad
 mv9630: that is their AGame
 mv9630: A-game
 mv6021: Orange ten yet all the rest wrong...
 mv5565: Orange team is gonna win I hope winning
 mv9630: http://picdn.posterrevolution.com/p/41642197.jpg
 mv1518: wait, I thought this was like golf where the lowest score wins
 mv3100: how you say? I'mp womp
 mv2206: 2012 Fisker Karma at Dorschel

Content Area:

PNEUMATICS: AIR PREPARATION AND COMPONENTS

LEARNING OBJECTIVES

1. Understand the basic properties of air.
2. Apply perfect gas laws to understand the basic of air processing.
3. Describe briefly the purpose, construction, and operation of compressors.
 - A. Positive displacement versus Dynamic compressors.
 - B. A look inside into reciprocating (most common +D), screw, and vane compressors.
 - C. Air capacity ratings.

SPECIAL ATTENTION TO:

- Understand that in a gas: pressure, volume, and temperature are correlated.
- Compressibility. It is the property that affect the most in designing a pneumatic system

PROBLEM / DEMONSTRATION OF THE DAY:

Air Compression/Compressors Animations...
 Practice Examples and Problem 13-28E...

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Current Tool: Pen

3/20 Online as: luvmet

“Seeing” student learning progress



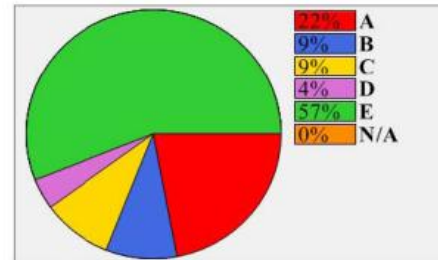
0610-305 Pneumatics and Hydraulics

DyKnow Test Drive
Where I will write; where you should write

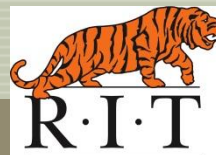
Polling test

I think DyKnow may be able to help me in the class in the following ways

- A) Take notes on the presentation AND have all of the professor notes
- B) Be able to absorb the material rather than just copying the material
- C) Use the chat feature to ask the professor to review a point
- D) Prepare for tests using my electronic notes I can access from any location
- E) All of the above



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“Seeing” student learning progress

ENERGY & POWER IN HYDRAULIC SYSTEMS

3.3 FORCE MULTIPLICATION (cont.)

Pascal's Law

Recall

$$P = \frac{F}{A}$$

Click on the correct answer.

What is the amount of force produced by the output piston?

A. 100 lb

B. 250 lb

C. 2500 lb

Possible Answers:
A-C

$$F = P \cdot A$$

$$F_2 = P \cdot A_2$$

$$F_2 = \frac{F_1}{A_1} \cdot A_2$$

$$F_2 = \frac{100 \text{ lb} \cdot 2.5 \text{ in}^2}{1 \text{ in}^2}$$

$$F_2 = 250 \text{ lb}$$



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R·I·T APPLIED FLUID MECHANICS

FLUID FLOW and BERNOULLI'S EQUATION (Chapter 6)

APPLICATIONS of BERNOULLI'S EQUATION... (6.9)

...general procedure on example problems...EXAMPLE 6-10 STUDENTS

PRACTICE

$$\left(\frac{v_1^2}{2g} + Z_1 + \frac{P_1}{\gamma} \right) = \left(\frac{v_2^2}{2g} + Z_2 + \frac{P_2}{\gamma} \right) \quad \text{ref from Bottom}$$

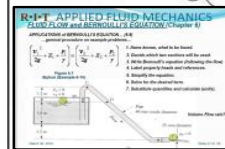
$$3 = \frac{v_2^2}{2(9.81)}$$

$$v_2 = \sqrt{3(2 \times 9.81)} = 7.67 \text{ m/s}$$

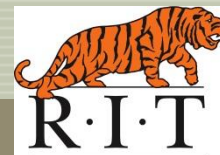
$$A_2 = \frac{0.025 \text{ m}^2 \times \pi}{4} = 4.91 \times 10^{-4} \text{ m}^2$$

$$Q = A_2 v_2$$

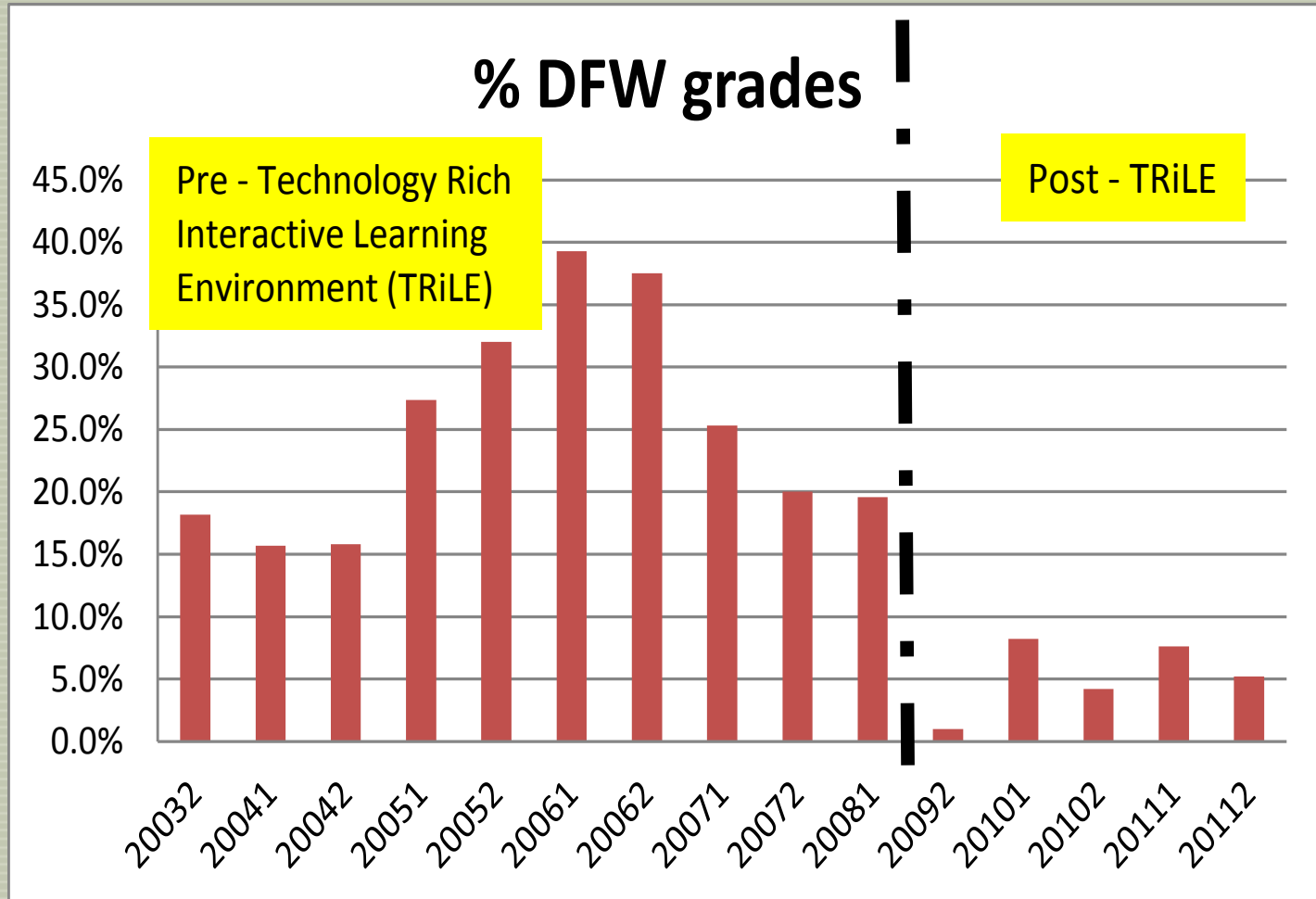
$$4.91 \times 10^{-4} \text{ m}^2 (7.67 \text{ m/s}) = 0.0037 \text{ m}^3/\text{s}$$



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Assessment measures.



Technology Rich Interactive Learning Environment (TRILE) vs. Control Classes



TRiLE	Control
Mean (standard deviation)	
3.192 (0.8500)	2.500 (1.014)

	TRiLE	Control
Low GPA (<3.0)	2.507 (0.8259)	1.904 (0.8687)
High GPA (>3.0)	3.607 (0.5407)	3.263 (0.5833)

Grades for Low versus High GPA students in the TRiLE versus control classes



Grades for Men versus Women in the TRiLE versus control classes



	TRiLE	Control
Male	3.160 (0.8684)	2.568 (0.9966)
Female	3.474 (0.6118)	2.105 (1.0485)



Conclusion



- The TRiLE approach in the classroom helps students succeed in engineering technology classes.
- Students with a lower GPA entering the courses perceived a greater benefit from this learning environment and recommended using the technology rich lecture environment.
- The technology rich environment allows the instructor to implement an interactive and engaging learning environment.



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