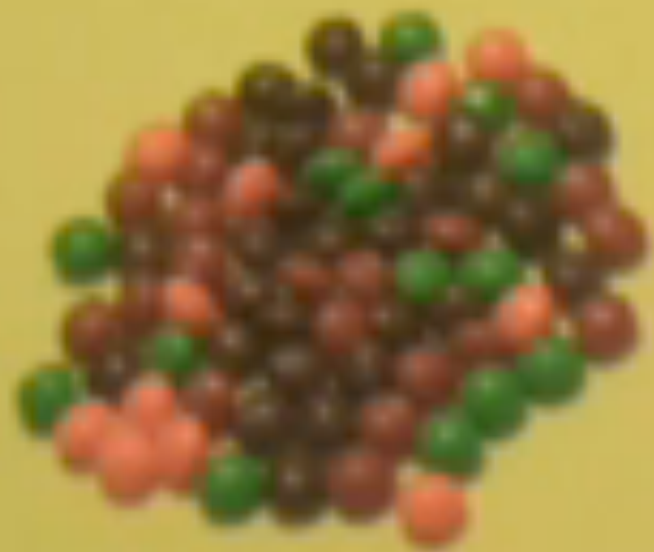
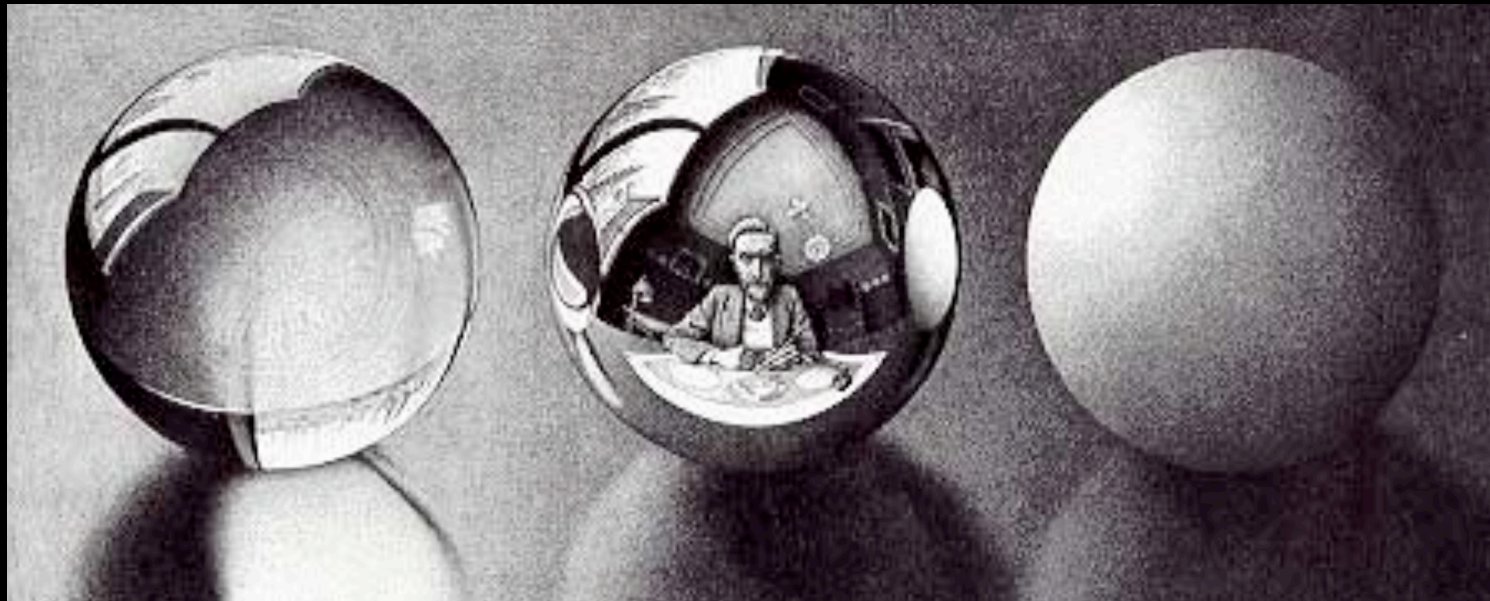


# Magic Touch



Solutions to problems are easy to find,  
the problem is a great contribution.  
What's truly an art is to wring from your mind  
a problem to fit a solution  
— Piet Hein





# Educational Technology & Teacher Education The TPACK framework

January 2009

# College of Education

MICHIGAN STATE UNIVERSITY



My collaborator &  
friend







A true  
collaboration



The role of technology  
in teaching/learning  
(what do **teachers** need to  
know?)



Frozen in time?



Generations	
10,000	speech
750	agriculture
500	writing
400	libraries
40	universities
24	printing
16	accurate clocks
5	telephone
4	radio
3	television
2	computers
1	internet/email
0	gps, mp3, youtube, web2.0 etc. etc.





So what  
are  
teachers  
to do?

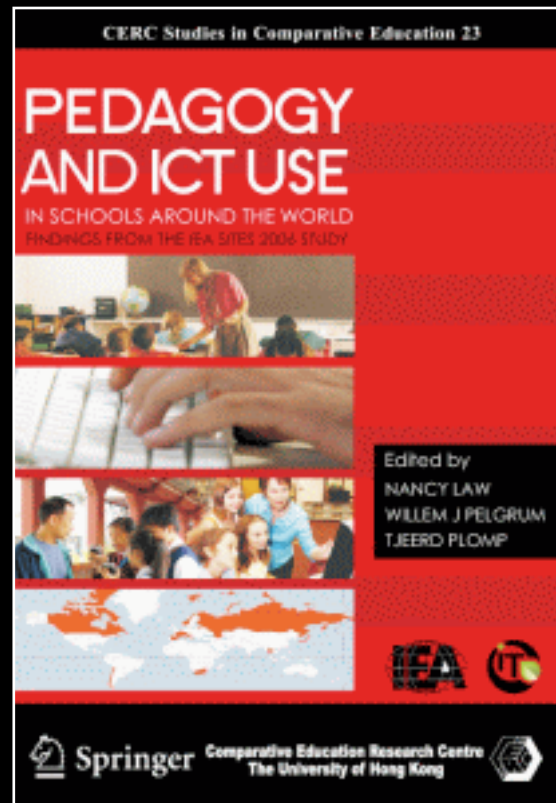




How are they using  
technologies?

In the US



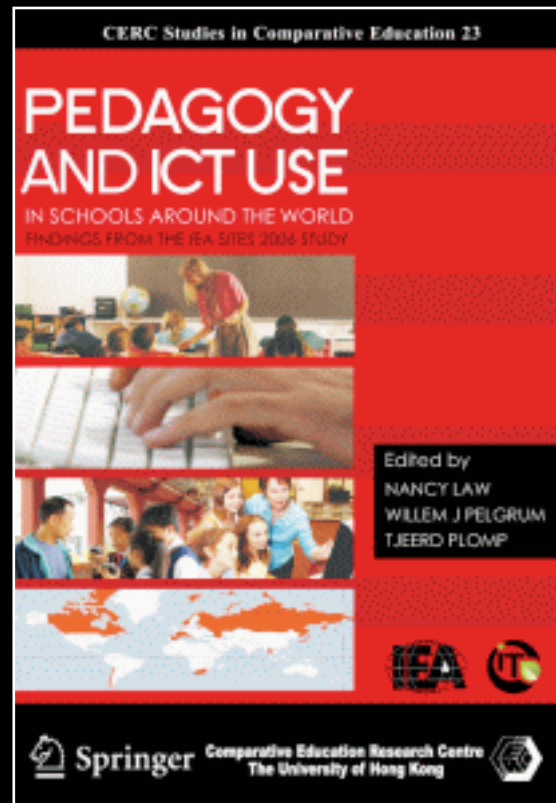


# SITES 2006

## IEA Second Information Technology in Education Study

Law, N., Pelgrum, W.J. & Plomp, T. (eds.) (2008). Pedagogy and ICT use in schools around the world: Findings from the IEA SITES 2006 study. Hong Kong: CERC-Springer.





9,000 schools and over  
35,000 mathematics and  
science teachers in 22  
countries/education systems



NOT

that increased technology use led to student learning

INSTEAD

the effectiveness of technology use [ICT] depended on the teaching approaches used in **conjunction** with technology

AND

Pedagogical ICT competence was the best positive predictor of teachers' pedagogical adoption of technology”

THUS

it is NOT the technology alone, but rather how teachers integrate it with their teaching that matters.

## IN OTHER'S WORDS:

If you are not going to change  
pedagogy then technology use  
makes no significant difference

– Tom Reeves (yesterday, standing right here)

Technology

Use

Technology

Integration


Technology

Innovation

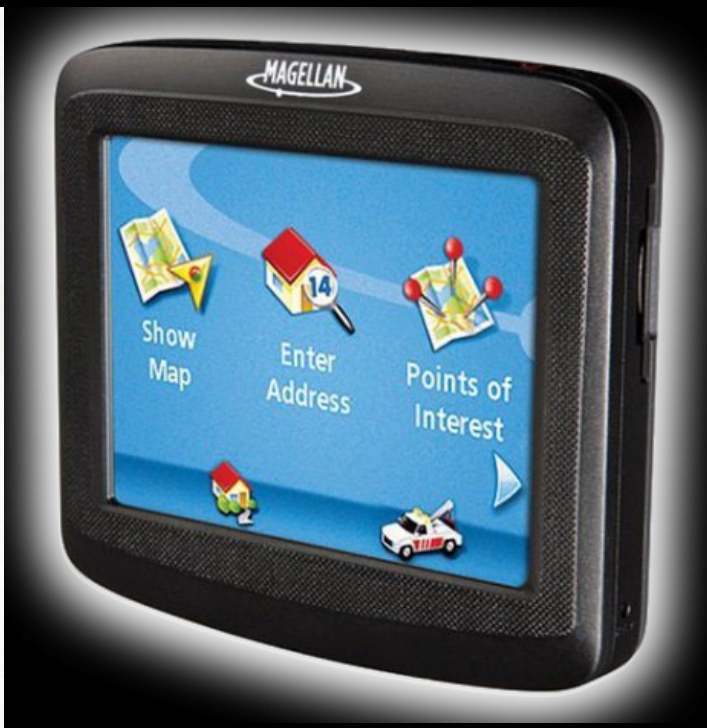
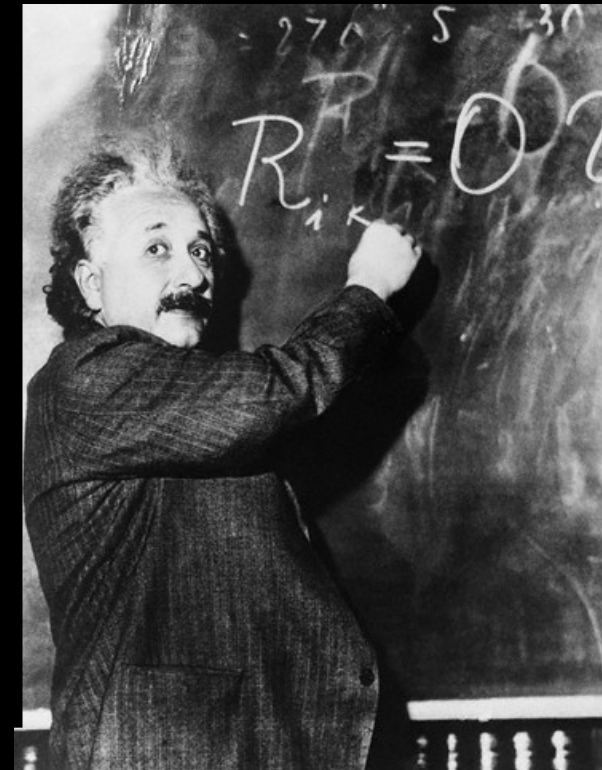
Technology

What is it?

# Understanding



Technology



Technology solves  
problems

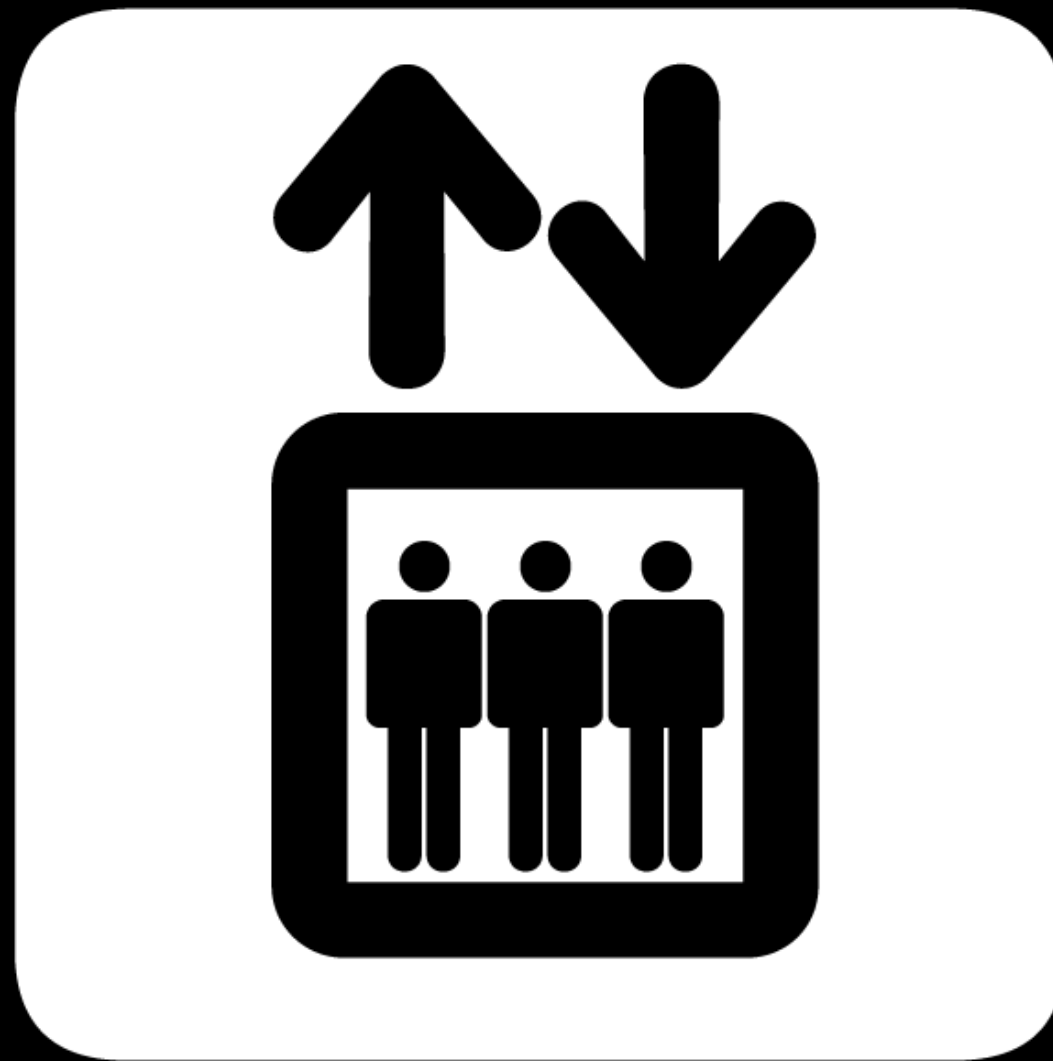






But creates new ones







How?

# Affordances (and constraints)







But

Users redefine  
technologies









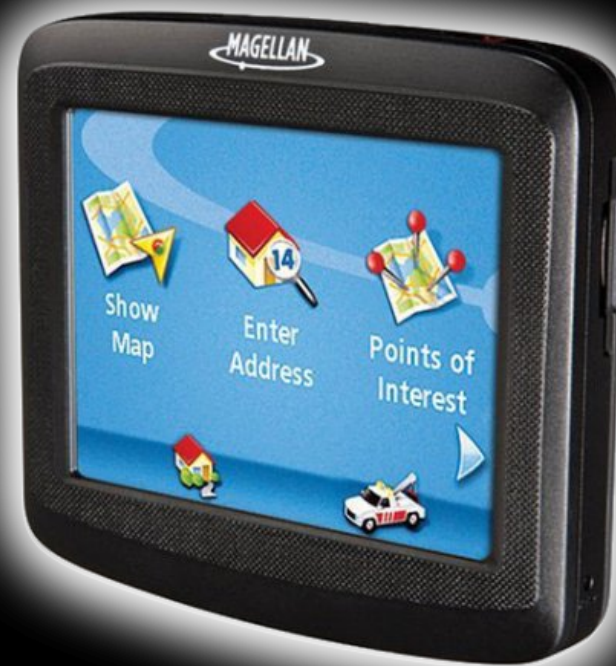
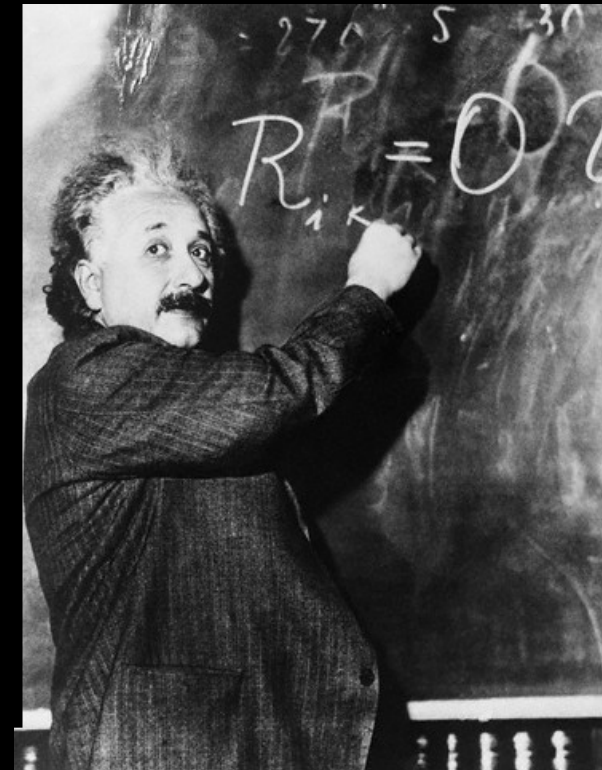






Why is this important?

Only repurposing makes  
a technology an  
educational technology..







Access



Excel



PowerPoint

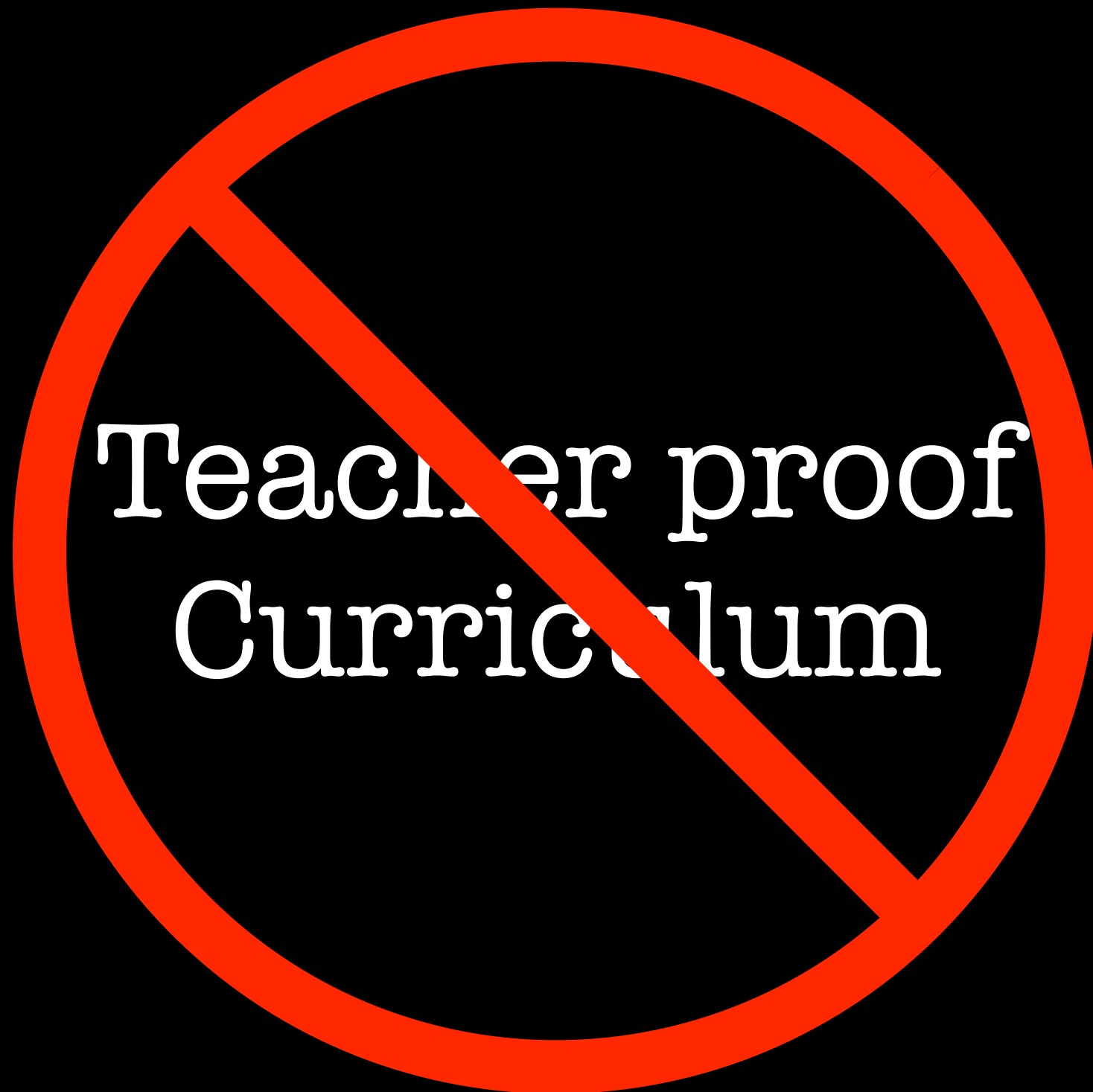


Word

This is a creative,  
innovative act

The crucial mediating  
role played by the  
teacher...





Teacher proof  
Curriculum

To sum up

Rapid rate of change

Understanding technology

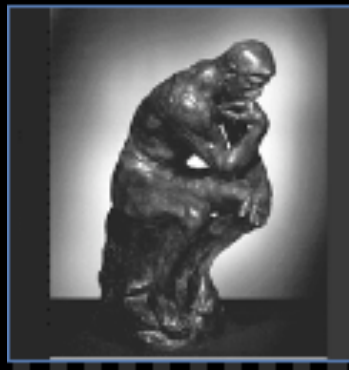
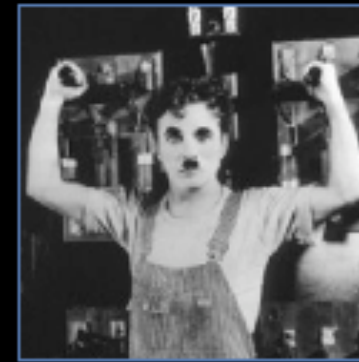
Affordances & constraints

The importance of repurposing  
(from Tech to Ed Tech)

The crucial role of the teacher

# Technology & Teaching





knowledgeable,  
accessible, wise,  
funny, cerebral,  
benevolent, fair,  
firm, flexible,  
playful, serious  
... *& more*

Teaching is always  
about something





Content

# The goals of education



The disciplines



Disciplines teach  
us to see



Disciplines teach  
us to see

Knowledge | Methods | Purposes | Forms



# Disciplines teach us to see

Knowledge | Methods | Purposes | Forms

facts, concepts  
relationships

knowledge  
creation &  
validation

reasons why  
disciplines  
exist

genres,  
symbol  
systems

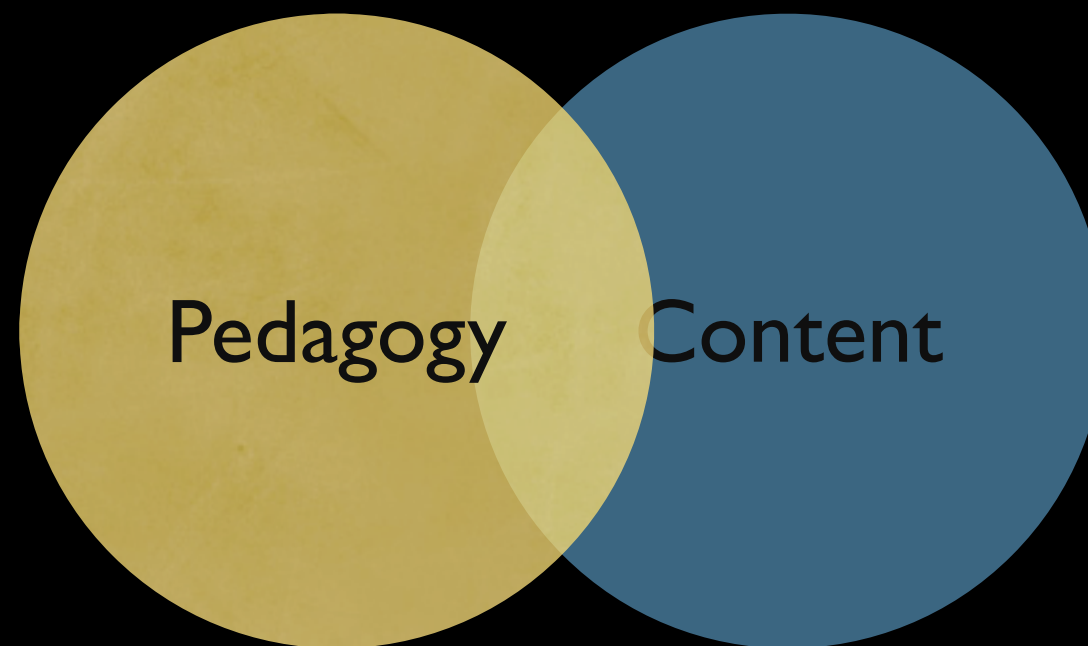




Knowing a discipline



Teaching a discipline





Mathematician

*necessarily*  
Not <sup>^</sup>a good  
teacher of math



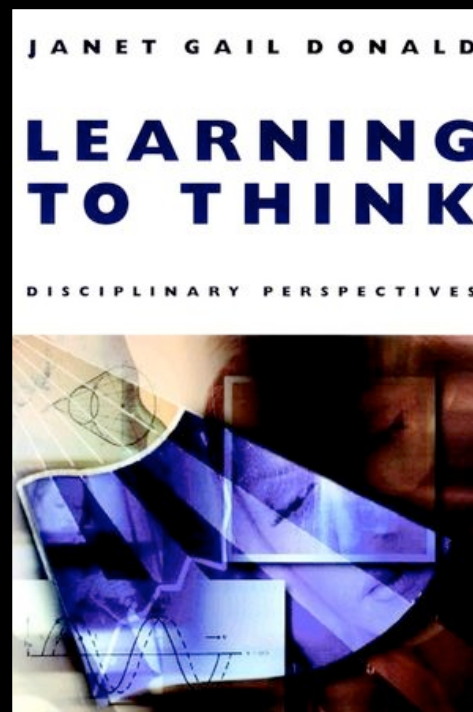
artist

physicist

economist

Quality teaching is

transformation of  
content  
for



in a disciplined  
manner

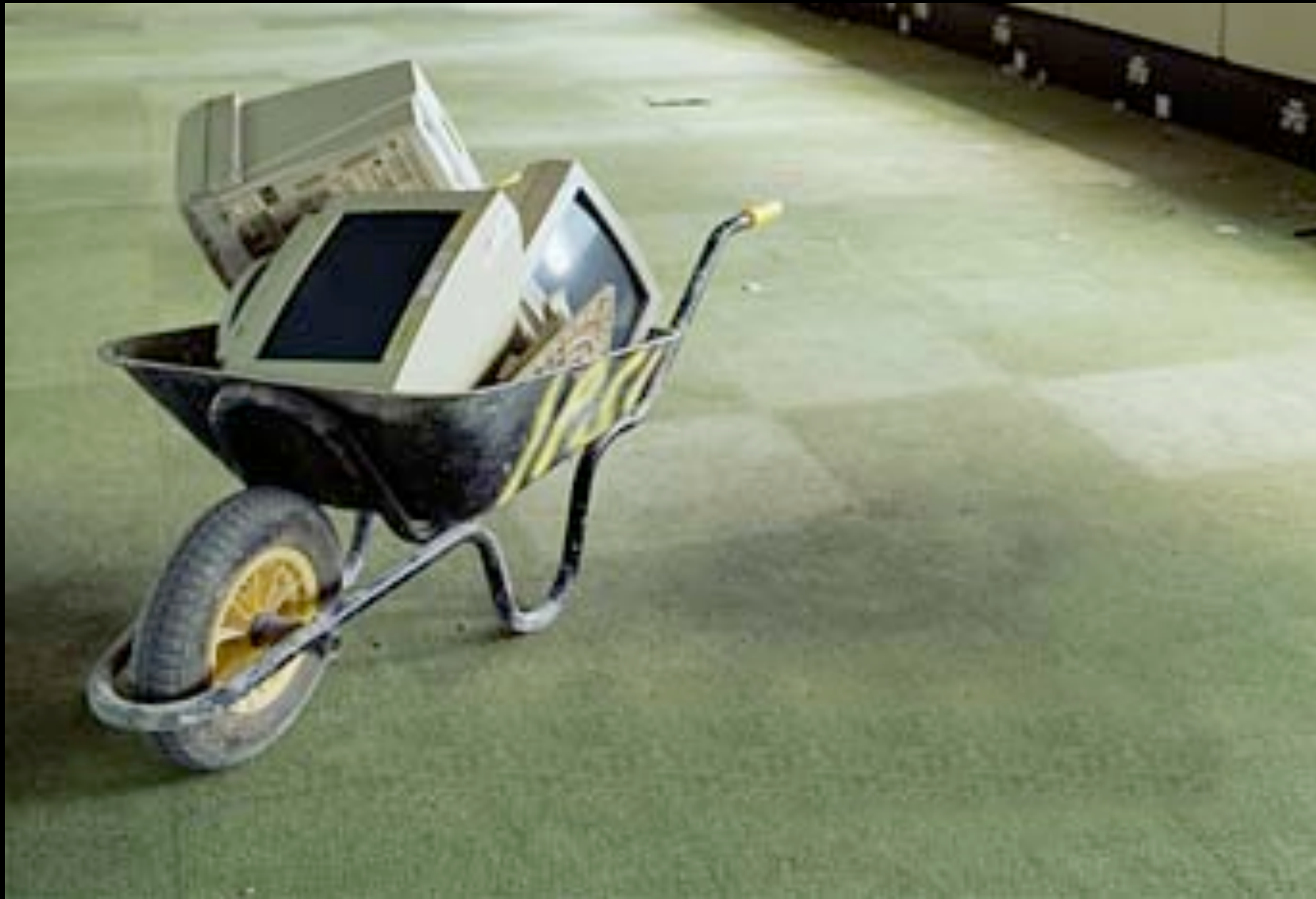
To sum up



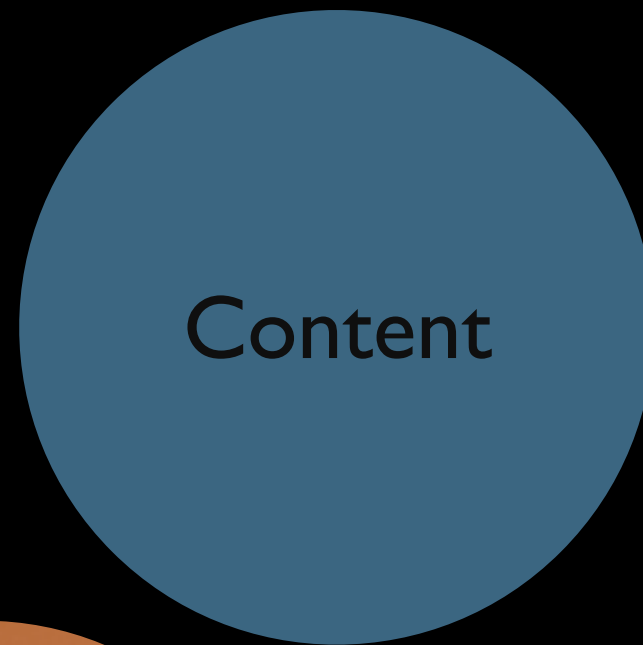
Teaching is messy & complex

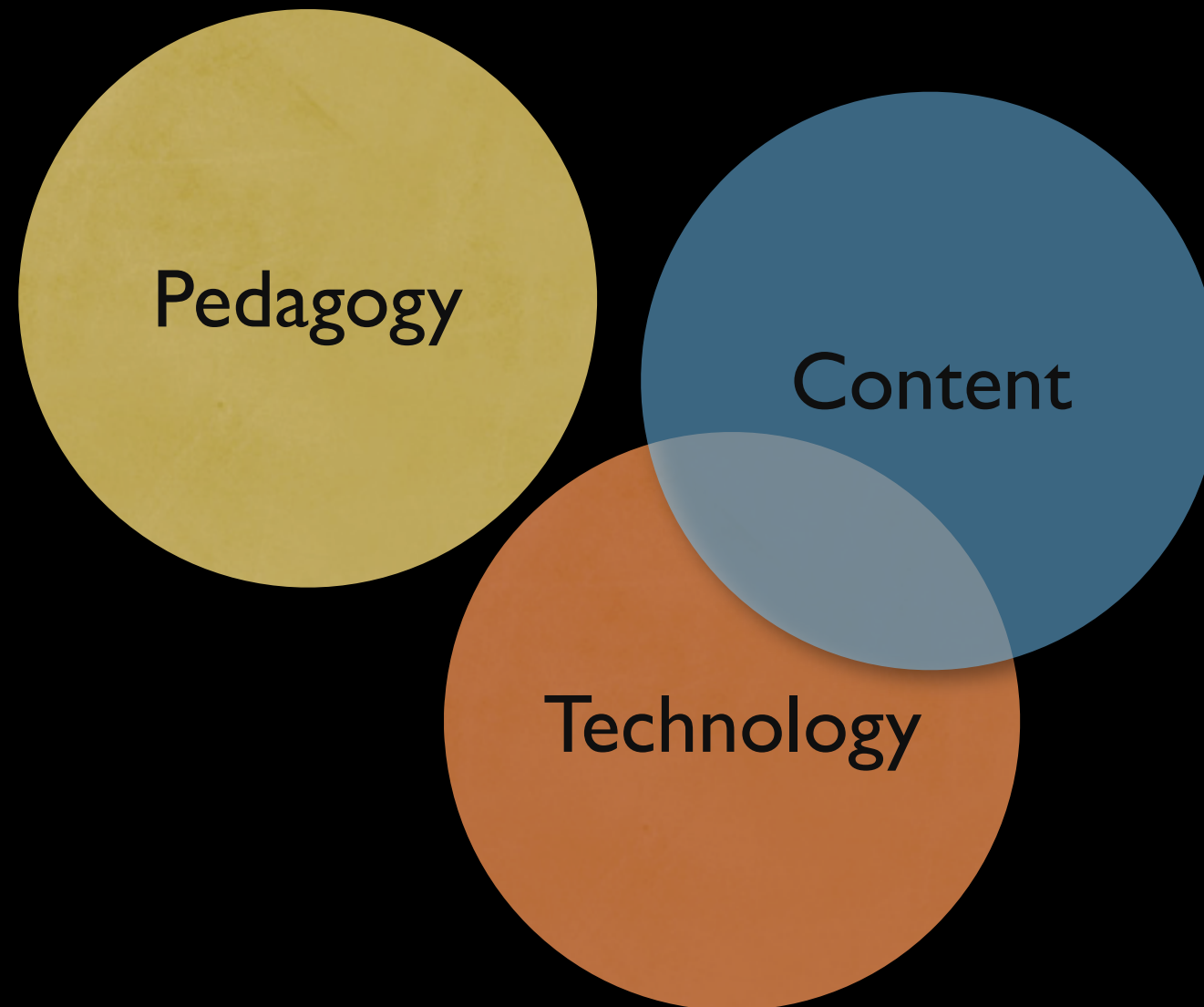
The importance of  
discipline(s)

Teaching is about  
transforming disciplinary  
knowledge to meet the needs  
of students



Adding technology





# The transformation of content due to technology

mathematics

science

physics

engineering

history

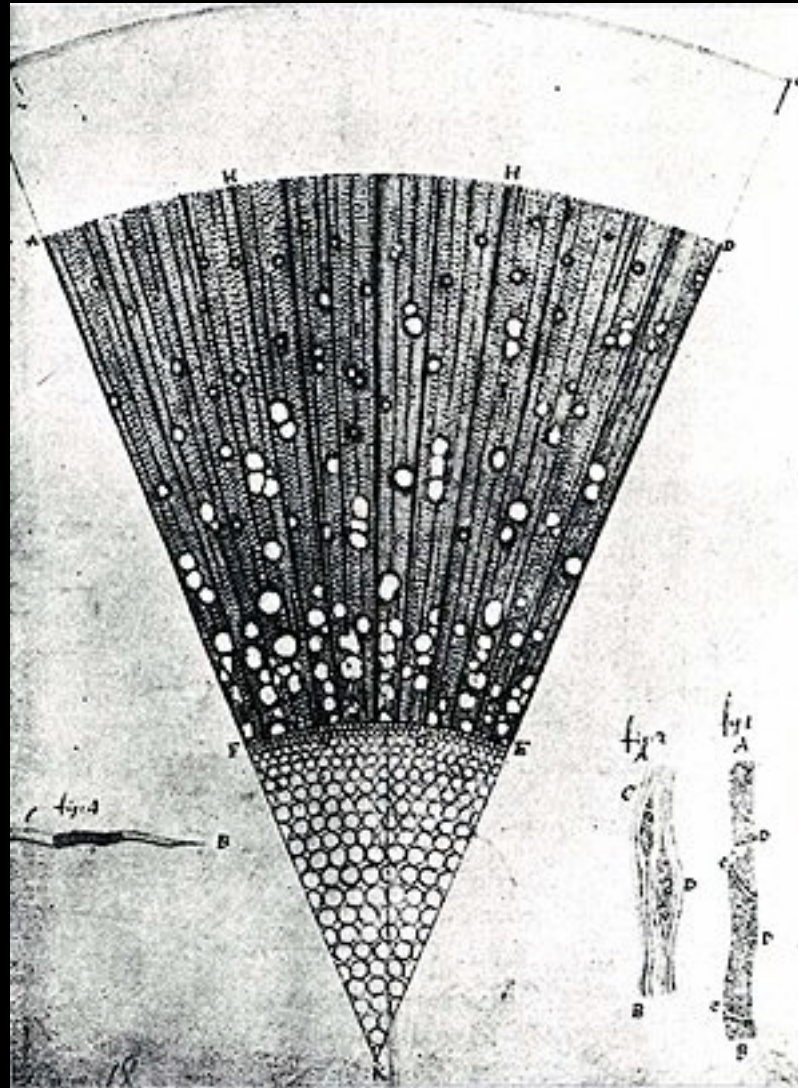
political science

education

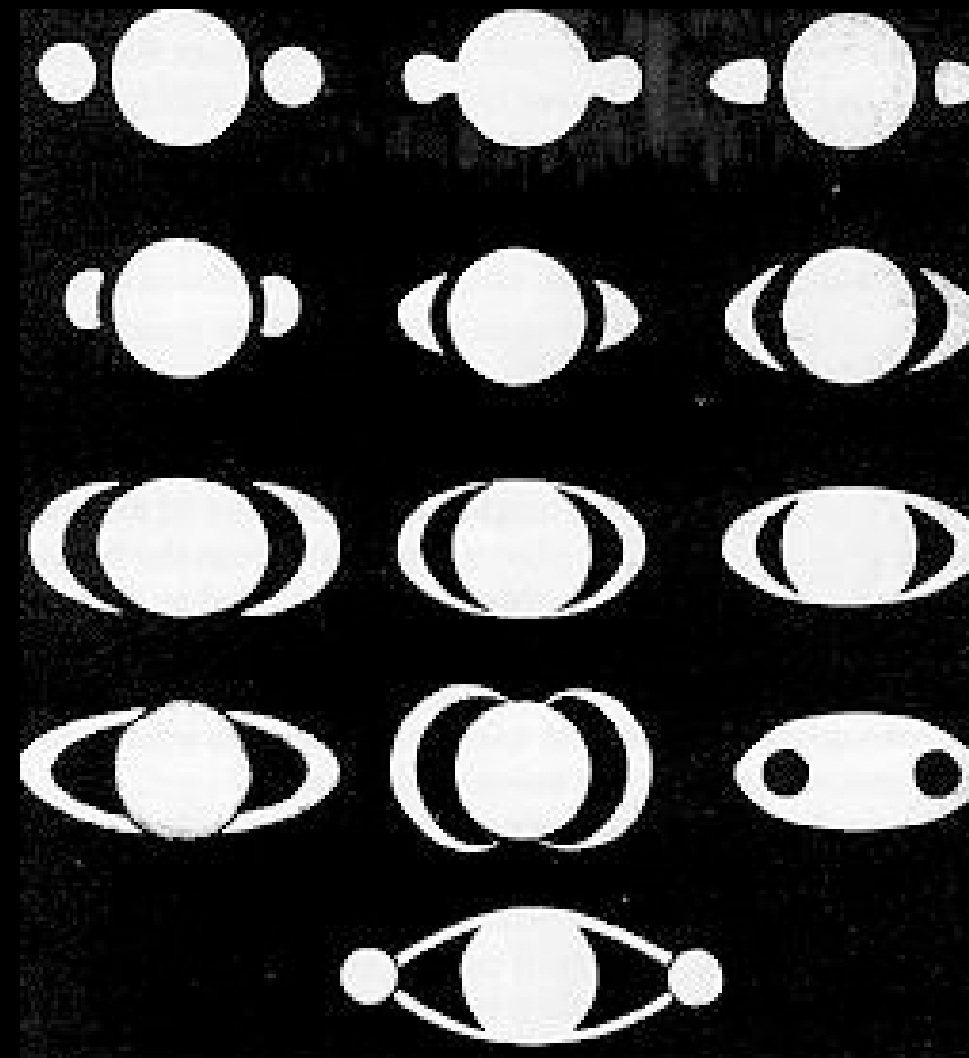
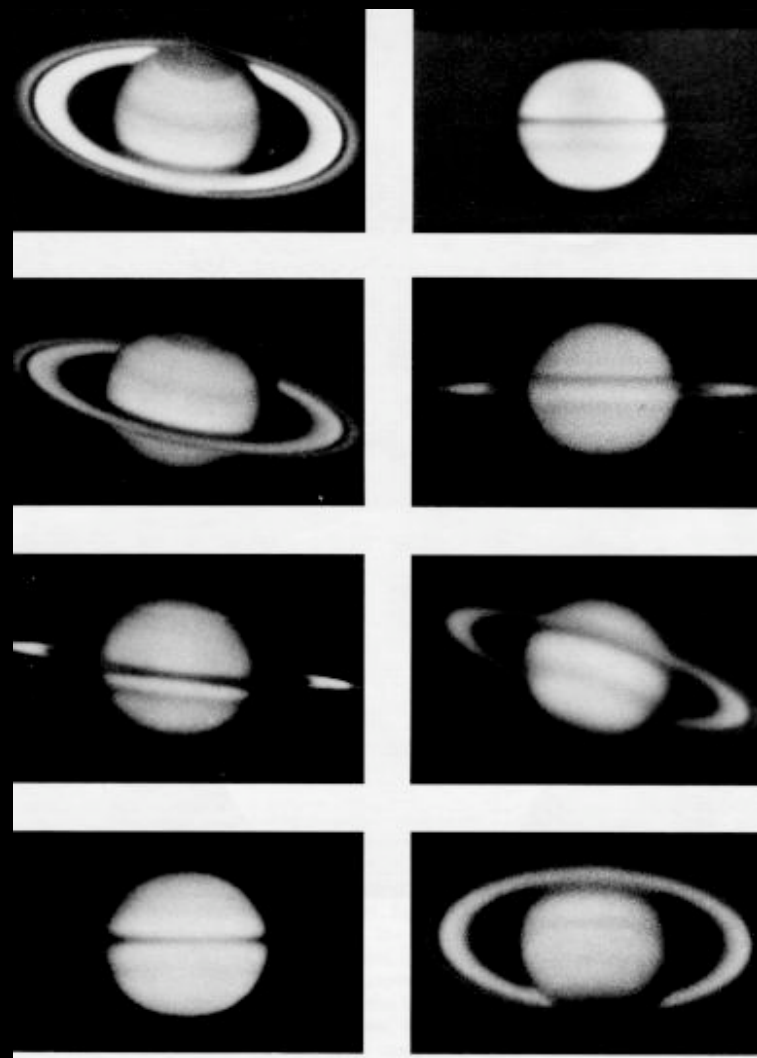
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.



Antonie van Leeuwenhoek



Christiaan Huygens

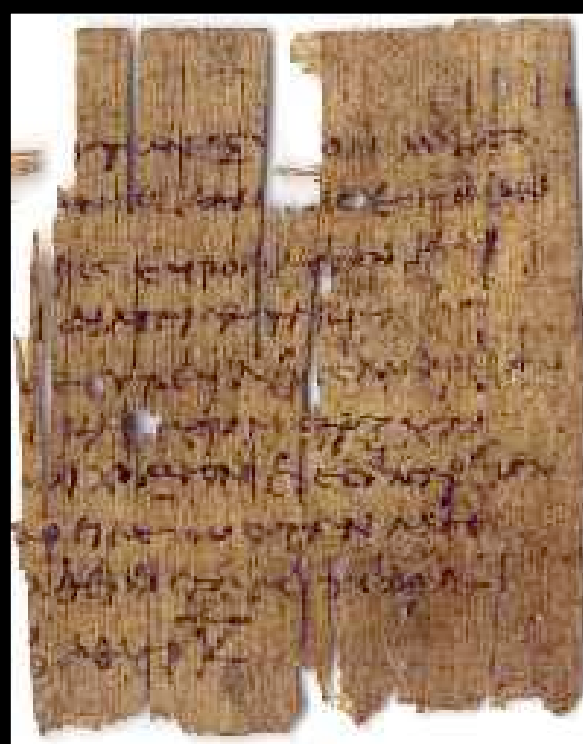


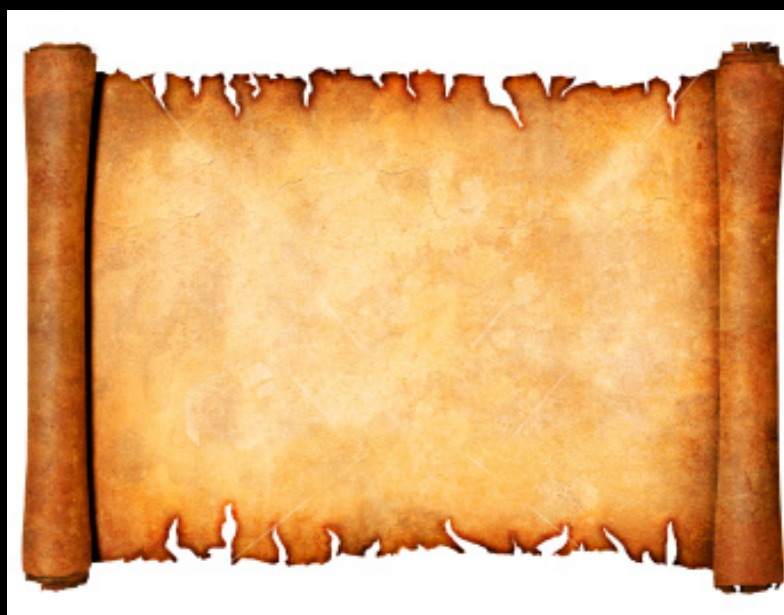
Literacy  
technologies



A book is a machine to think with

























*media*  
New ecology



New literacies

# Periodic Table of the Elements

# Periodic Table of the Elements

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\* Lanthanide  
Series

+ Actinide  
Series

58 <b>Ce</b>	59 <b>Pr</b>	60 <b>Nd</b>	61 <b>Pm</b>	62 <b>Sm</b>	63 <b>Eu</b>	64 <b>Gd</b>	65 <b>Tb</b>	66 <b>Dy</b>	67 <b>Ho</b>	68 <b>Er</b>	69 <b>Tm</b>	70 <b>Yb</b>	71 <b>Lu</b>
90 <b>Th</b>	91 <b>Pa</b>	92 <b>U</b>	93 <b>Np</b>	94 <b>Pu</b>	95 <b>Am</b>	96 <b>Cm</b>	97 <b>Bk</b>	98 <b>Cf</b>	99 <b>Es</b>	100 <b>Fm</b>	101 <b>Md</b>	102 <b>No</b>	103 <b>Lr</b>

*s*-Block

H	
Li	Be
Na	Mg
K	Ca
Rb	Sr
Cs	Ba
Fr	Ra

*f*-Block

La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb
Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No

*d*-Block

Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn
Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd
Lu	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg
Lr	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Uub

*p*-Block

					He
B	C	N	O	F	Ne
Al	Si	P	S	Cl	Ar
Ga	Ge	As	Se	Br	Kr
In	Sn	Sb	Te	I	Xe
Tl	Pb	Bi	Po	At	Rn
Uut	Uuq	Uup	Uuh		



File Edit View Go Bookmarks Options Directory Window

Netscape: [FLIPS]: Flexible Learning in the Periodic System

Back Forward Home Reload Images Open Print Find Stop

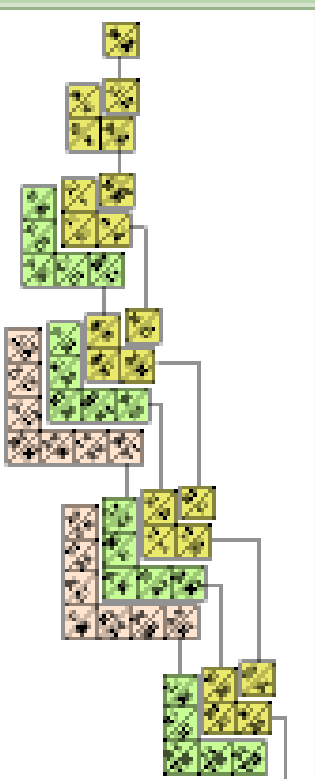
[FLIPS] Session 3

2. Tables and then 2.4 Toprow

[next step] [help] [return home]

### Treptow's Electronic Form

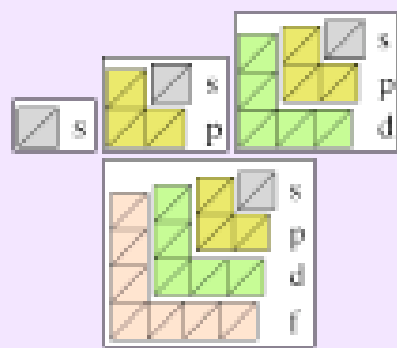
Description



Select another table...

- Standard
- Spiral**
- Pyramid

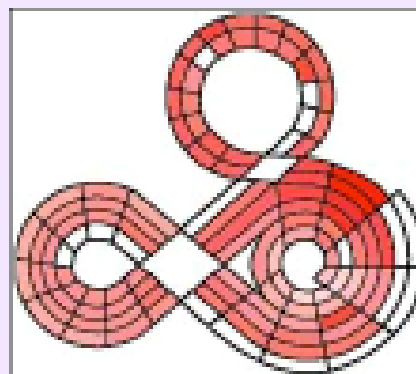
This table was first reported by Richard Treptow in 1994. It takes a very different approach to periodicity than the other tables. It does so by arranging sub-blocks of elements into progressively larger blocks as we increase the atomic number. There are 7 blocks, one for each value of  $n$  (the principal quantum number). Each block contains as many elements that can have the given principal quantum number i.e.  $2n^2$ .



The first block has one square - representing the 1s orbital. The top half gets the first element and the bottom half gets the next element. Notice how this clearly shows that the first element has an unpaired electron and the second one has two paired electrons of opposite spin.

Notice how we could determine the presence of paired and unpaired electrons in the electronic configuration of an element.

The atomic radii of the elements are shown in the diagram. The smaller the atom, the smaller the radii. White cells designate elements whose atomic radii are yet unknown.



Atoms get bigger as we move outward among the representative elements.

Atomic radii show minor variation in the transition and inner-transition elements.

Also once again there is a sharp edge where the alkali metals -- lithium, sodium etc. start - though the halogens -- fluorine, chlorine etc. differ from them in just one atomic number.

File Edit View Go Bookmarks Options Directory Window

Netscape: [FLIPS]: Flexible Learning in the Periodic System

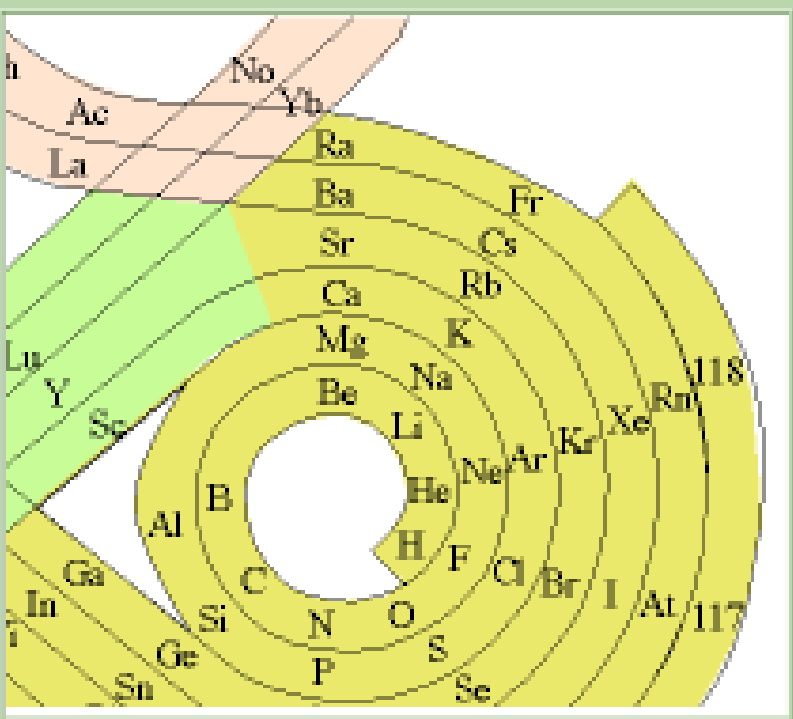
Back Forward Home Reload Images Open Print Find Stop

[FLIPS] Session 1

4. Tables and then 4.1 Standard

### Jand's Spiral Form

Select there...



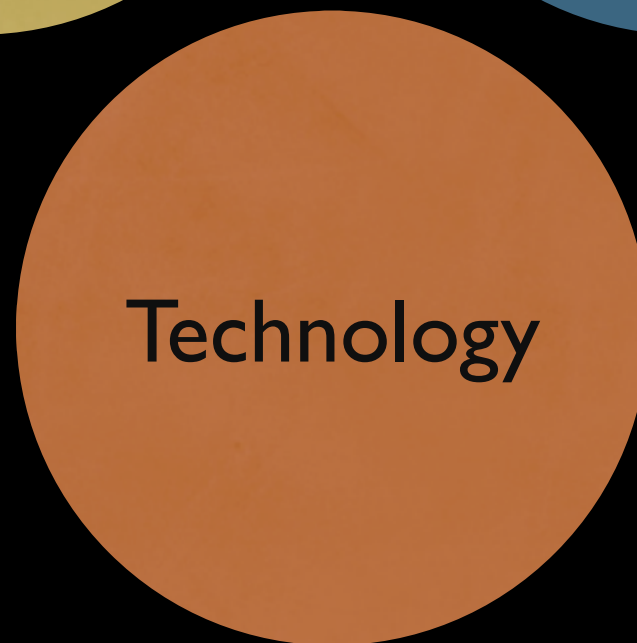
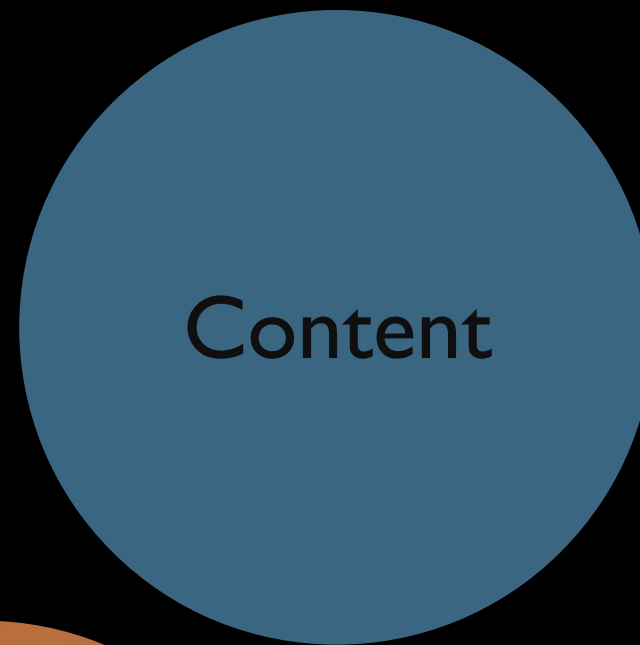
To access the table click on the table with the "standard" (apple) key pressed.  
To access the table with the "standard" (apple) key pressed.  
To access the table with the "standard" (apple) key pressed.

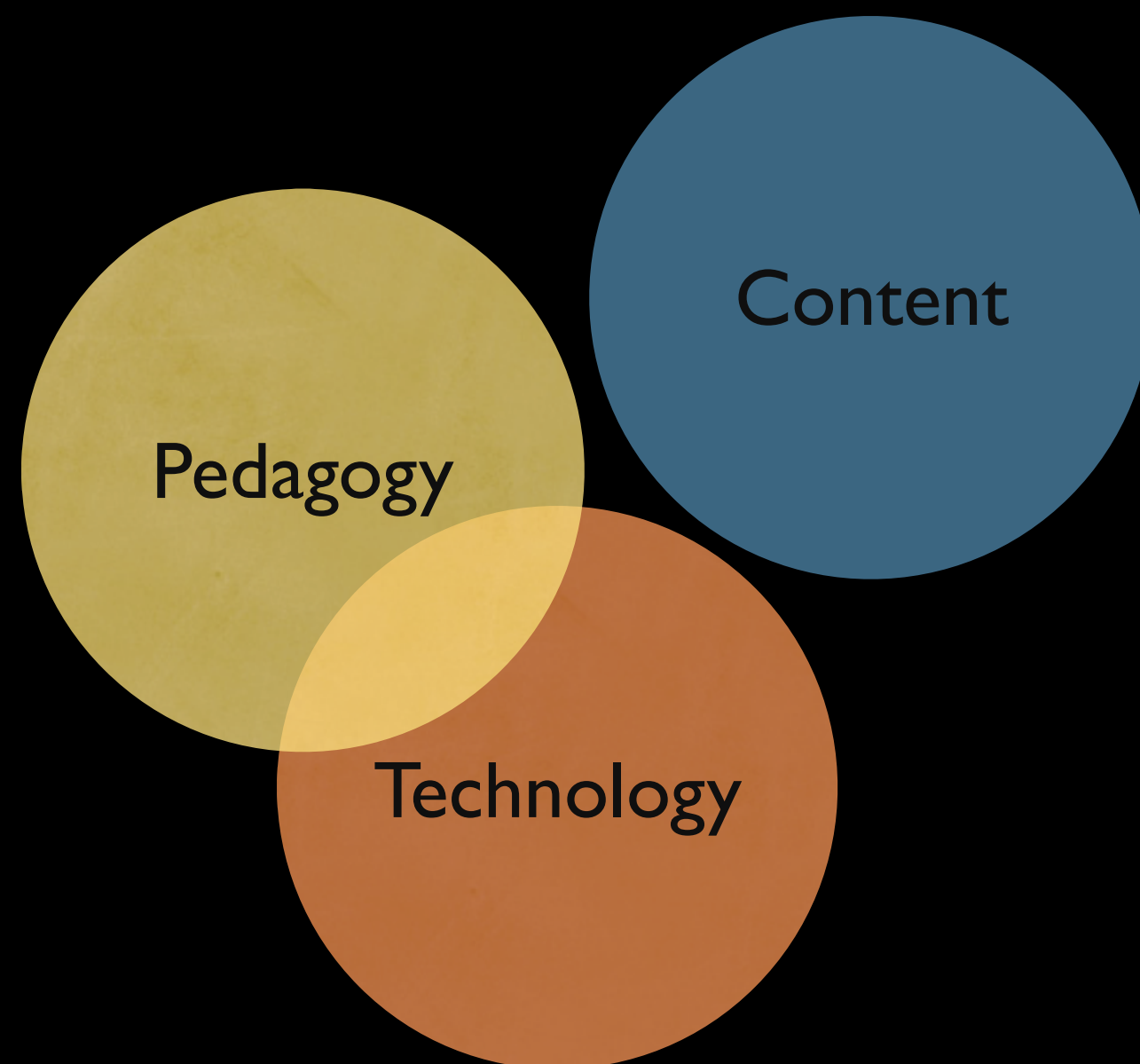
To sum up

Technology & content  
are intimately related!



# Technology and the transformation of pedagogy







open courseware



Online learning

“me too!”

“I agree”

“I agree”

Hmmm...

“nice post”

“I agree”

Good job

“I agree”

“I agree”

“me too!”



Me too

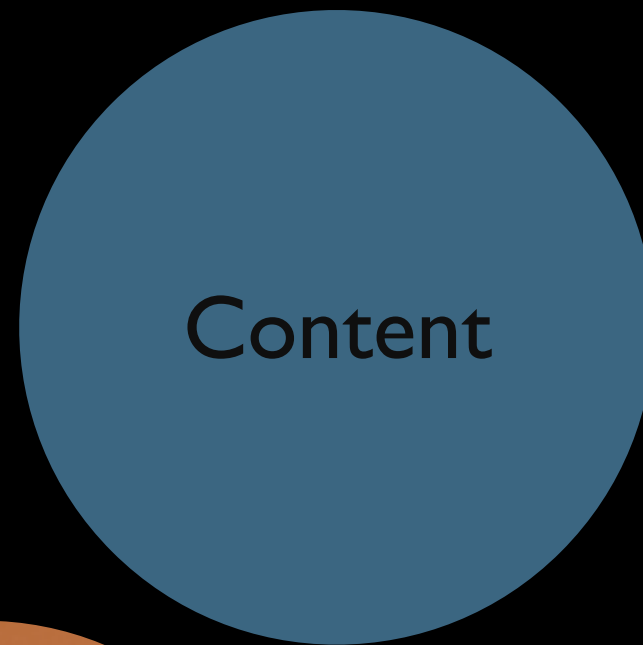




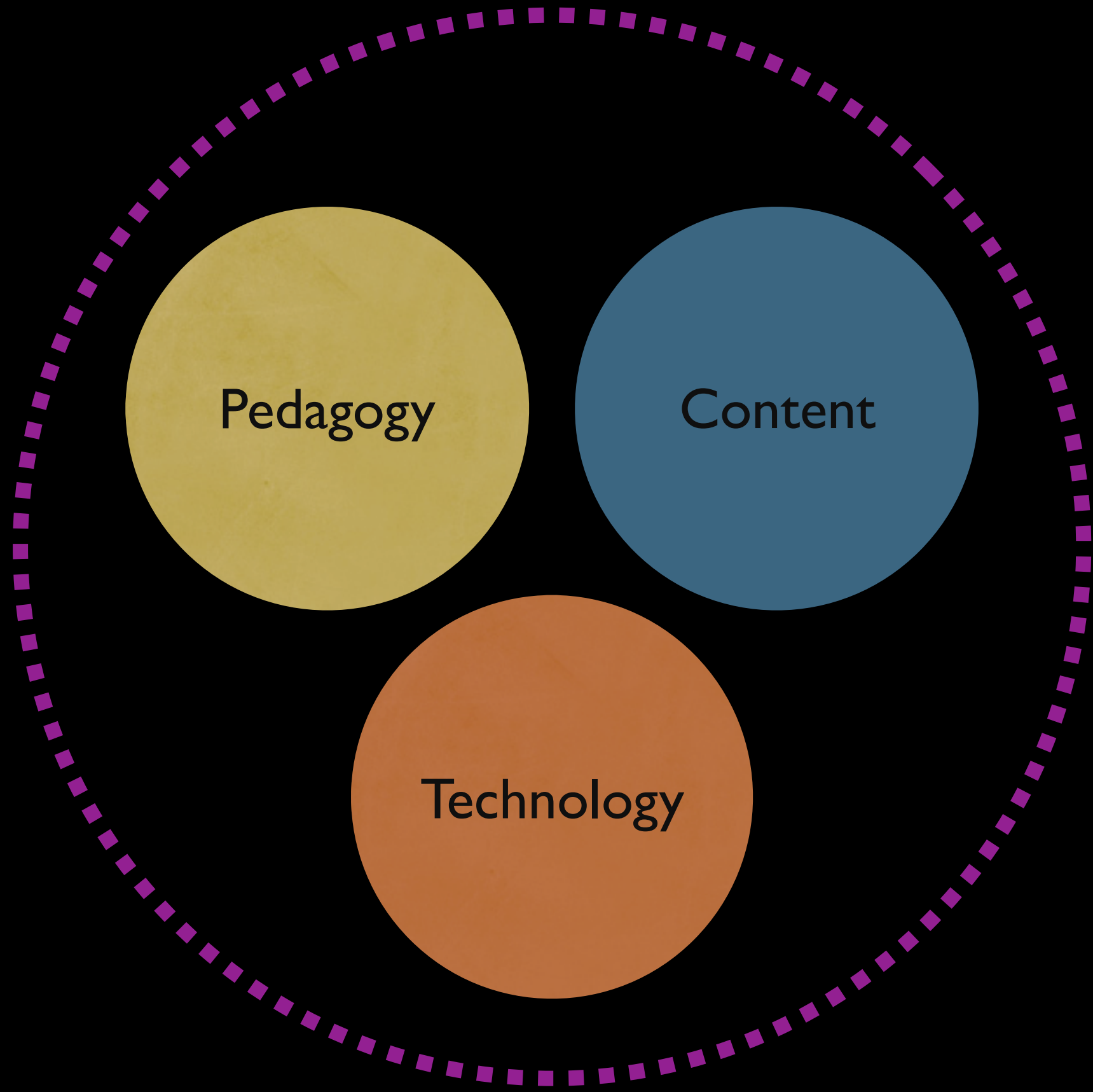
# Laptops in the classroom

(the idea of micro-blogging)

What have we covered  
so far?



What's missing?



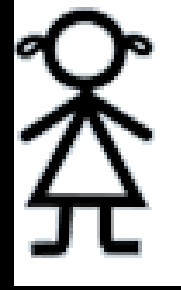
Pedagogy

Content

Technology

Context

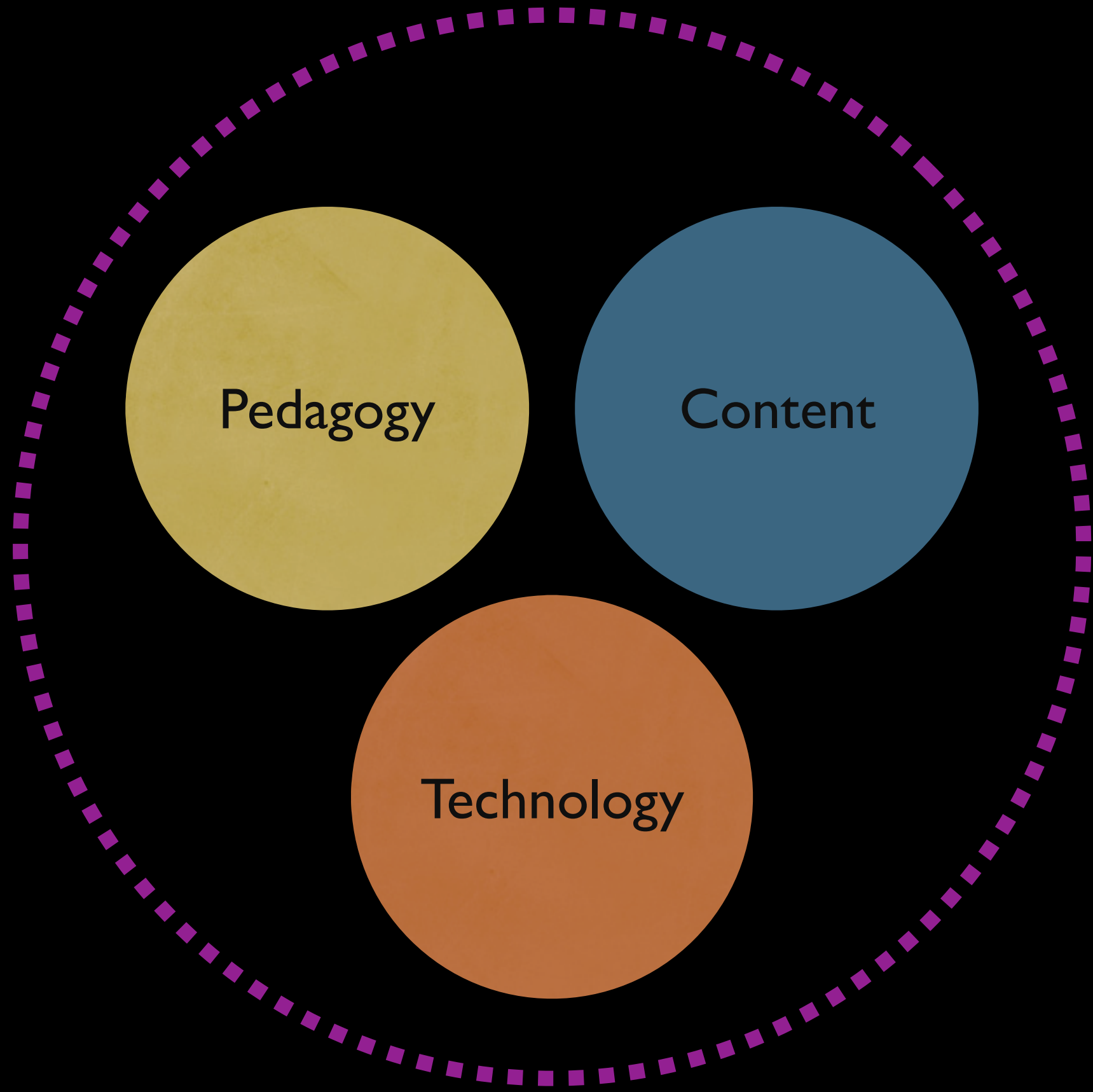








So?



Pedagogy

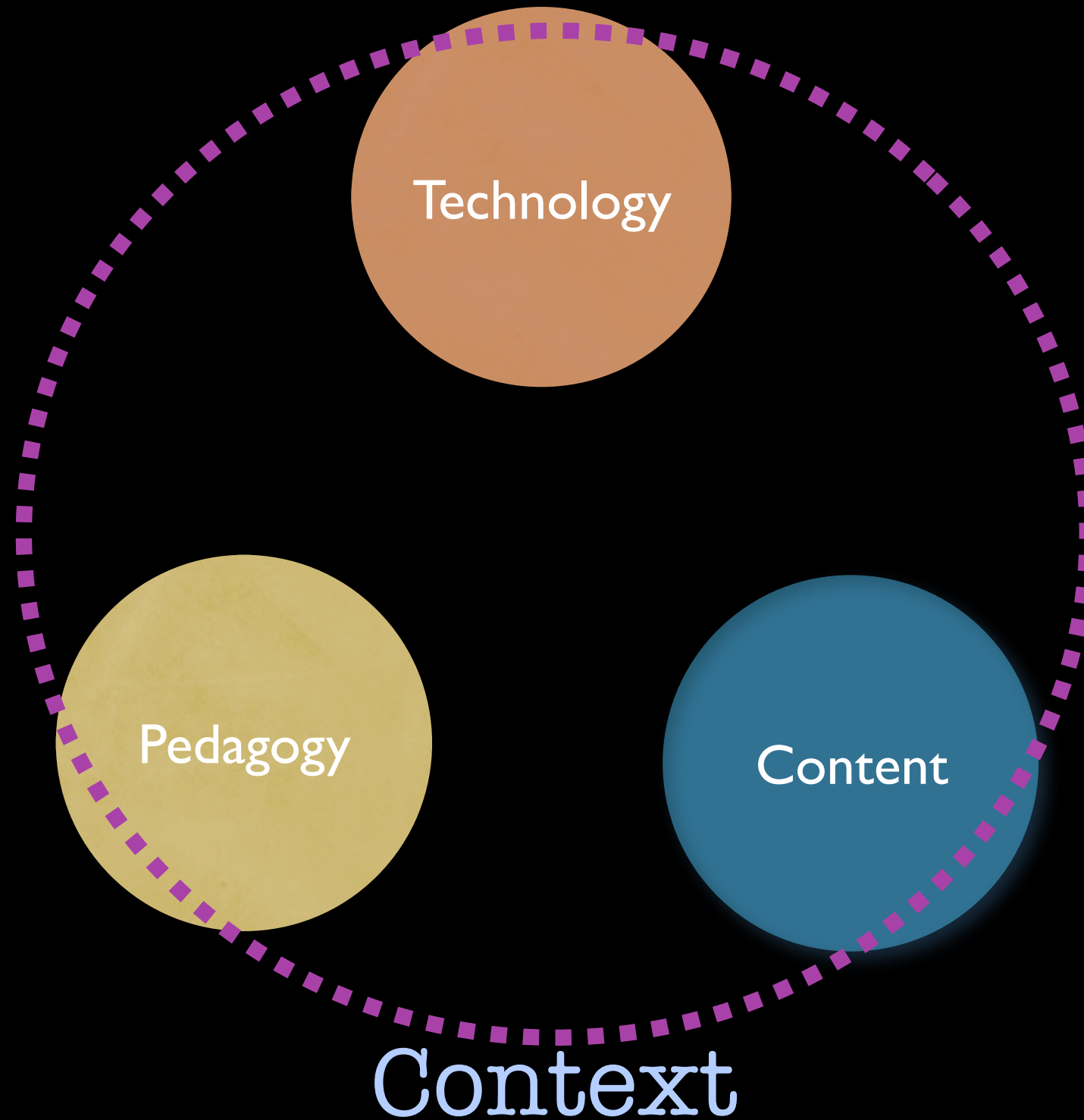
Content

Technology

Context

The most  
important  
overlap

# TPACK Model



# TPCK

Technological Pedagogical  
Content Knowledge



And how  
are we supposed  
to pronounce  
this again?

**ToothPiCK?**

# TPACK

Technological Pedagogical AND  
Content Knowledge

TPCK

TPACK

Total PACKage

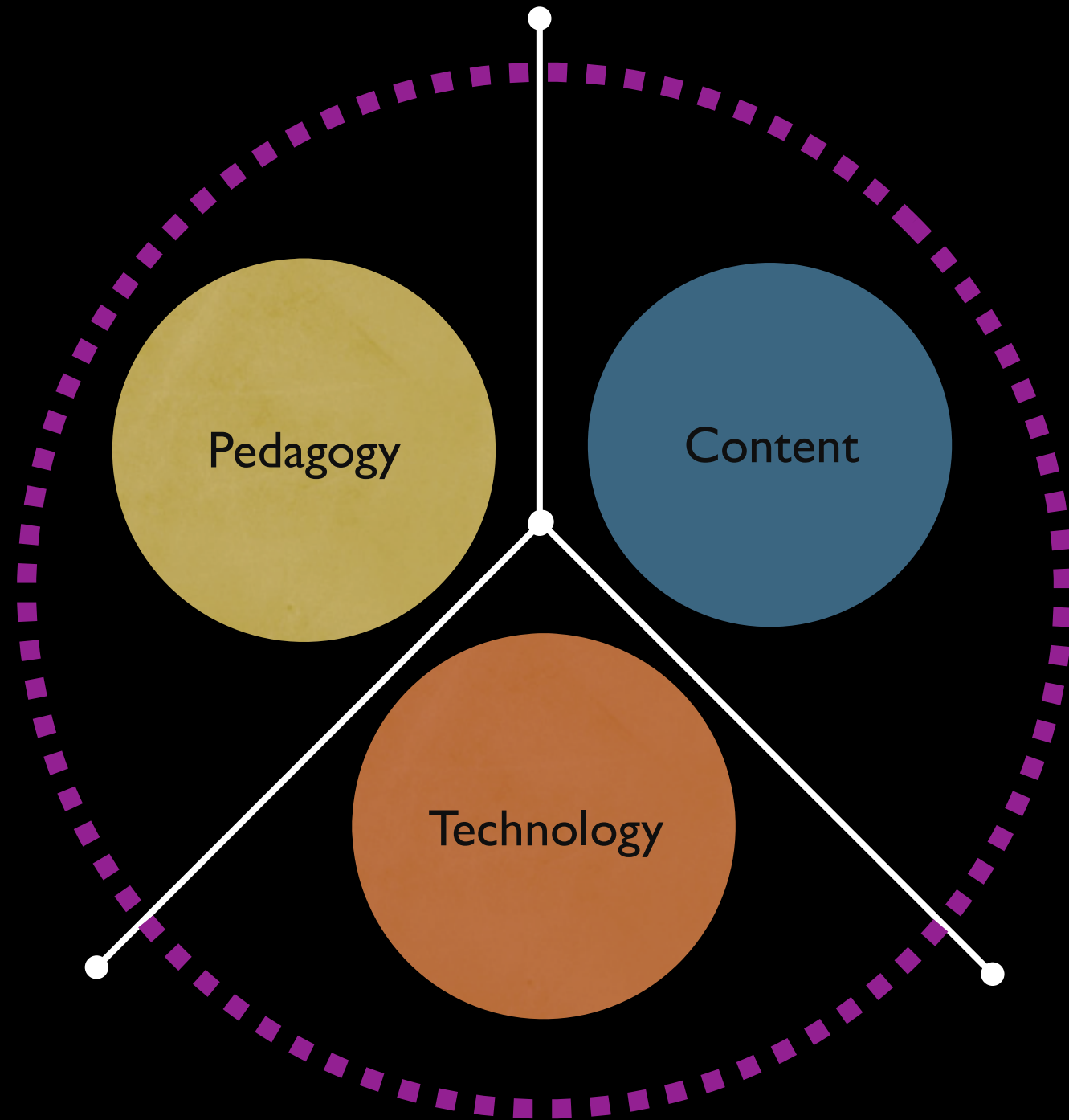


Total PACKage



The research  
(a look back)

what doesn't work



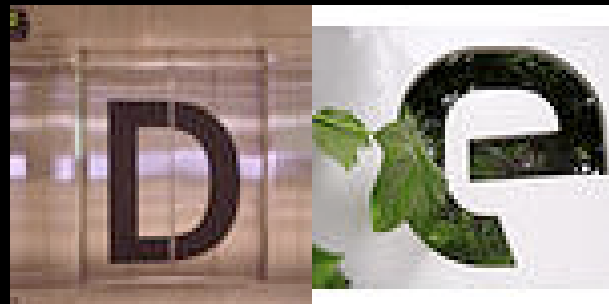
Context

... from **thought**

... to **thing**

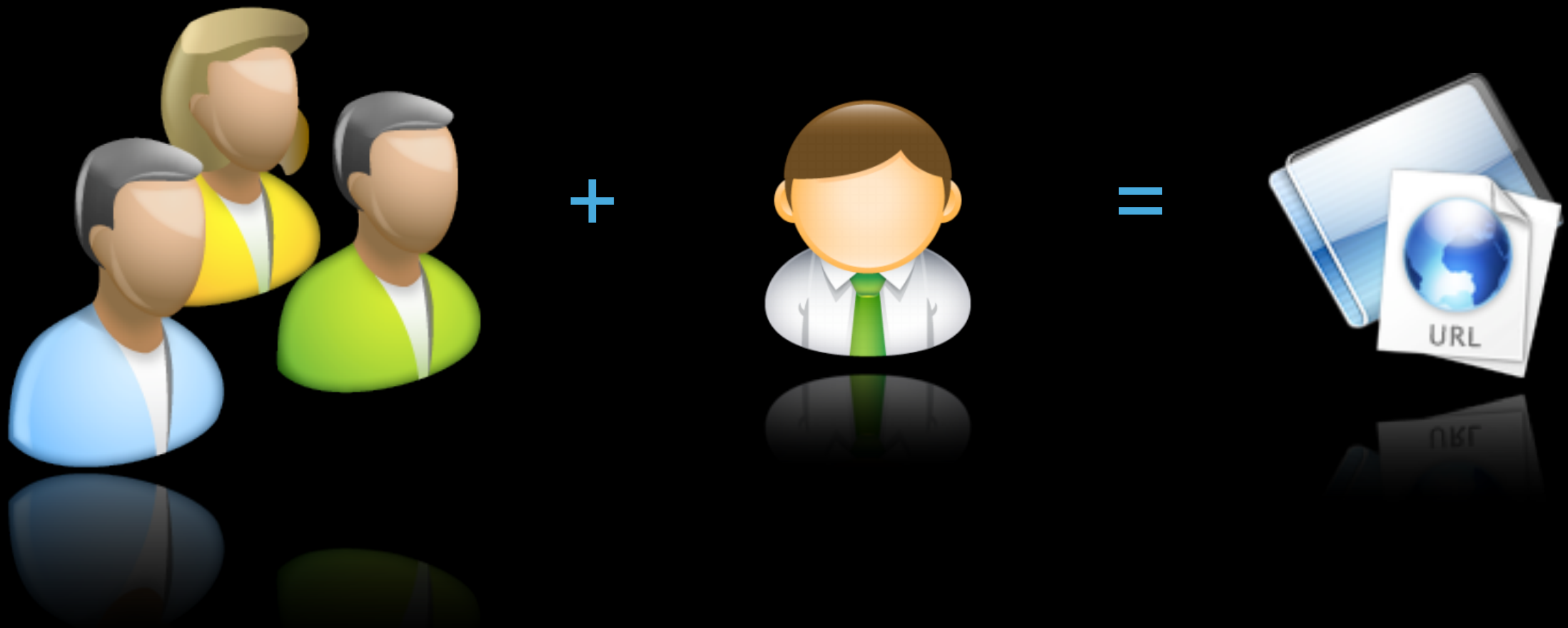


Learning Technology by





# Faculty Development Course



# Designing online courses



Prototype a section of the course

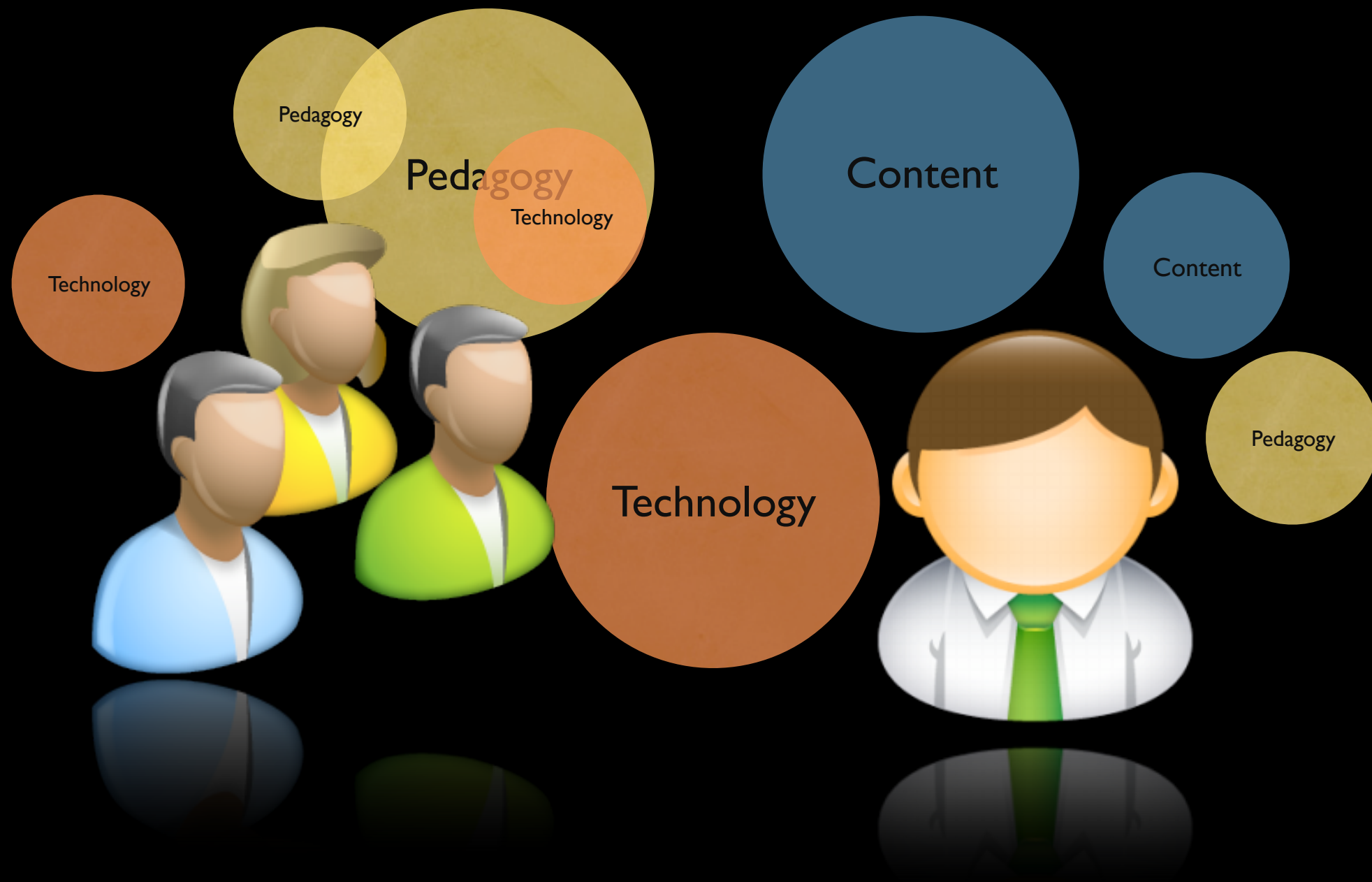


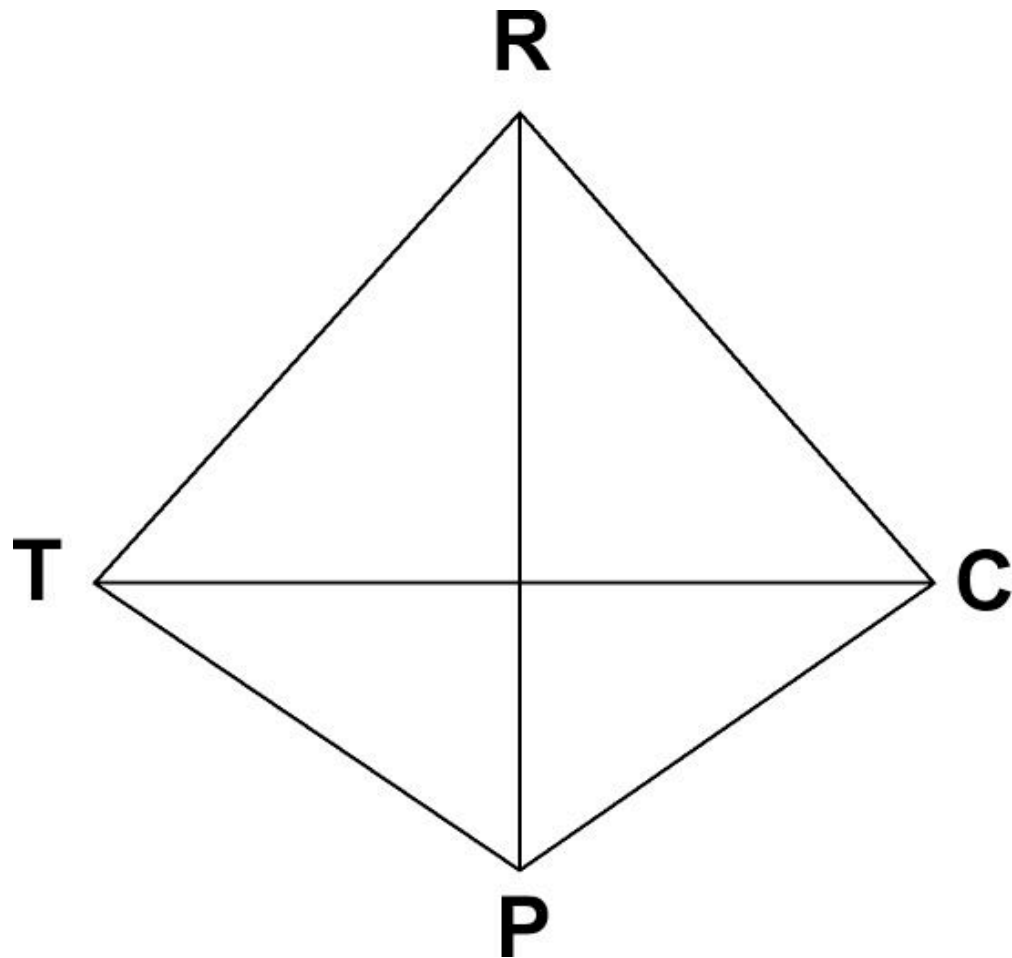
Pilot a section of the course



Redesign a section of the course

# Looking at the data!



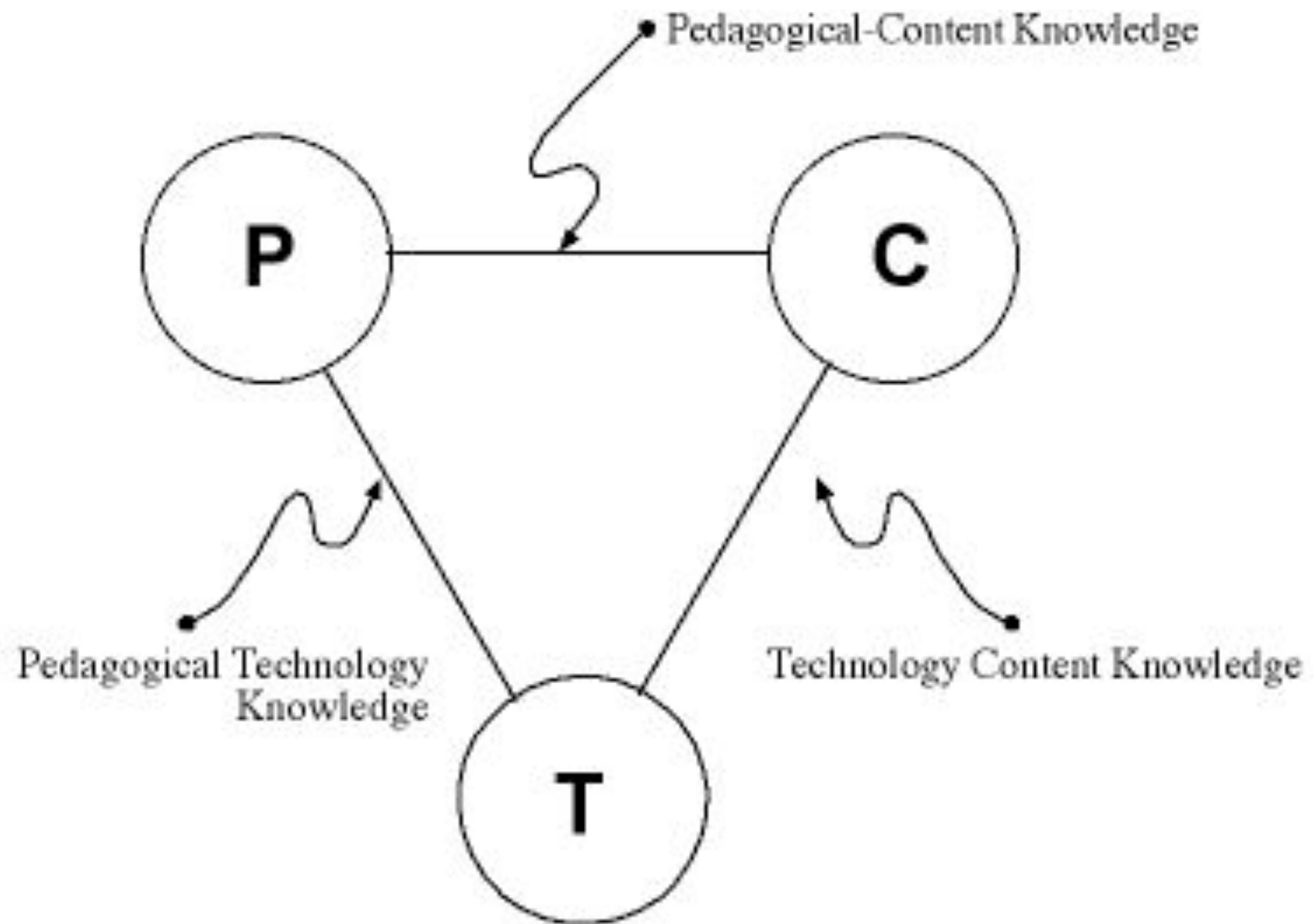


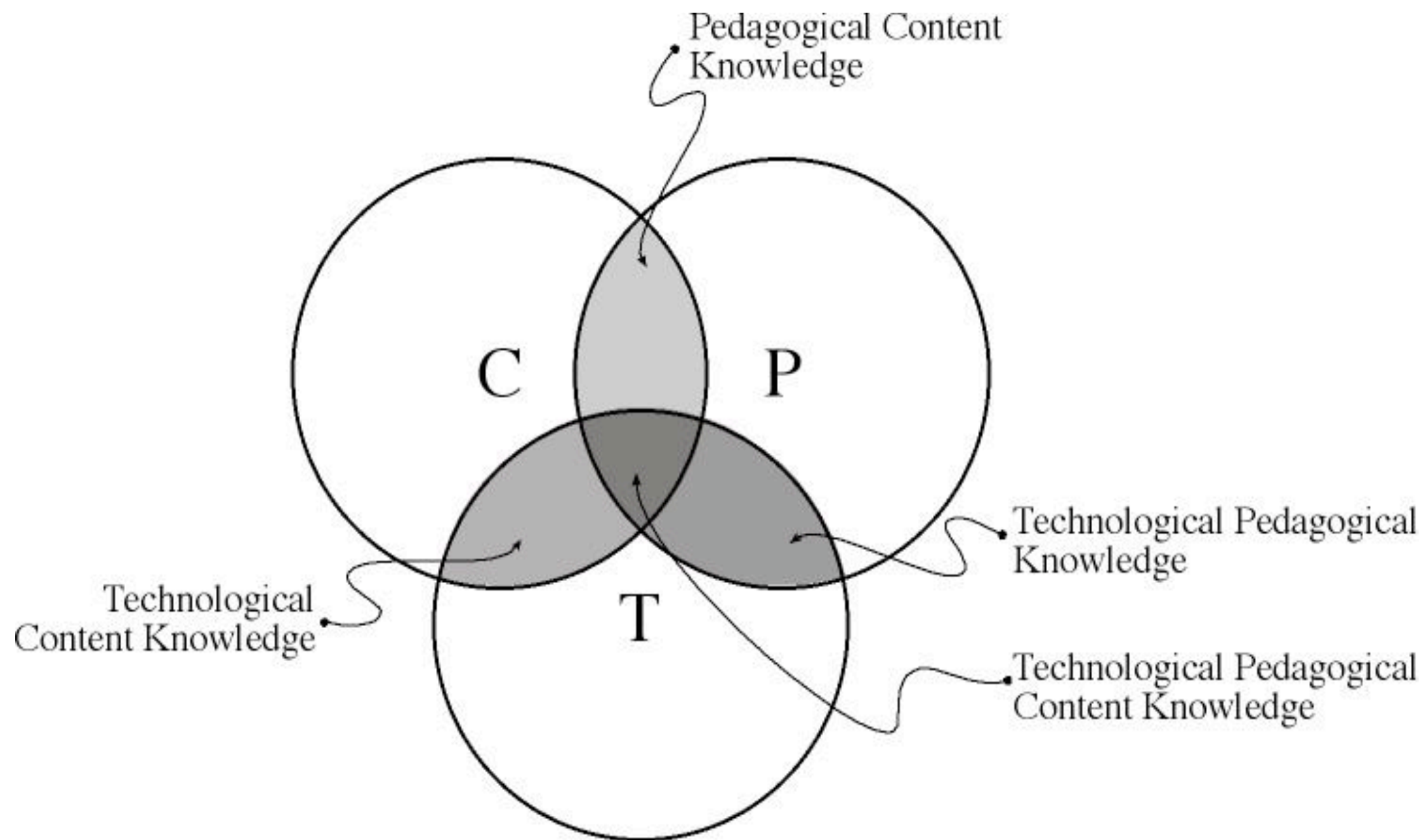
Content

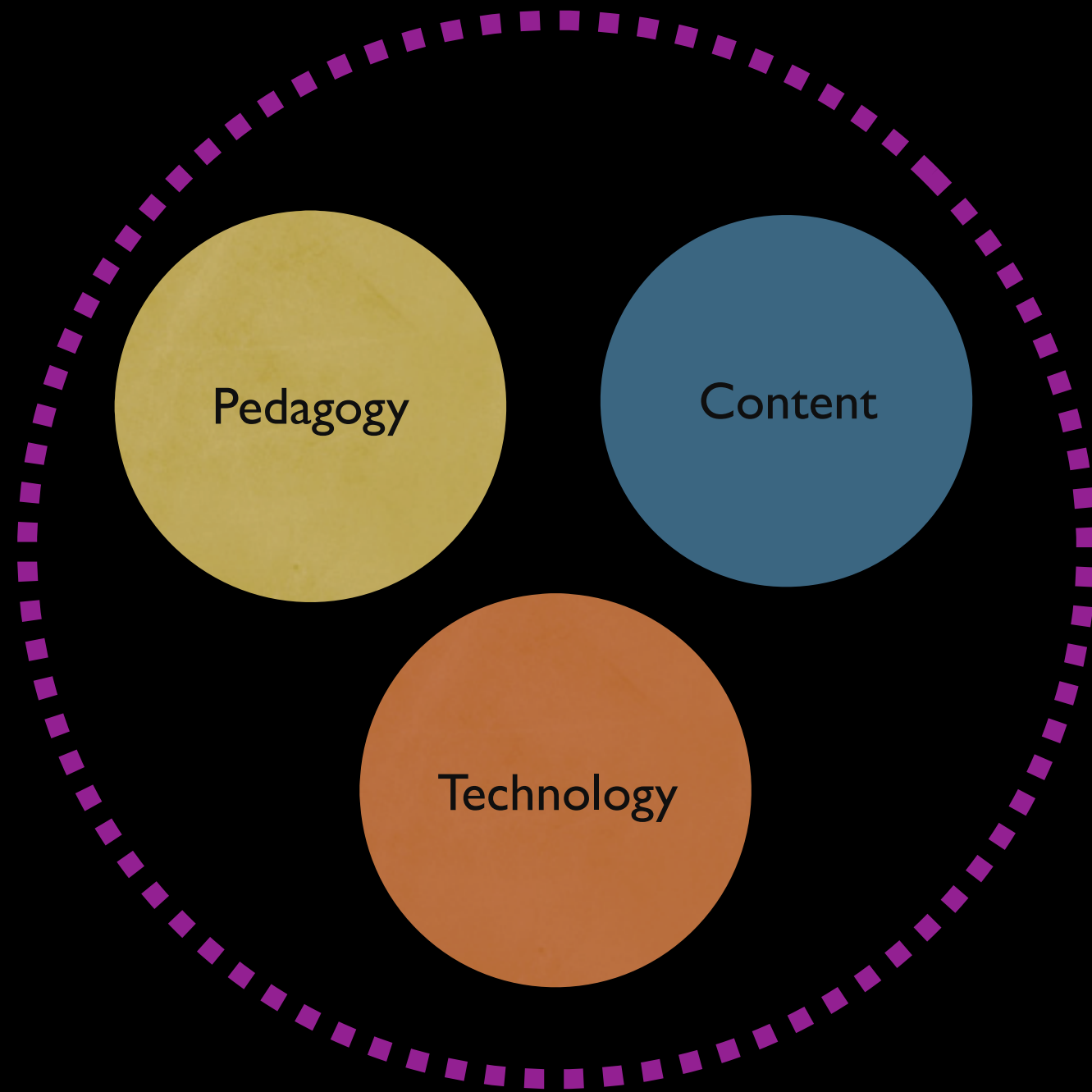
Pedagogy

Technology

Representations







Context

# Measuring TPACK

Case studies of teachers learning about technology integration (Koehler et al. 2004)

Qualitative studies of conversations (Koehler, Mishra, & Yahya, 2007)

Survey measures (Koehler & Mishra, 2005) + ongoing

Studying teacher creativity (Deschryver & Mishra, 2008)

At other institutions...



# An early case study

## Koehler, Mishra, Hershey & Peruski (2004)

Dr. Shaker, Ph.D. - Psychology of Classroom Discipline

Welcome to the classroom!!



This class is made up of diverse learners. They can be: Amusing, Challenging, Tiring, Awe-Inspiring, Playful, Intimidating. And they're in OUR class!

[Meet the students!](#)

[Intro](#) | [Overview](#) | [Schedule](#) | [Classroom Issues](#) | [Student Issues](#) | [Discussion](#) | [Online Resources](#) | [Site Map](#) | [Instructor](#) |

Welcome

one  
two  
three  
four  
five  
six  
Extras

This is CEP 889  
the Psychology of Classroom Discipline

Summer 2001

Welcome  
to Cep 889  
Psychology of Classroom  
Discipline

Introduce yourself at the [discussion board](#).

- Bulletin Board
- School Calendar
- Discussion Area
- Send EMail to other and the professor
- Help Area

View my introduction to this course in [QuickTime](#)

My Contact information is:

Dr. Shaker, Ph.D.

[drshaker@msu.edu](mailto:drshaker@msu.edu)

Counseling,  
Educational  
Psychology,  
& Special Education

517-555-1212

Psychology of Classroom Discipline  
Dr. Shaker, Ph.D.

Welcome to Class!

MICHIGAN STATE  
UNIVERSITY  
CEP 883

Psychology of Classroom Discipline  
Dr. Shaker, Ph.D.

Home

Week 1

Week 2

Week 3

Week 4

Week 5

Week 6

Extras



Welcome to class



Click on my photo to  
view my introduction  
to this week's  
activities in  
QuickTime

Dr. Shaker, Ph.D.

My Contact information is:

Dr. Shaker, Ph.D.

[drshaker@msu.edu](mailto:drshaker@msu.edu)

Counseling, Educational Psychology, & Special  
Education, Erickson Hall

517-555-1212

Time to get started.

First, Read over  
the [Course Orientation Page](#) for  
expectations and technical issues.

Virtual University Requirements, Navigation  
of this course, etc.

Second, view the week's video introduction.  
(to the right.)

Third, since this is week one you should be  
working on [Week One](#) Materials.

Course Navigation

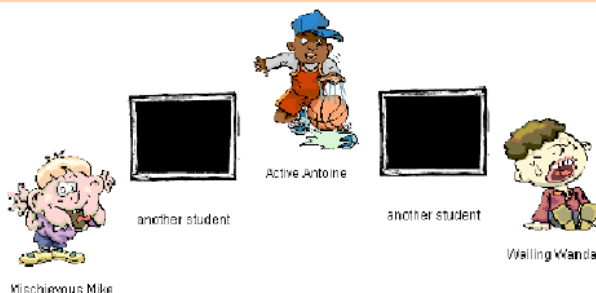
Each Week is listed on the left.

Extras has additional information and links  
to sites, references and group work  
dynamics that apply to the entire course.

Help gives you some specific information as  
you go.

Psychology of Classroom Discipline - Dr. Shaker, Ph.D. MSU

STUDENTS: [A](#) | [B](#) | [C](#) | [D](#) | [E](#) | [Back](#)



Meet some of your students - click on each one to learn more.

[Intro](#) | [Overview](#) | [Schedule](#) | [Classroom Issues](#) | [Student Issues](#) | [Discussion](#) | [Online Resources](#) | [Site Map](#) | [Instructor](#) |

Week 1

one  
two  
three  
four  
five  
six  
Extras

Materials

Day 1  
Community Building  
General Intro, orientation toward ecological  
Classroom Management  
5 Reasons for Team Building

Day 2

Discus - How do we move ahead with project?  
Goals, Hopes, Dreams in small groups  
Reflective Thinking - naive, what works

Day 3

Standards Presented  
React to standards and small groups, etc.  
React to kids "Who do you think they are?"

Rationale for teachers: Teachers require professional development in the area of classroom management for professional and pragmatic reasons. The National Board for Professional Teaching Standards proposes five areas of teaching competencies, two of which are directly related to classroom management. Accomplished teachers "ensure a disciplined learning environment" through engaging students in instruction and effectively managing the group and social processes in the classroom (Proposition 5). Additionally, the standards call for teachers to be aware of the influence of context and culture on behavior, to provide equitable access to instruction for all students and to promote motivation and other pro-social competencies in students (Proposition 1). Pragmatically, teachers are challenged by the range and type of behavior problems presented in the regular education setting. These modules are designed to enhance the capacity of teachers to use "best practices" informed by psychological principles to design effective learning environments for all students.

Rationale for school psychologists: School psychologists consult with classroom teachers regarding discipline problems and are charged with developing positive behavior plans as mandated by IDEA. School psychologists often view this task narrowly by focusing on behaviors of individual students without sufficient knowledge of contextual influences on behavior. They may not have evaluation tools to assess the adequacy of the learning environment. Additionally, school psychologists may not use classroom-based interventions to prevent or reduce behavior problems of individual students and may not have sufficient knowledge of interventions outside of the behavioral paradigm. These modules will broaden the repertoire of school psychologists for consultation with teachers regarding classroom management and discipline issues.

[Intro](#) | [Schedule](#) | [Team Work](#) | [Discussion](#) | [Online Resources](#) | [Site Map](#) | [Instructor](#) | - | [TOP OF PAGE](#) |

Psychology of Classroom Discipline  
Dr. Shaker, Ph.D.

MICHIGAN STATE  
UNIVERSITY  
CEP 883

Psychology of Classroom Discipline  
Dr. Shaker, Ph.D.

Home

Week 1

Week 2

Week 3

Week 4

Week 5

Week 6

Extras



Course Info

Orientation to VU

This is my first web-delivered course. I'm excited about the possibilities that on-line education brings, but a little nervous about how this might all work. Specifically, I generally enjoy the camaraderie of the classroom, the intellectual stimulation that I get from the give-and-take of discussions with students. I'm not sure how that will work in an on-line format. But, I'm excited to try! How about you? Please send me a brief email about your experiences with previous on-line education and what your hopes and worries are about this course's format.

If you haven't yet walked through the orientation provided by the Virtual University for on-line learners, please do so now.

Course Structure

This is a three semester-hour graduate level course. As such, it demands a considerable amount of work on your part. Because this is a "virtual university" course, we will not have face-to-face meetings as is common in most courses. Instead we will "meet" electronically on the world wide web, through e-mail, web-tell, and possibly through chat-rooms. Each week will have the same organizational structure:

- Unit One: "Thinking about..." This unit introduces the topics, content, and goals for the week. Activities will typically consist of readings, multimedia presentations, and linking with web resources. Unit One will be posted on Sunday by 5 p.m. and should be completed by Tuesday at 5 p.m. (Eastern Time).
- Unit Two: "Thinking through..." This unit provides an opportunity for you to engage in an activity with two or three classmates so that you can apply the concepts you learned in Unit One. You will be assigned to a study group for the duration of the course. You will also work on one or two long projects with your study group. I hope that your collaborations with your peers will give you an opportunity to wrestle with the materials, test your ideas, sharpen your thinking, take intellectual risks, exchange insights, and develop applied skills. Your study group will develop a set of agreements on how to work together during the first week. I hope these will be non-threatening arenas to think together with peers and that they will be infused with a willingness to listen and sustain conversation, patience, humor, individuality, respect, tolerance of diverse viewpoints. For those who haven't indicated much in an on-line environment, you may want to review common rules of etiquette on the Net. NETICUETTE STUFF

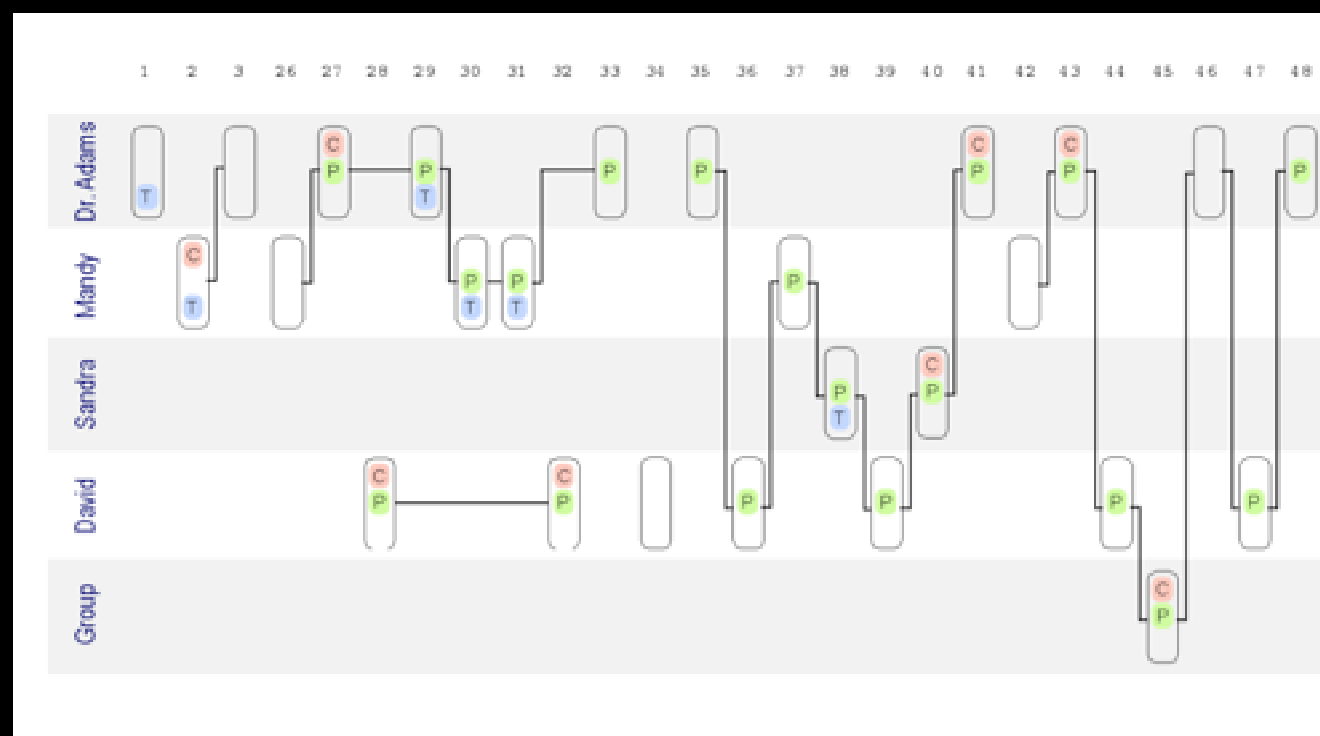
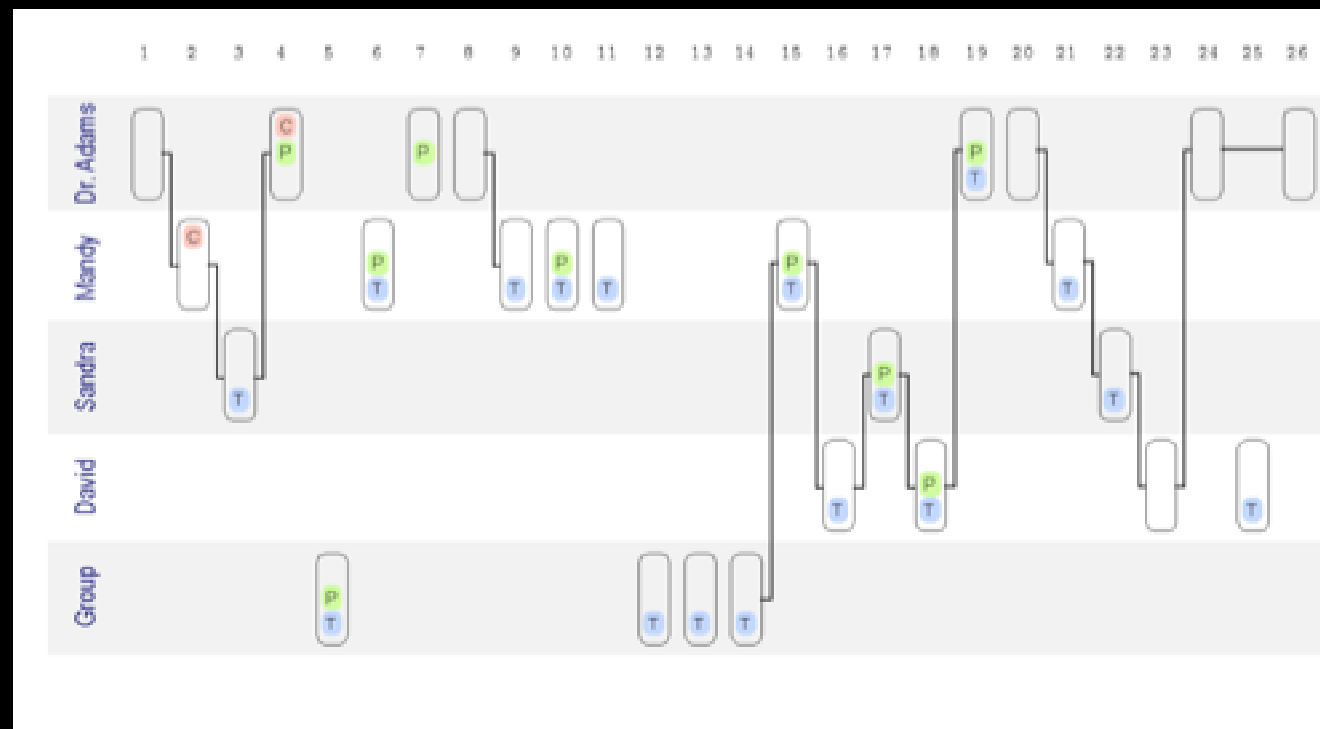
Study groups will have their own work space in the "XXX" area and will meet electronically via Webtalk, e-mail, or Virtual Chat. Study group activities should be completed between Tuesday at 5 p.m. and Friday at noon (Eastern Time).

- Unit Three: "Thinking about..." This unit provides an opportunity for you to reflect on the week's content and activities and their relationship to your professional practice. Short reflection papers will be due to the instructor by Sunday at noon (Eastern Time). The time is also allotted for work on your group's project.

Time Commitment

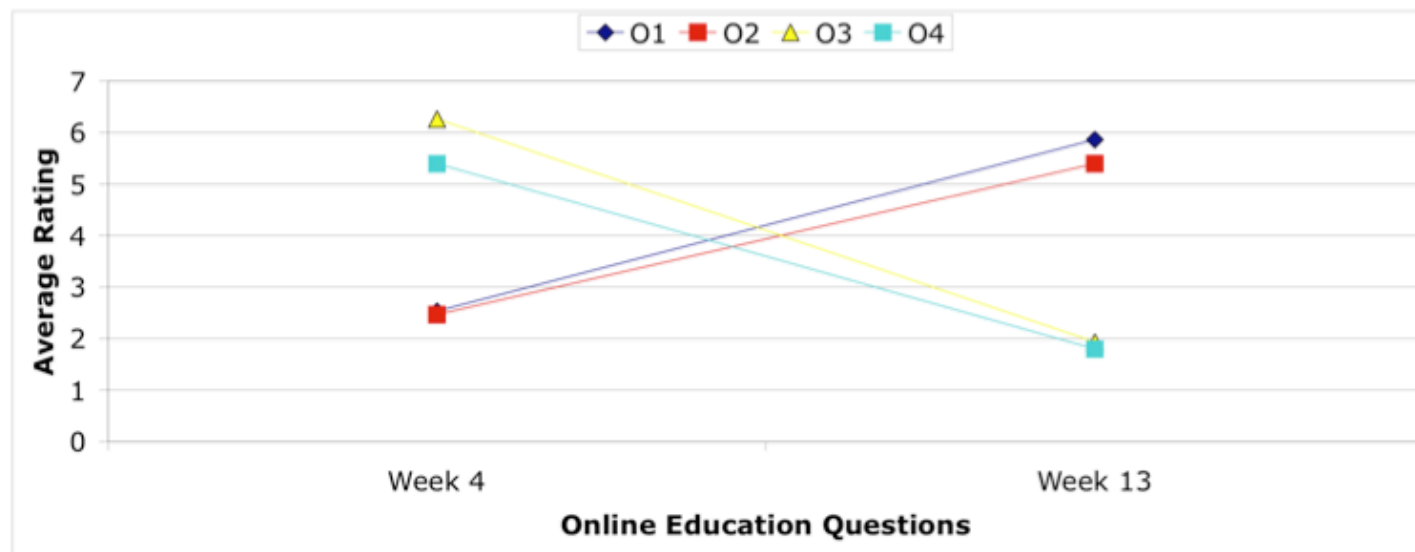
# Studying Design Talk

Koehler, Mishra, & Yahya (2007)



# A Survey of TPCK Thinking

Koehler & Mishra (2005)

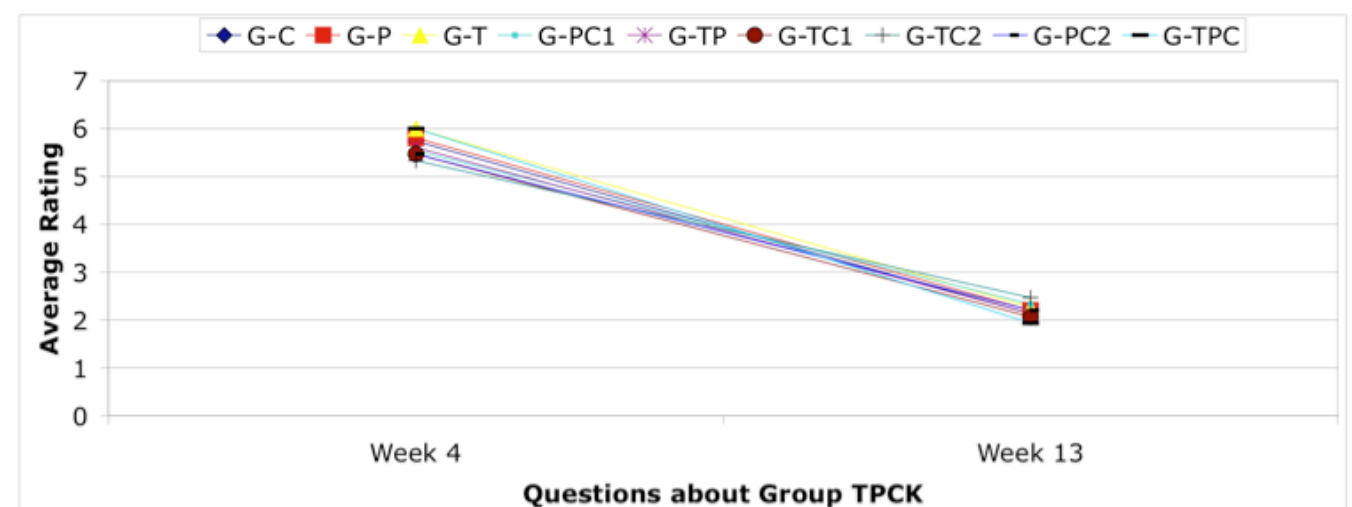


“Designing an online course requires changes in what we teach and how we teach”

More ...

“Our group has chosen technologies that fit the course content and the instructors teaching philosophy.”

More ...



Ongoing

DeSchryver & Mishra, 2008

# TPACK & Creativity



Mix and Match (Bricolage)

Domain Knowledge  
Serendipity

Representation

Iteration

Interconnectedness

Transformation

Perspective

Expression

Provisionality

Pre-service mathematics teachers

Hampered by lack of knowledge of C, P & T

# Developing a TPACK survey

In collaboration with Iowa State  
University

To be presented at SITE09 and AERA09

Also see:

Banyas & Mishra (2008)

- affordances of learning management systems & instructor teaching philosophies

Peruski & Mishra, (2005)

- activity theory analysis of teaching online

Dirkin & Mishra (2008)

- transactional relationship between beliefs, values and teaching with technology

Walking the walk



# Reflections on learning

## An online course!

Pick any card from the deck below and commit that card to memory.



Be careful not to indicate which card you picked with your cursor.

When you are finished, click the red button below.



TE150 - Spring 2008 - Section 2

TE150 - Spring 2008 - Section 2

Watching movies: What do you see?

Navigation Menu

- TE150\_Sp08\_002
- Course Info
- Module 1
  - Intro to TE150: A whack on the side of the head via magic!
  - Direct Link to Card Trick
  - How does the magic trick work?
  - Module 1 Forum
  - Getting to know each other
  - Getting to know the course
  - Watching movies: What do you see?
  - Your turn as a movie critic
  - Research Consent Form
  - Polit: Innate or Environment?
  - Historical background of nature v. nurture
  - "Nurturing" the Inquisitive Knowledge Seeker
  - Your thoughts on the nature v. nurture debate
- Module 1 Summary Posting
- Are we done yet?
- Mod 1 Summary/Discussion
- Module 2
- Module 3
- Module 4
- Module 5
- Module 6
- Module 7
- Module 8
- Module 9
- Module 10

Course site tip #2: Resources

Supplementary resources for all modules are available now in the course "Resources."

If you'd like to start reading ahead for a topic, go for it!

There are more activities in this module to get your mind warmed up and thinking about some of the issues we'll raise in the course.

The first activity uses the following video clips. The first is a montage from Hollywood and educational films, and the second a rather famous task for young children. Watch the videos closely. At the end, you will be asked to write a 500-word essay answering this question "What are different ways that people learned in these movies? What evidence could you see in the movies that people were learning?" What are factors that helped or hindered people from learning? You don't have to talk about all the clips; pick three or four that you find interesting. Use as many details as you can in your answer. You should probably watch the videos more than once.

Ready to post your response? Click on the next section!

TE150\_Sp08\_002: Behaviors in the Real World (due Sat, the 28th)

Re: Behaviors in the Real World (due Sat, the 28th)

to Edward Frequenter - Saturday, 26 January 2008, 10:10 AM

While thinking about behaviorism and looking for a real world example, I remembered going to the dentist as a little kid. Every children (and even some adults) fear going to the dentist. They are afraid of possible pain that may result if they have treated their teeth poorly. I used to be afraid of going to the dentist myself because of all the "horror" stories I had heard such as stories of root canals and getting teeth drilled or pulled. However, at the dentist I went to they had a treasure chest. Inside this chest were different toys (including really expensive, but to a little kid these were totally awesome). And whenever I got done at the dentist I was allowed to pick two toys out of the treasure chest. This would motivate me to go to the dentist because I looked forward to getting new toys every time I went. It really helped me to become okay with going to the dentist's office and I now have no reluctance going there, although I no longer get toys.

This is an example of positive reinforcement. I was being immediately rewarded every time I went to the dentist. While looking at the schedules of reinforcement, I realized that this would fit under the continuous ratio category because I was being rewarded every time I went to the dentist, and not just some of the time. I will go to the same dentist that I did when I was younger and I hope that they will have the treasure chest for the younger customers to take advantage of I realize that this worked for me when I was younger and I am sure that it works for other children as well.

Show parent | Reply

Re: Behaviors in the Real World (due Sat, the 28th)

to James Stewart - Saturday, 26 January 2008, 10:10 AM

My dentist used to have a treasure chest too when I was a kid. I don't mind the dentist though at all. I actually enjoy it. I have had many bad experiences, though such as the dentist pulling out a tooth and my mouth wasn't numb at all. I cried and he was like "what's wrong?" I was like "I felt everything and it was horrible. He felt really bad. I was scared for maybe like a year but now I look forward to my visit every 6 months!"

Show parent | Reply

Re: Behaviors in the Real World (due Sat, the 28th)

to Leslie Thumke - Monday, 28 January 2008, 10:20 PM

My dentist did this as well. I went to the dentist with my sister and my nephew the other day. He was not wanting to do all and kept complaining that the lights were too bright. The dentist in an attempt to get him to sit still, handed him a pair of sunglasses. He was okay for a little while, but got really agitated. The dentist knew that Peyton loved bouncy balls and told him that if he sat still while she cleaned his teeth, he could have 2 bouncy balls. Well of course he was in the glory because if he was good he could have not one, but TWO bouncy balls. He sat still the rest of the time.

Show parent | Reply

Re: Behaviors in the Real World (due Sat, the 28th)

to Renee Stewart - Saturday, 26 January 2008, 10:20 AM

I feel like I would be a little confused if I was a child though. If she was fully potty trained but then would get chosen to do around the house later on in life. Then I feel like she might long for that and be like "I was going on the potty when she did it wrong type of thing. Who knows if she had to do choose later or not but I feel like that could cause confusion in her life mind."

Show parent | Reply

Facebook | Talk about Your Memory Study (due Sat, Feb 9th)

http://msu.facebook.com/topic.php?uid=7314229063&topic=3714

Sybil Ellison (Lansing / East Lansing, MI) replied to Hayley's post on Feb 9, 2008 at 3:37 PM.

Post #15

That's interesting because I really hadn't looked at any of the lists in terms of provoking any specific memories. I think that's what's most interesting about people is that perception is often what a thing is all about. Things can provoke different ideas, memories in different people, and that I find interesting.

In truth I was having such a hard time getting my browser correctly to work for the last several days on our other site that I was probably not trying to think of the words in those terms. A bit tired, that "noise" in other words just wanted to get to the lists and do the work.

Is it possible to be too focused on a thing? Does that make you see it only from one point of view?

Reply to Sybil | Mark as Irrelevant | Send Message | Report | Delete Post

Jessica Varnas replied to Stephanie's post on Feb 9, 2008 at 3:40 PM.

Post #16

I had sort of the same problem with assuming some words were on the list. On the third list, while I was trying to recall as many words as I could, I thought that grape and dime were on there but I couldn't remember for sure. I figured that they were on there because there were other words that would go along with theme of fruit and coins. Grape and dime were on the list but I didn't write them down because I wasn't completely sure.

Reply to Jessica | Mark as Irrelevant | Send Message | Report | Delete Post

Stephanie Gould replied to Sara's post on Feb 9, 2008 at 3:47 PM.

Post #17

I think it's really interesting that you remembered words that rhymed. It never occurred to me that it might actually be easier to remember words that sounded alike or rhymed with each other. I tried to remember words by making connections/relationships, which became easier to do just because the words had a stronger relationship to each other.

Reply to Stephanie | Mark as Irrelevant | Send Message | Report | Delete Post

Jessica Varnas replied to Amanda's post on Feb 9, 2008 at 3:54 PM.

Post #18

2 replies

I also found it interesting that on, I believe it was the fourth list, I forgot "sun" and "moon", which are a pair so you would think that the association would help you remember those words. Maybe I couldn't remember those two because the other groups of words had four or more words that were linked (mother, father, brother, sister, and plane, train, bike, car).

I also used the same technique of the "Simon Says" game to try to remember some of the words and found that it did not work.

Reply to Jessica | Mark as Irrelevant | Send Message | Report | Delete Post

Sybil Ellison (Lansing / East Lansing, MI) replied to Amanda's post on Feb 9, 2008 at 3:59 PM.

Post #19

1 reply

I think human beings just naturally group things together, and thus chunking being most people here's preferred method of memorizing something is not so surprising. Everything in our society is group. Fruits, vegetables, people even belong to several groups so applying the concept to the methodology of thinking and memory seems pretty logical.

Maybe that's one of the many reasons they could not completely change the wild boy of Aveyron. Having had nothing to associate what they were trying to teach him, how could he have been expected to totally recall the lessons or to fully understand them?

Reply to Sybil | Mark as Irrelevant | Send Message | Report | Delete Post



Working with school  
districts for teacher  
professional development

Documenting &  
sharing examples of  
“pretty good” practice

# Technology for Authentic Problem Solving

[Home](#)[Browse Tags](#)[Browse Videos](#)[Search](#)

## Keith Forton - Solution

Mr. Forton's solution is to use video capture to acquire video of simple and complex examples of motion. He then has the students use the software [World in Motion](#) to plot the and create a graph of the motion. This way students can see the translation of energy and other hard to conceptualize physics principles.

[Review the problem.](#)

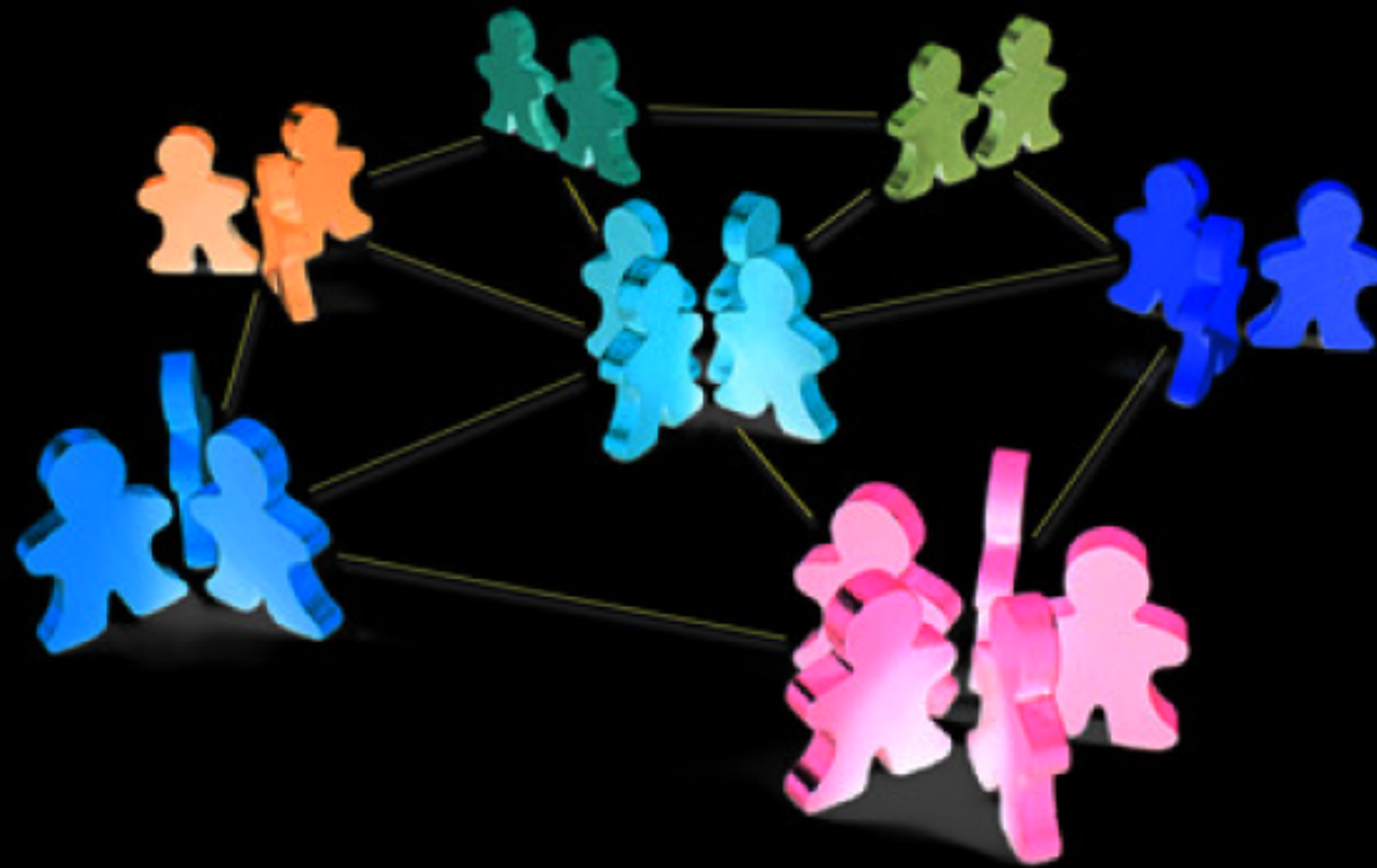


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## More Information

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## Spreading the word

The Society for Information Technology in Teacher Education (SITE), The American Association of Colleges of Teacher Education (AACTE), The National Associations of Childhood Teacher Educators (NACTE), National Council for the Social Studies (NCSS), Association for Mathematics Teacher Educators (AMTE), The Association of Teacher Educators (ATE), and the International Society for Technology in Education (ISTE).

# What does the generative level of TPACK look like?

Repurpose  
technology

Working with constraints

Become curriculum  
designers

Using creativity



# \* Design principles

Integrated (T, P & C)

Spiral development (baby steps)

Changing teacher beliefs (Nudge)

Collaborative teams

Importance of creativity  
(repurposing/redesign)

Modeling / Humility

Iterative

# So far...

Understanding technology

Teaching as lying at the intersection  
of C, P, & T (in specific contexts)

Going beyond use & integration

Three levels: mechanical, meaningful,  
generative

Some broad design principles





The future  
Looking into the crystal ball

# Looking forward

- \* Strategies for developing TPACK
  - \* Where do we start?
- \* Measuring TPACK
- \* Individual or group?
- \* Connecting to TE programs (PD/degree)

In closing



Understand maps?

Go beyond concrete  
understandings?

Make maps more personal?

# Solutions

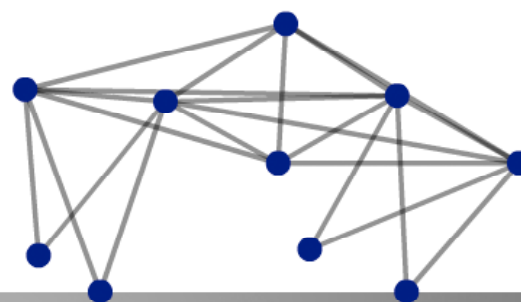
KidPix,  
Mapquest,  
satellite photos,  
virtual field trips  
etc...



The transformative  
aspects of technology







show polys

next model

gravity ————— 0.38

ground friction ————— 0.54

wave speed ————— 0.01

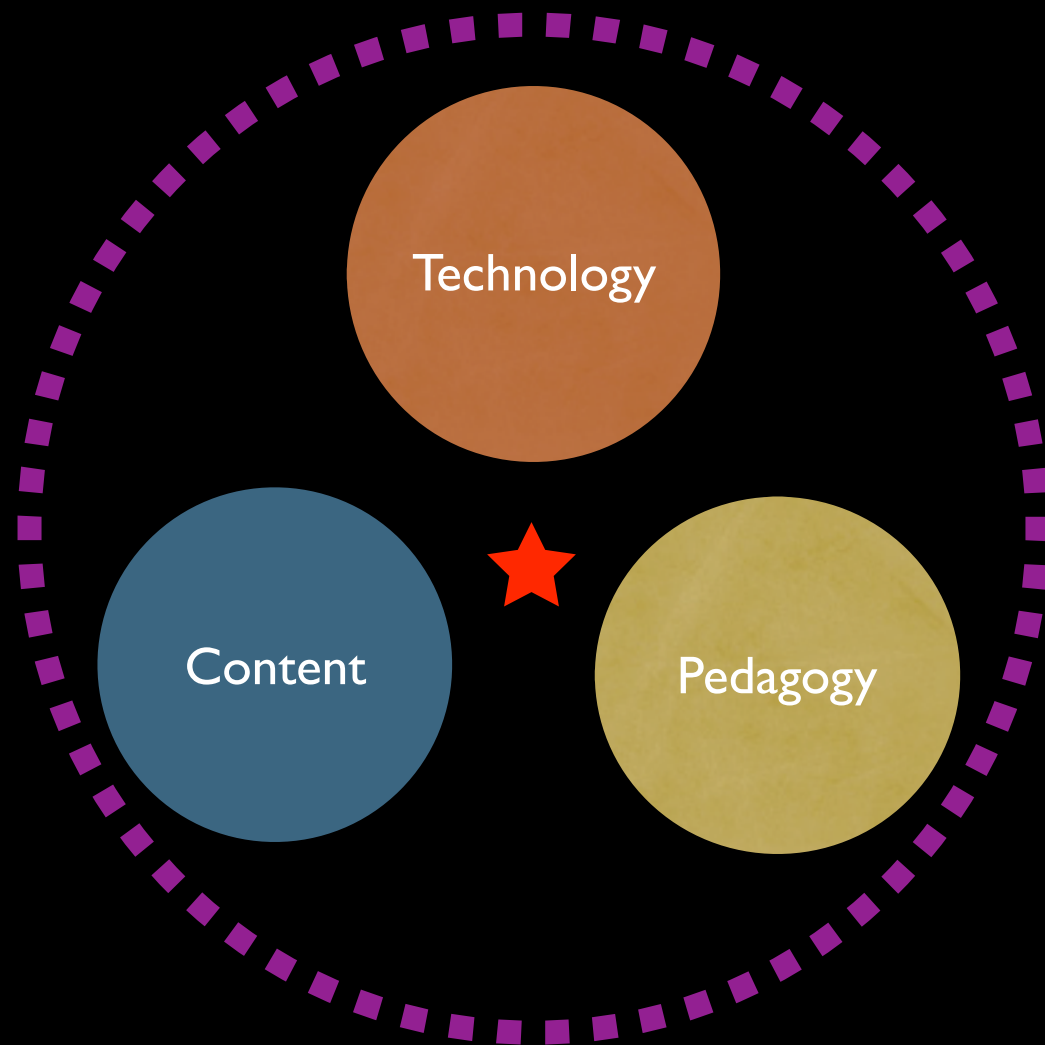
The walls  
between art and  
engineering  
exist only in our minds

The walls  
between  
Technology  
Content &  
Pedagogy exist only in our minds

The walls  
between  
Technology  
Content &  
Pedagogy exist only in our minds

If we are willing to  
play

# TPACK



Context

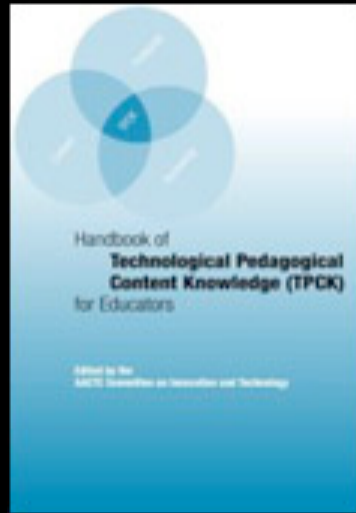
Coming up...





Looking at the world in strange ways





TPCK Handbook for  
Educators



[www.tpck.org](http://www.tpck.org)



Faculty development by design

We shall have to evolve  
problem-solvers galore—  
since each problem they solve  
creates ten problems more.  
— Piet Hein

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