

That's wonderful, but what are they going to talk about — G. B. Shaw, (when told that India and Britain were joined by cable)

The technicalities matter a lot, but the unifying vision matters even more  
— T. Nelson

# Thanks











<TITLE>

TPACK'd and ready to go!

</TITLE>



<a name="Punya Mishra"  
affiliation="Michigan  
State University">



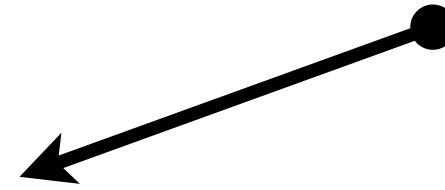
@punyamishra  
@matthewkoehler



<a name="Matthew Koehler"  
affiliation="Michigan  
State University">



Hot Air



Ballast





Punya

Matt

# Hot air + Dead weight!





<START>



- 1 How we came to TPACK
- 2 What is it anyway?
- 3 The spread of an idea
- 4 Some examples...
- 5 Developing & Measuring TPACK
6. Looking ahead...

</START>



How we came to  
TPACK?



# WAYBACK MACHINE – HISTORY OF *TPACK*

WAYBACK

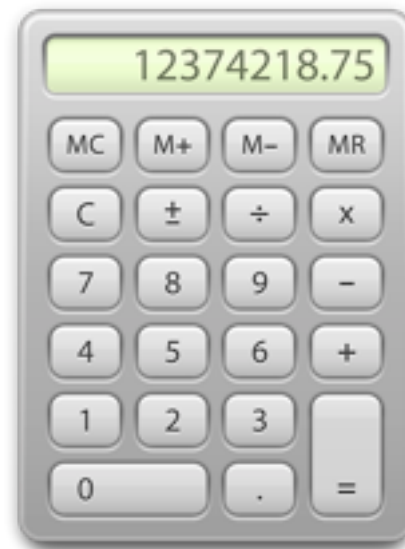
1999

1999





1999



1999



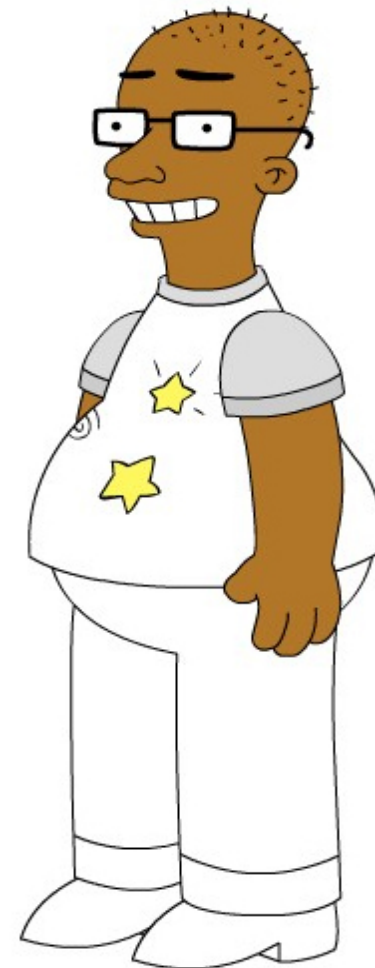
1999



1999



2000





2000

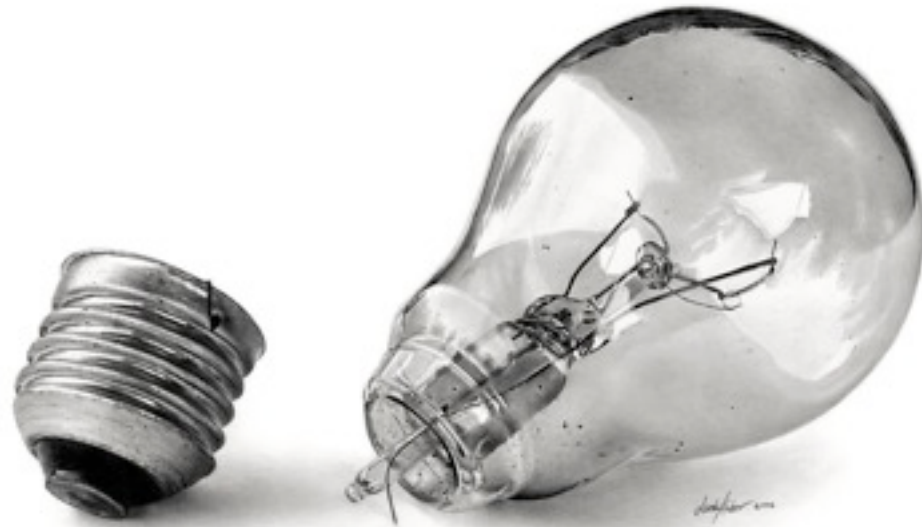




2000



2000



**Hands on**

**Contextualized**

**Authentic**

Connected to **practice**

Learning by **doing**



# **design** experiments

Brown, 1992; Cobb, Confrey, diSessa,  
Lehrer, & Schauble, 2003; Design Based  
Research Collective, 2003

# design experiments

Learning Technology by



+



Problems of practice

# design Teams



+



Diverse expertise

Distributed across the team

Faculty tended to be content experts

Masters students (teachers) tended to know more about technology

# design Tasks



+



Example: Design an online course  
(e.g. a masters level course in literacy)

Learn technology as needed

Web -design, video editing, FTP,  
CMS, collaborative learning,  
communication tools, etc.

# design experiments

Learning Technology by



Time - a whole semester

Course - Release

Financial Support

Equipment

Graduate Students

2002

It's working!!

Collaboration allowed for sharing expertise

Learning was contextualized

Multiple technologies were being learned

Learners were engaged

Distributed knowledge was becoming shared by individuals

2002

## How to talk about it?

**Shulman (1986)**

Content knowledge

Pedagogical knowledge

Something missing - **Pedagogical Content Knowledge:**  
Knowledge about how to teach a particular subject matter.

Knowing how to teach math is different from knowledge about math, or knowledge about teaching in general.



2002

Shulman 1986

C — P

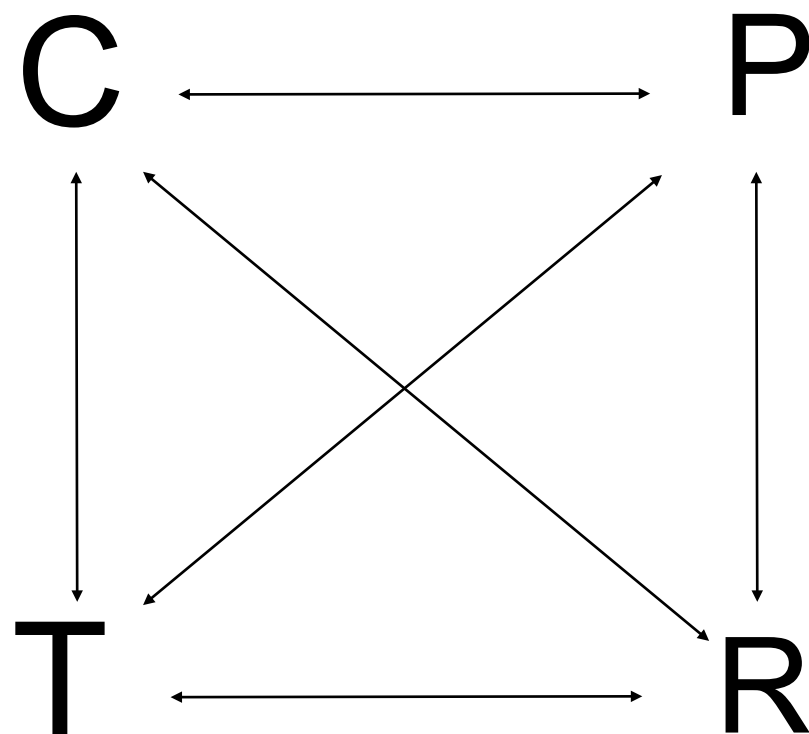
2002  
Workshops

C — P

T

2002

Learning Technology by

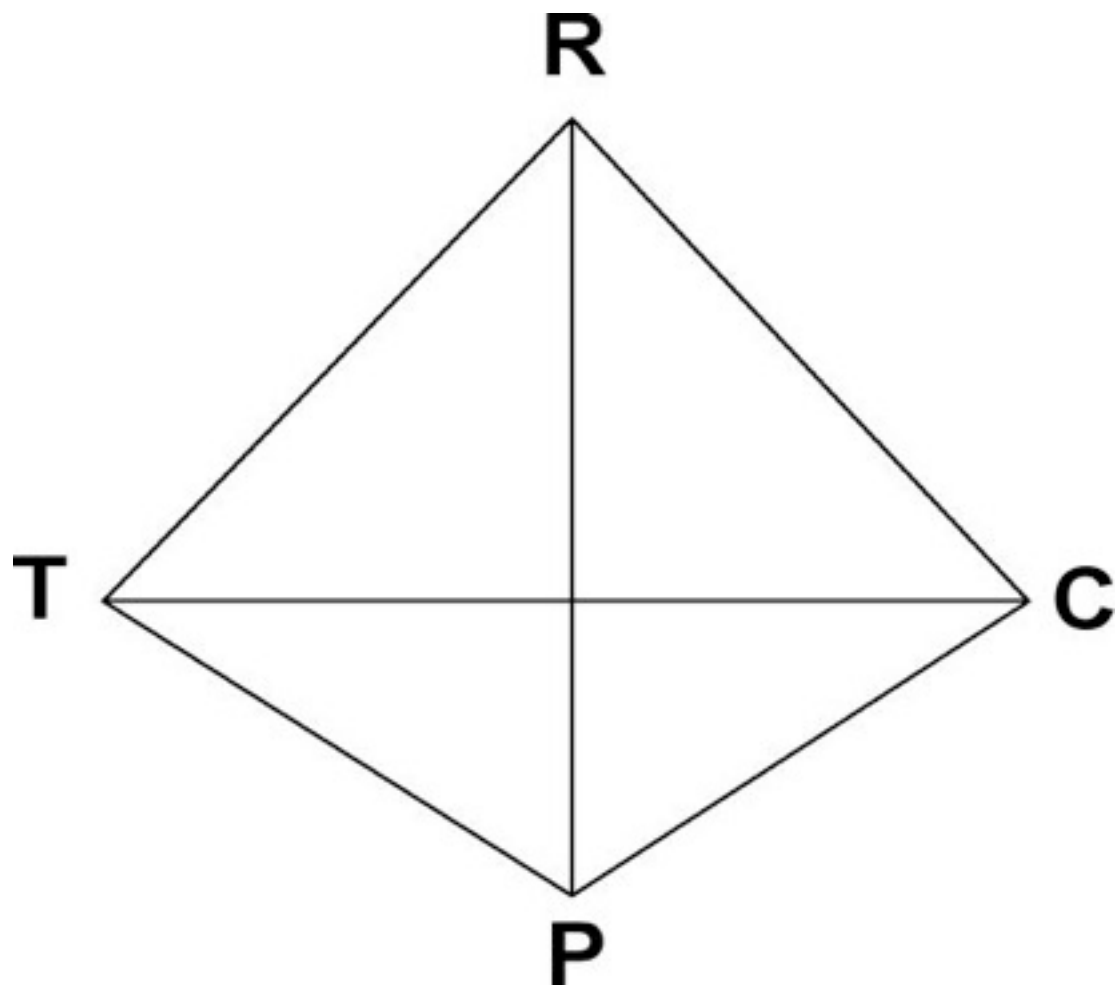


- C : Content
- P: Pedagogy
- T: Technology
- R: Representations

\* Didn't get a lot of attention

2002

Learning Technology by

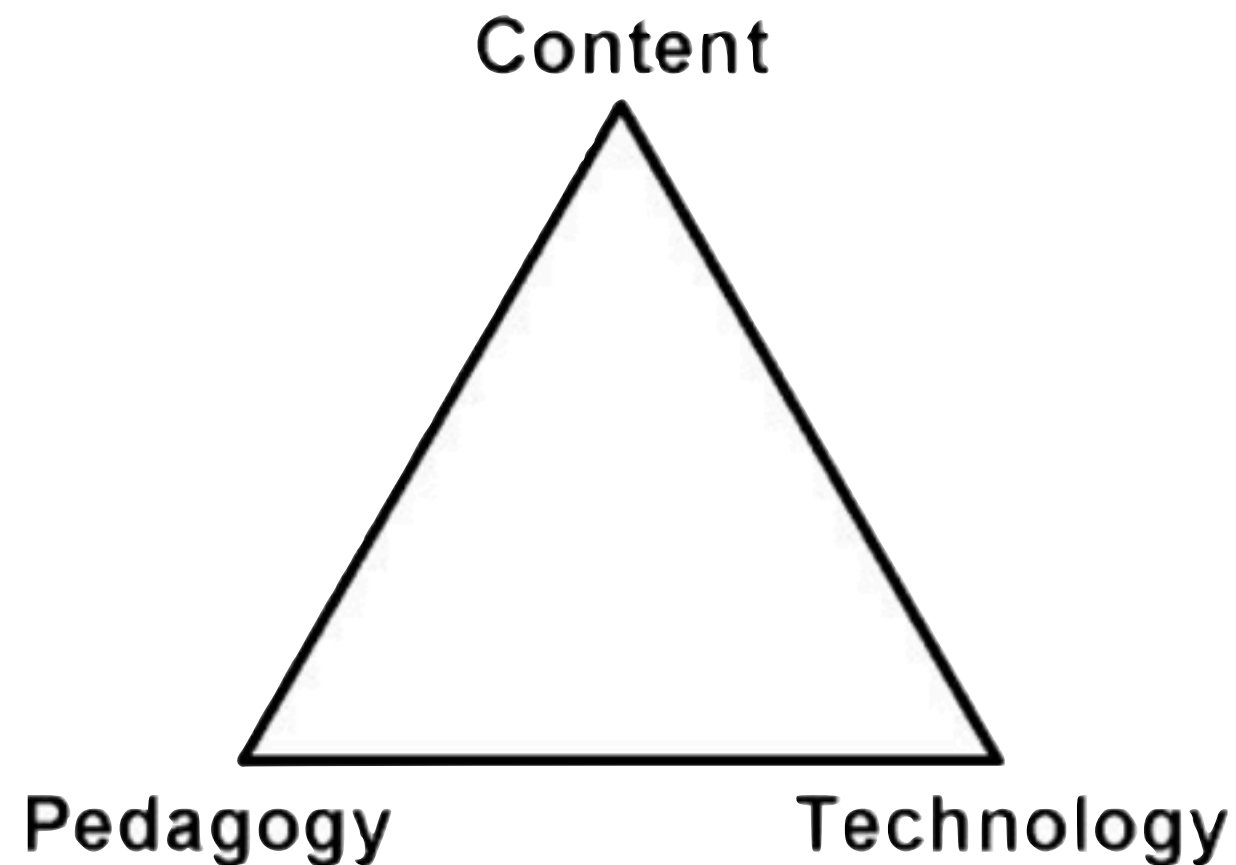


- C : Content
- P: Pedagogy
- T: Technology
- R: Representations

\* Didn't get a lot of attention

2004

## TPCK Unveiled

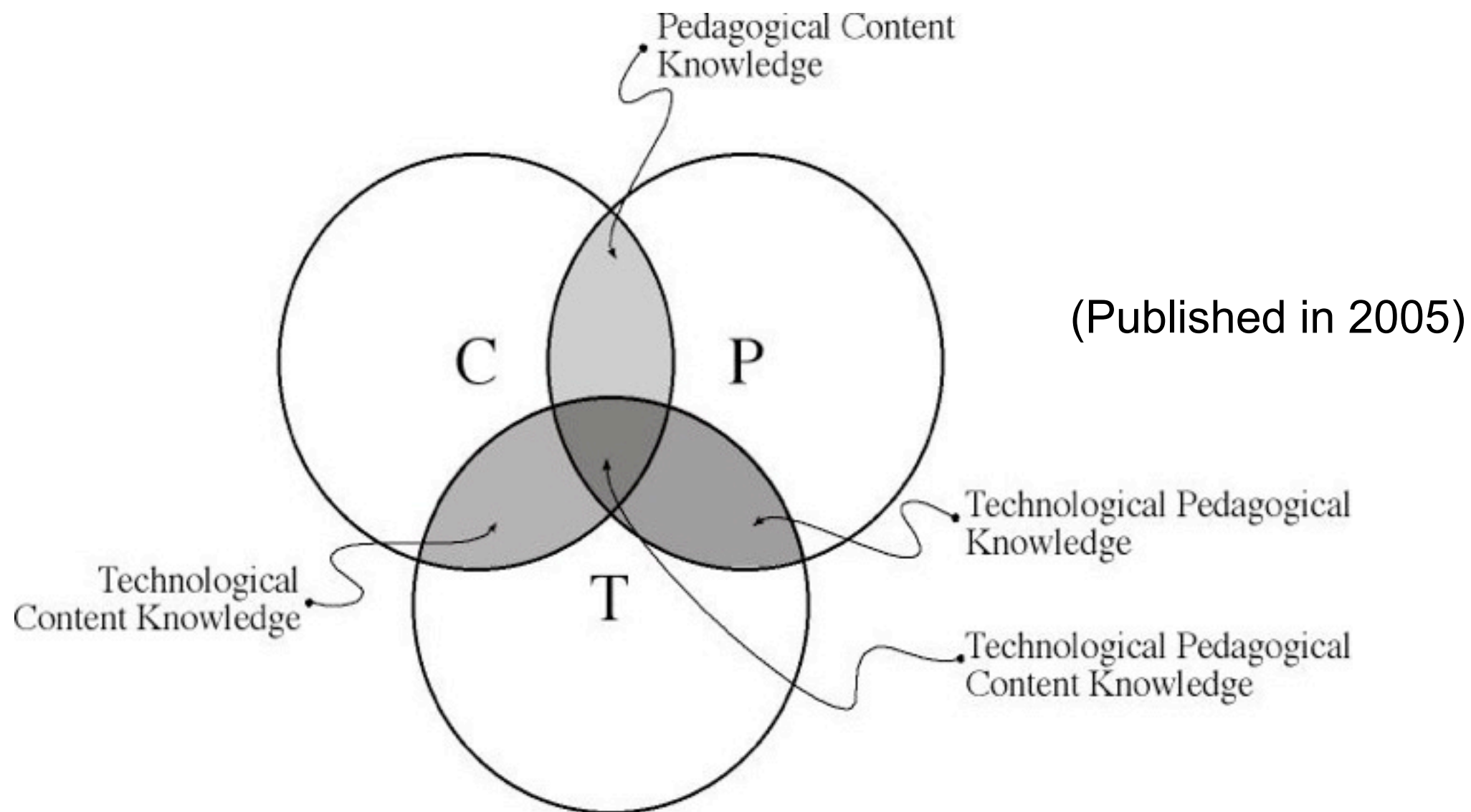


(First publication of the TPCK in 2004)

\* Didn't get a lot of attention

2005

## TPCK Evolves

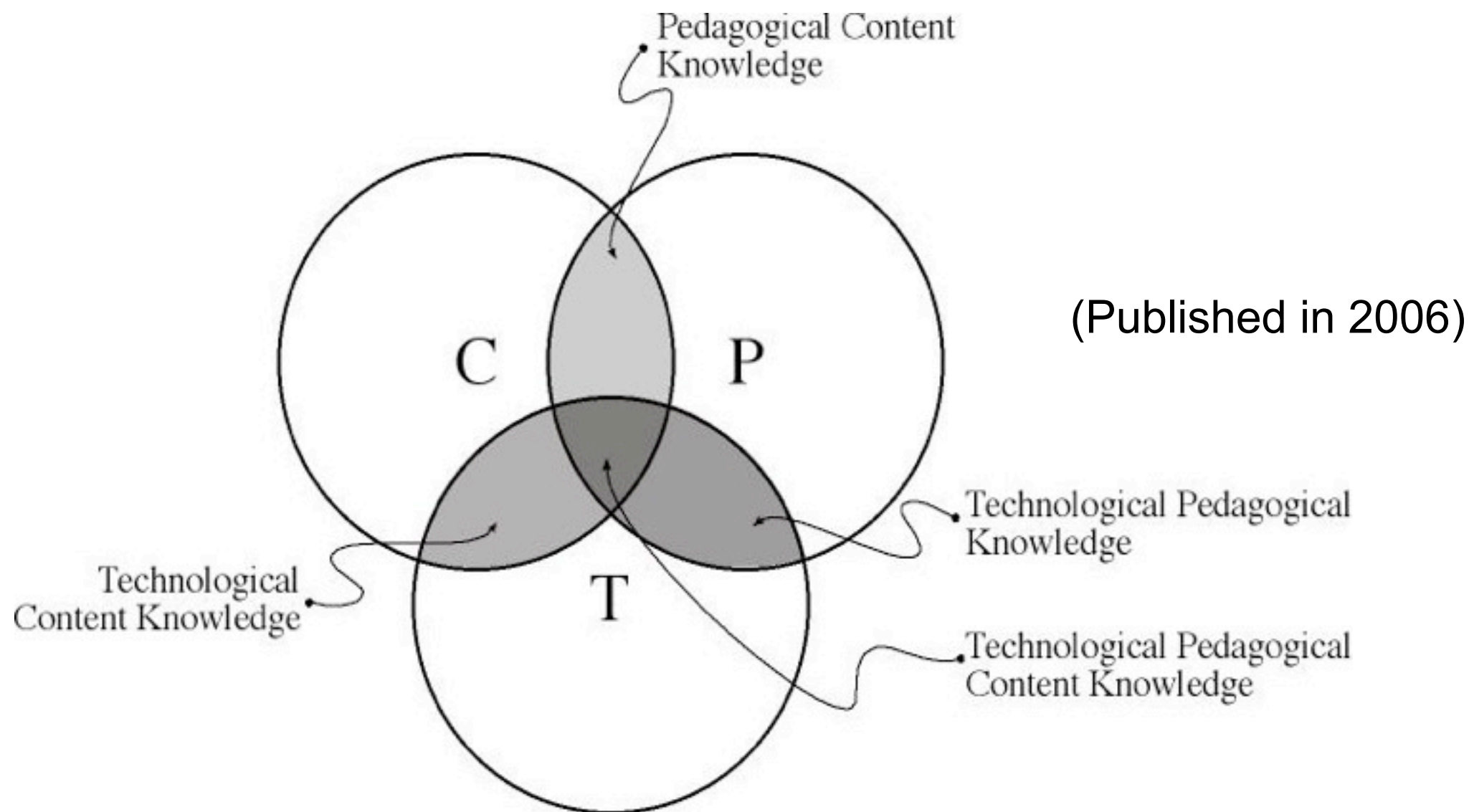


\* Didn't get a lot of attention

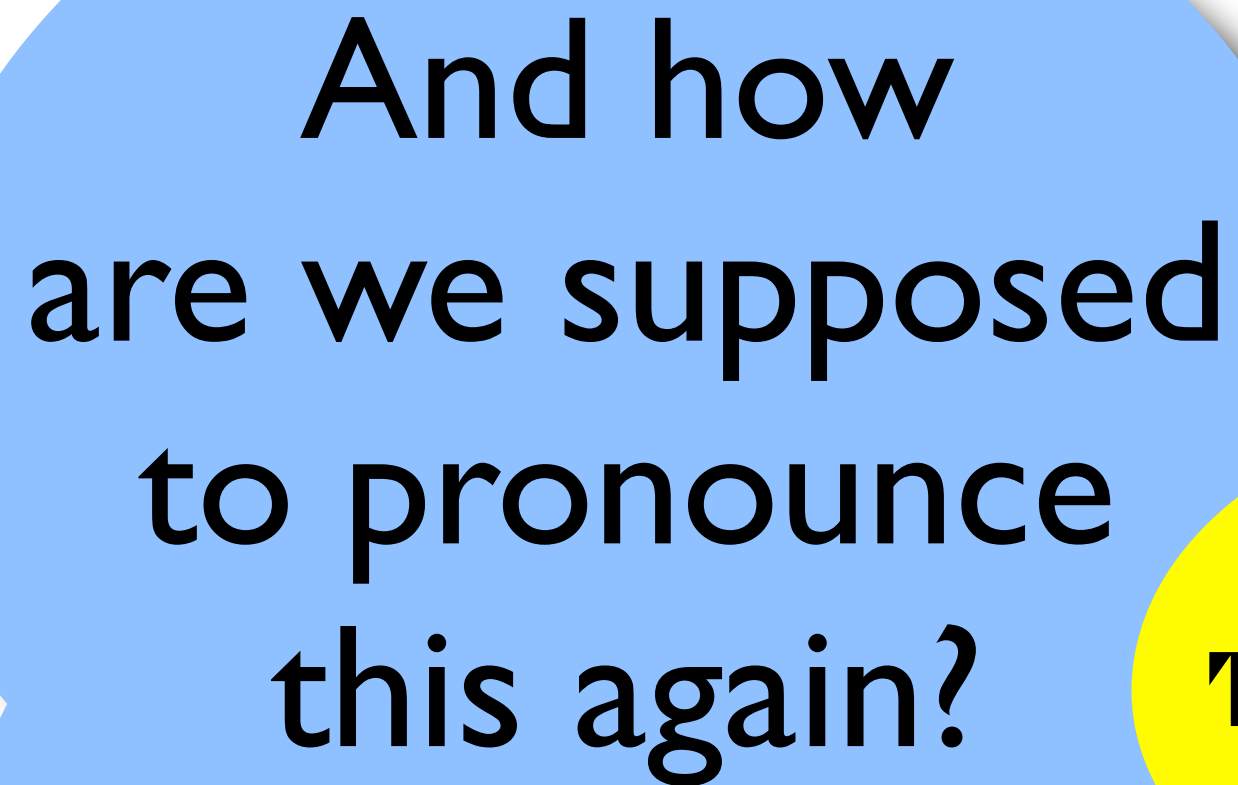


2006

TPCK is re-conceptualized as a framework



\* People start seeing  
valuable connections  
to their work



And how  
are we supposed  
to pronounce  
this again?



**ToothPiCK?**

# TPACK

Technological Pedagogical AND  
Content Knowledge

2007

## TPCK gets a new Name



### EDITORS' REMARKS

Ann D. Thompson  
Punya Mishra

### ***Breaking News: TPCK Becomes TPACK!***

For those of us interested in the construct Technological Pedagogical Content Knowledge and the clarity it brings to our work with preservice and inservice teachers, the acronym TPCK has been somewhat problematic. The consonant heavy, TPCK is difficult to say and even getting the letters in the correct order is a challenge for most of us. It is not surprising, thus, that both undergraduate students and inservice teachers tend to be put off when confronted with this unfriendly set of consonants. We have found ourselves apologizing every time we introduce the idea because it does tend to suggest the type of educational jargon for which we educators have received much (justifiable) criticism. TPCK is actually a simple, yet powerful idea and the complicated name and acronym does disservice to its utility and power.

technology, content and pedagogy that honors the interdependence of these three important parts of teacher education and teaching. Emphasizing creating the total package for effective teaching and teacher education will help bring clarity and simplicity to developing knowledge of the effective ways to help teachers take advantage of technology.

Products from the 9<sup>th</sup> Annual NTLS will go far beyond the revision of TPCK and will include the publication of a new ISTE book on the use of digital video in classrooms (developed within the TPACK framework), a new agenda for legislative advocacy for funding for technology in education, and suggestions for new directions for research and practice in TPACK. Readers will see the unveiling of these products in edited books and articles in each of the major journals in our field.

\* People can  
pronounce it now

So what?

The framework comes from similar circumstances

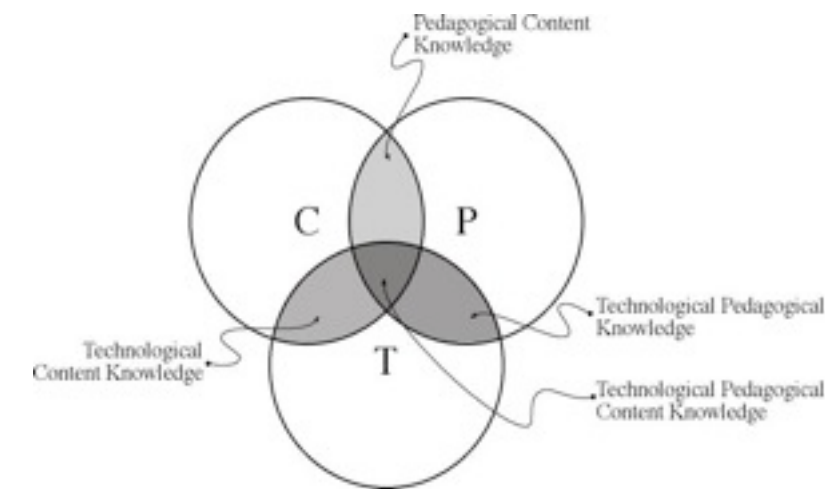
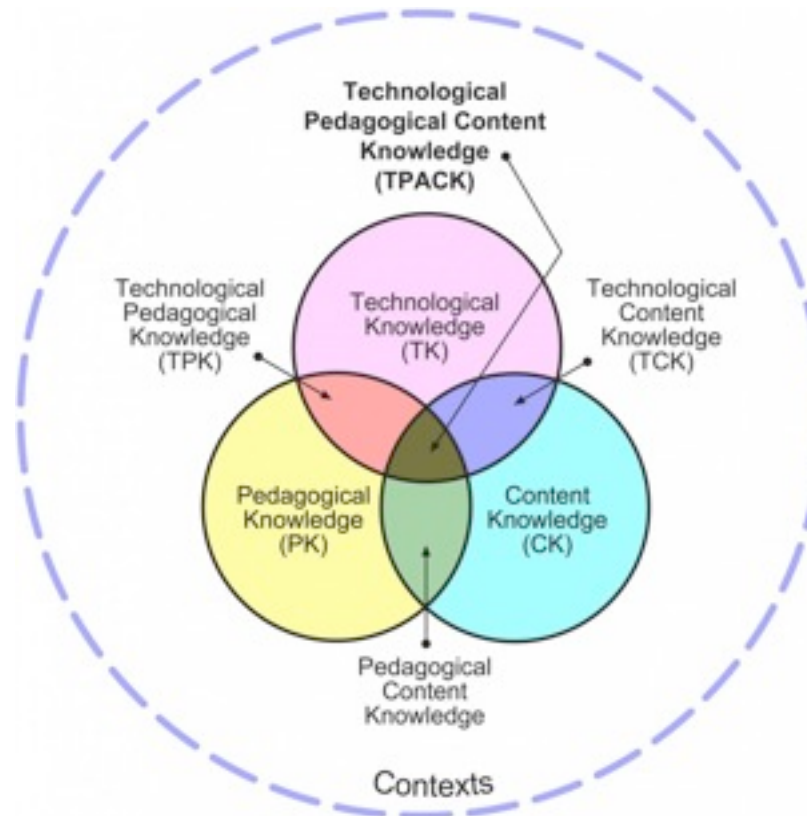
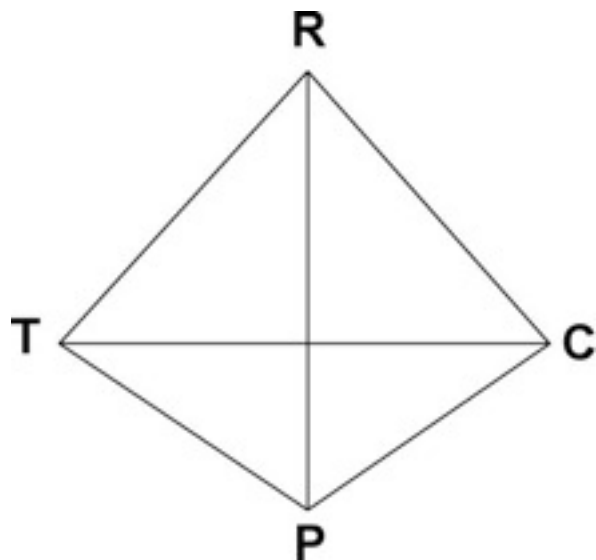
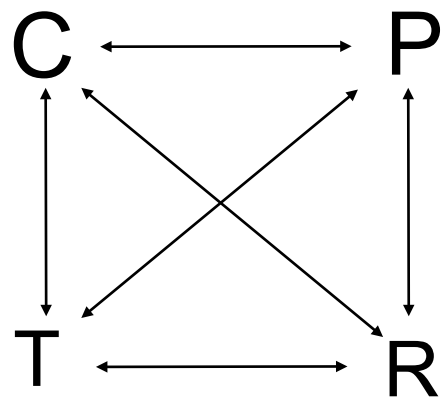
A keen interest in developing teachers  
skillful use of technology

Deeply rooted in practice

In a way that communicates and connects to  
a variety of stakeholders

So what?

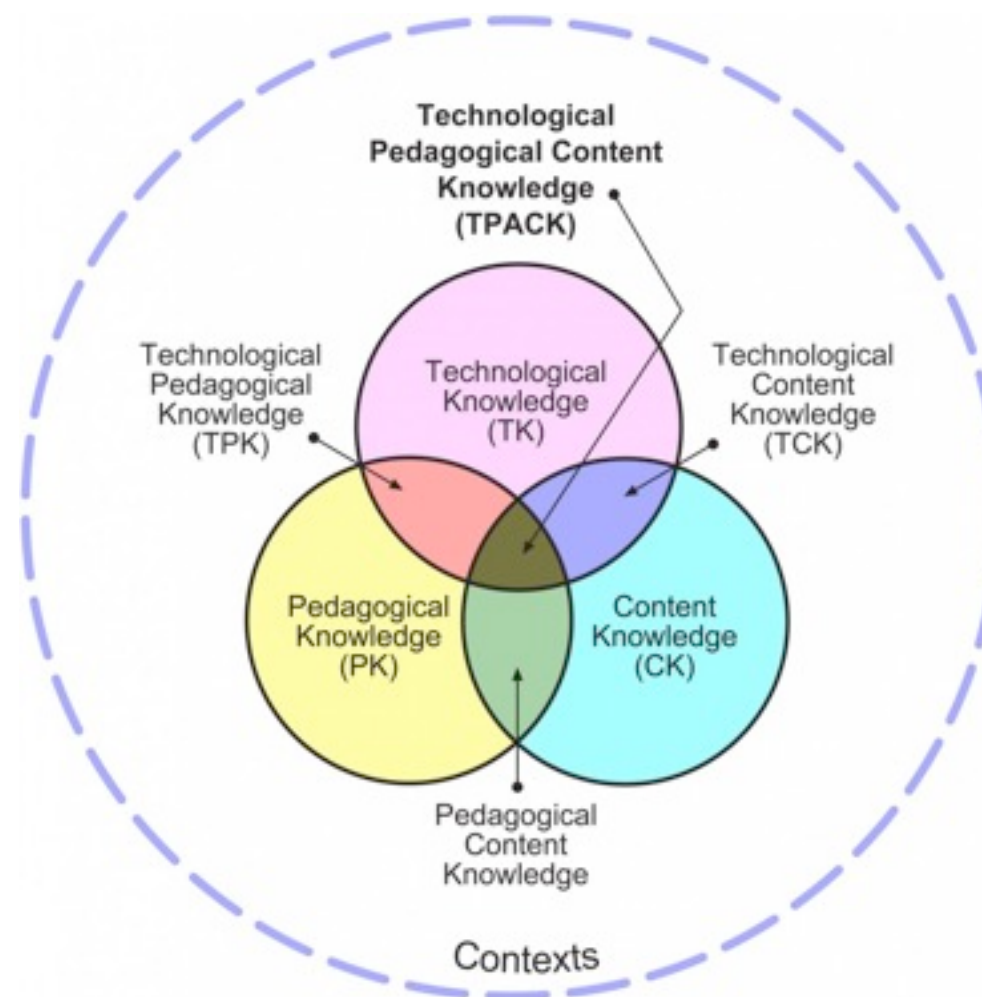
What you communicate is as important as how you communicate





So what?

The framework has to be complex enough







What is it

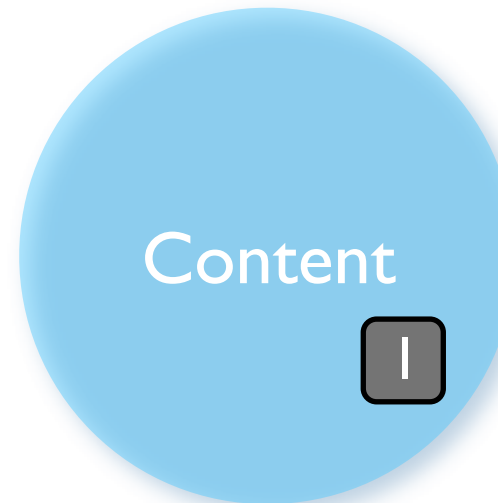
anyway?

# Deconstructing TPACK

1 Content  
Knowledge (CK)

2 Pedagogy  
Knowledge (PK)

3 Technology  
Knowledge (TK)



# Deconstructing TPACK

1 Content Knowledge (CK)

2 Pedagogy Knowledge (PK)

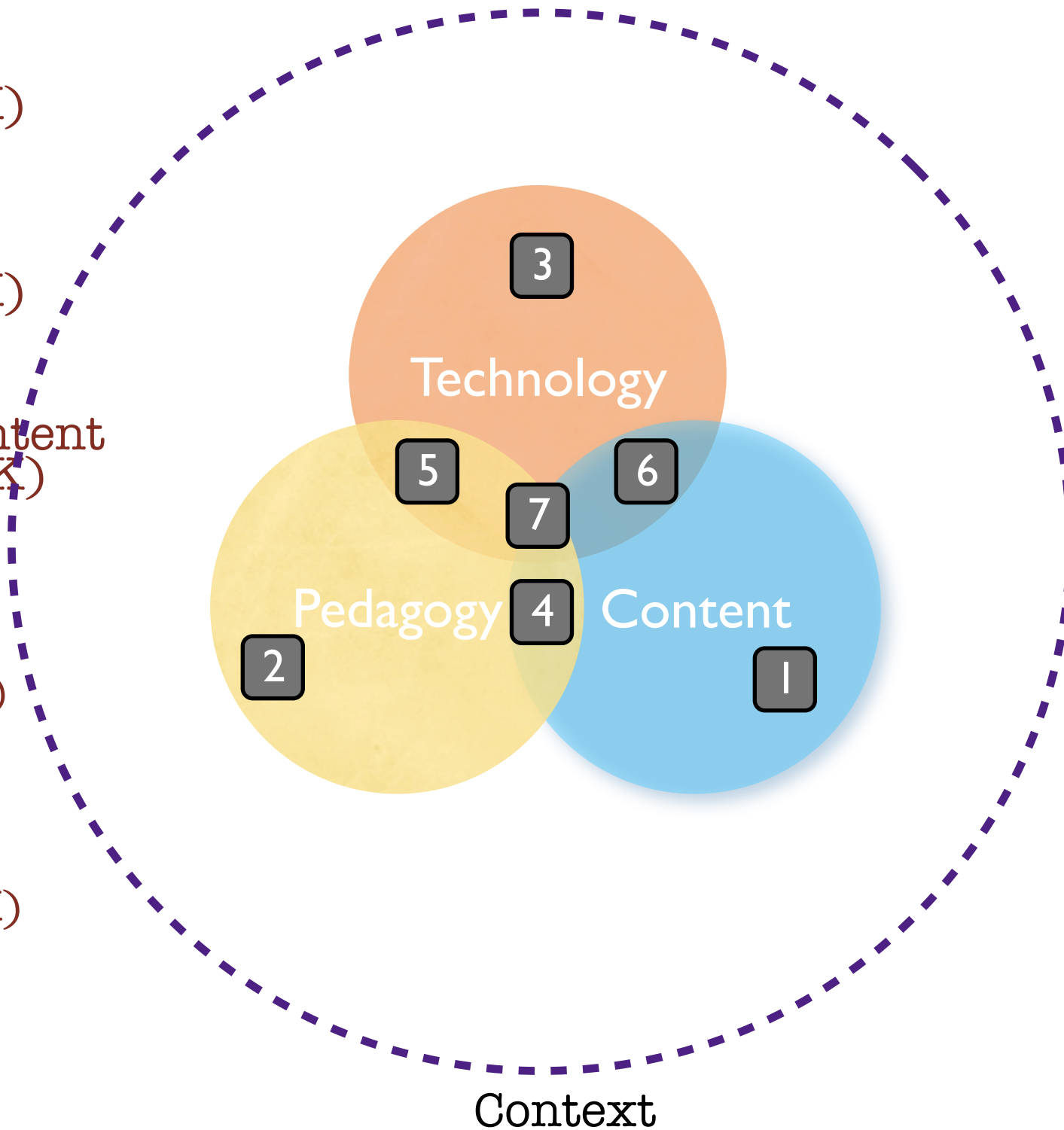
3 Technology Knowledge (TK)

4 Pedagogical Content Knowledge (PCK)

5 Technological Pedagogical Knowledge (TPK)

6 Technological Content Knowledge (TCK)

7 TPACK



# Framework is ..

Conceptual

Descriptive

Inferential

Analytical

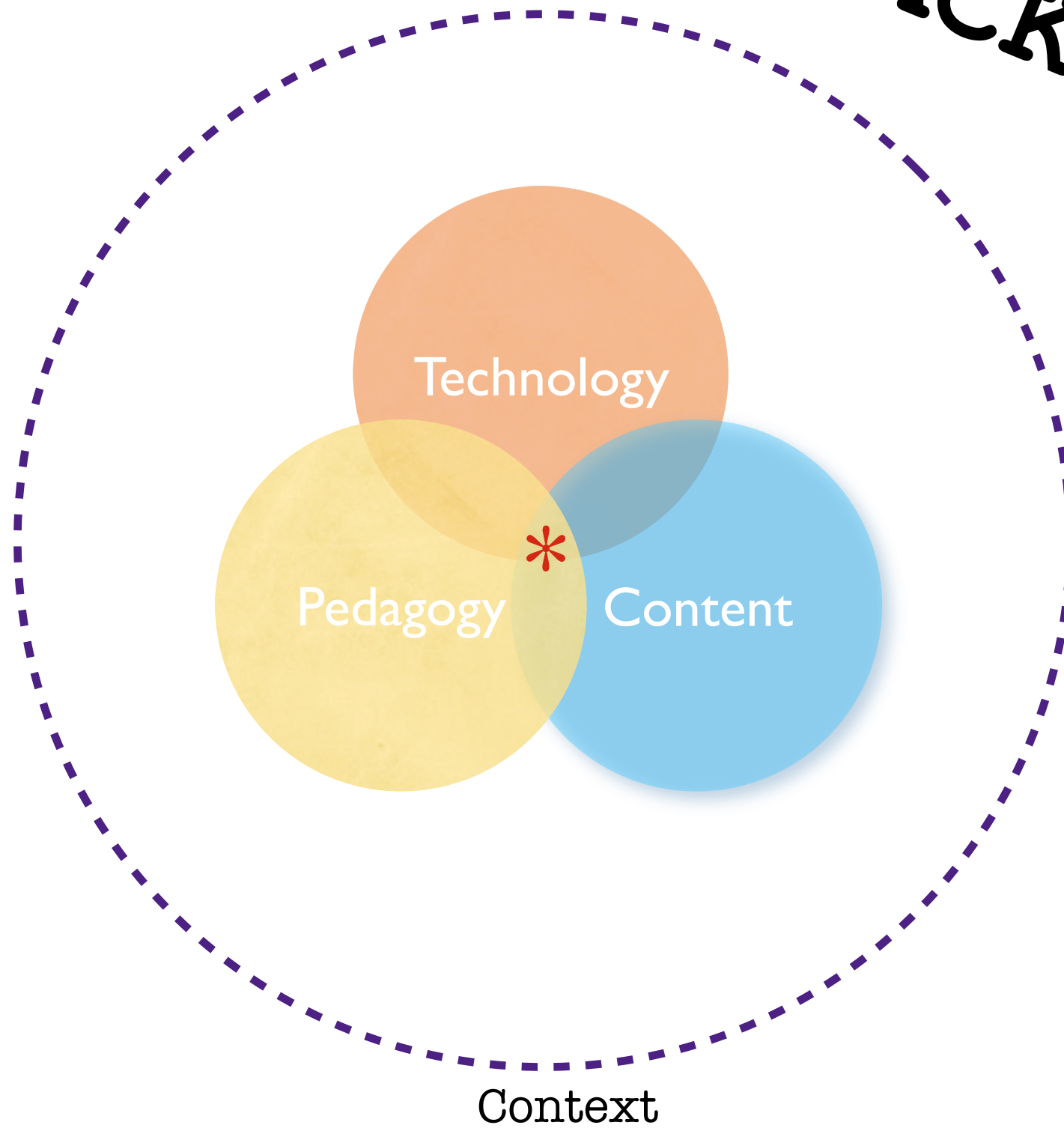
Applied

# Framework is not ..

Prescriptive

Complete

# TPACK



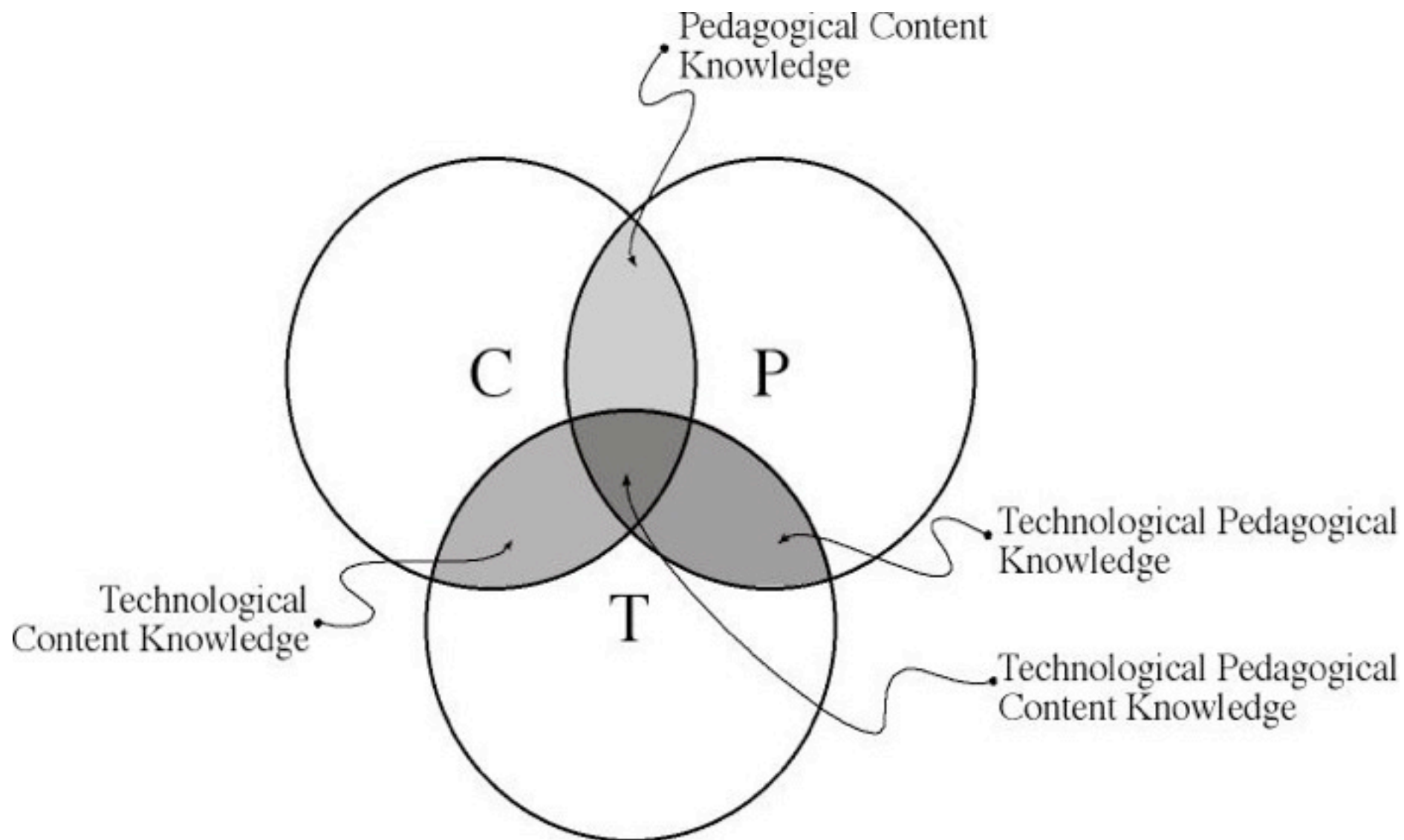


The spread of  
an idea

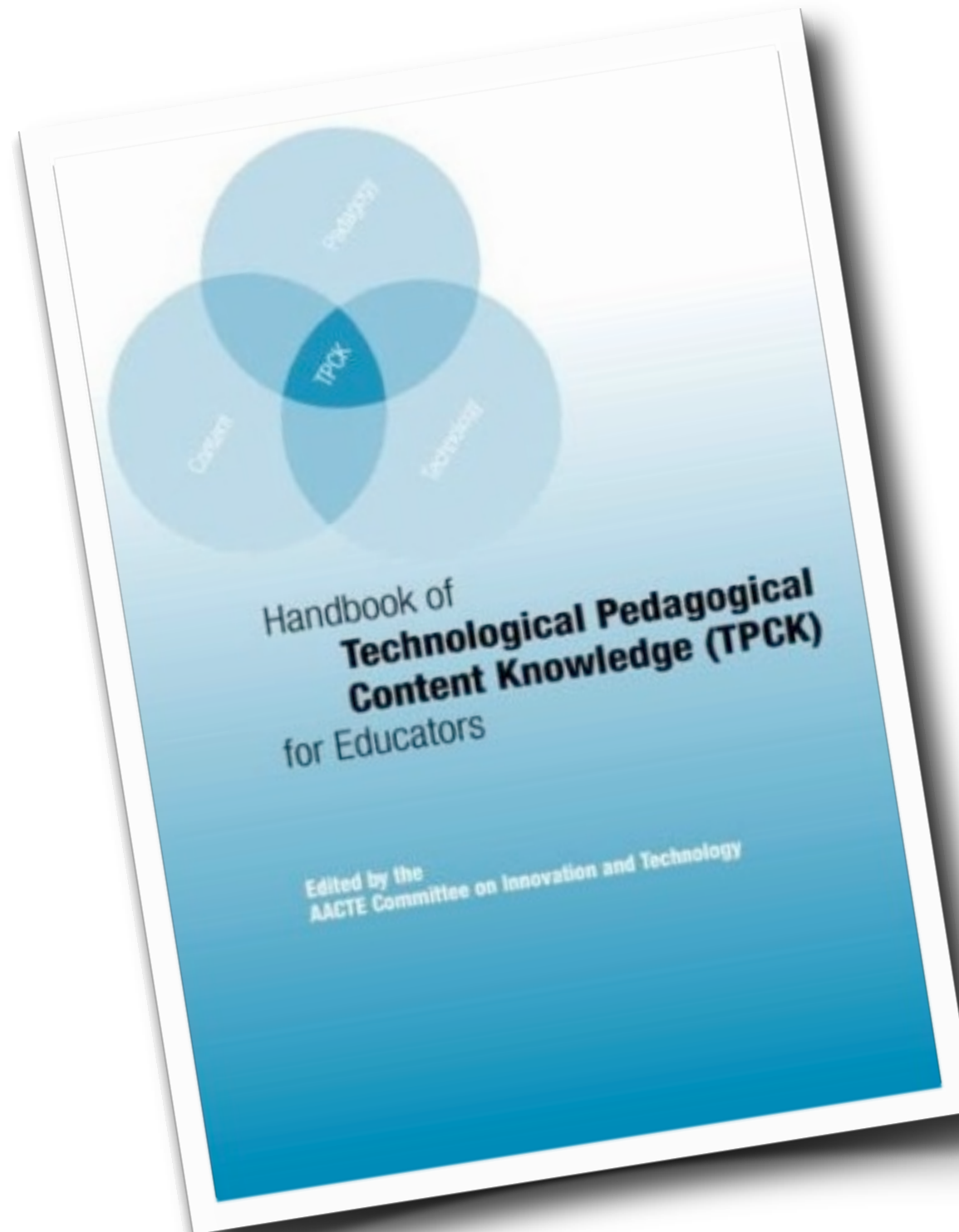


2006

Mishra & Koehler (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. Teachers College Record, 108(6), 1017-1054.



\* First TPACK Article



\* 2008

tpack.org

tpack 956 Packers Dictionary cnn fbook rss (149) odds\_help Import to Mendeley NCAA odds nfl odds hybrid Vanguard Onion Pete FF ANG

# TPACK – TECHNOLOGICAL PEDAGOGICAL AND CONTENT KNOWLEDGE

JUST ANOTHER DR. MATTHEW J. KOEHLER SITE

Search...

Home What is TPACK? Components of TPACK - Research and PD - Resources - Translations -

## Approaches to Developing TPACK

Help Needed: The section on Developing TPACK is in need of heavy development, and needs your help. If you know of any approaches to developing TPACK for pre- or...

### QUICK LINKS

MAY 13, 2011 2

#### What is TPACK?

An introduction to TPACK – Technological Pedagogical Content Knowledge

MAY 12, 2011 0

#### TPACK Surveys

A number of TPACK survey instruments have been created. Schmidt, Baran, Thompson, Koehler, Mishra, & Shin

MAY 11, 2011 0

#### Using the TPACK Image

Use the TPACK image in your own works.

MAY 11, 2011 0

#### TPACK Bibliography

The place to go for...

MAY 10, 2011 1

#### TPACK Group and Newsletters

MAY 9, 2011 1

#### Contributors wanted

Want to help develop and...

### Components of TPACK

- Technological Pedagogical Content Knowledge (TPACK)
- Technological Pedagogical Knowledge (TPK)
- Technological Content Knowledge (TCK)
- Pedagogical Content Knowledge (PCK)
- Technology Knowledge (TK)
- Pedagogical Knowledge (PK)
- Content Knowledge (CK)

### Research and Professional Development

- Researching TPACK
- TPACK within the content areas
- Developing TPACK

### Resources

- TPACK Surveys
- Using the TPACK Image
- TPACK group and newsletters
- TPACK Bibliography
- Conferences featuring TPACK

### Translations

- Espanol





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Groups

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Papers

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Share



TPACK

In this group: 289 papers · 102 members

Mendeley

Education

Groups

Overview

Papers

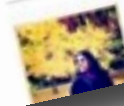
Members

About this group

Education

Articles about tpack (formerly tpck) - Technological, Pedagogical Content Knowledge. Please contribute to this group by adding papers relevant to TPACK. Give those papers the following tags:  
<http://www.mendeley.com/groups/522011/tpack/papers/>

Group activity



Mamta Shah and Carmen Biel have joined this group

2 hours ago



Owned by Matthew J Koehler  
Associate Professor

Education

102 members



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## Technology, Pedagogy and Content Knowledge (TPACK) SIG

### SITE SIG Community Group

This SITE SIG Community Group is the official place to connect with all the members of this SIG. [Join this SITE SIG Community Group Today!](#)



Catalyzed by much interest at the SITE 2007 conference and launched during SITE 2008 by Judi Harris, Matt Koehler, Mario Kelly, and Punya Mishra, the Technology, Pedagogy, and Content Knowledge (TPACK) SIG seeks to bring together

### Chairperson Info

[Candace Figg](#)



[Mark Hofer](#)





Over 300 scholarly articles

Over 20 Dissertations

Several Textbooks include TPACK

Individuals have used TPACK in  
their courses

TE programs have used TPACK  
(MSU, Iowa State)

Unified San Diego School District  
uses TPACK as one of its 3 pillars  
for professional development





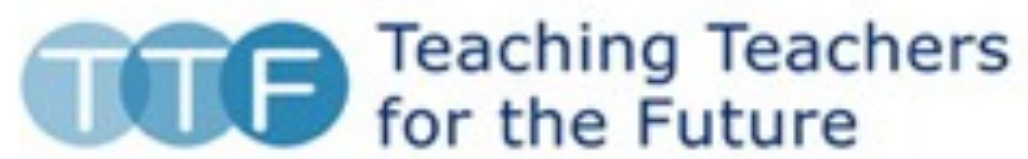
39 institutions

Comprehensive standards  
(National Professional Standards)

Online Resources (full, rich  
exemplars) spanning content  
areas, grades, and contexts

Support network

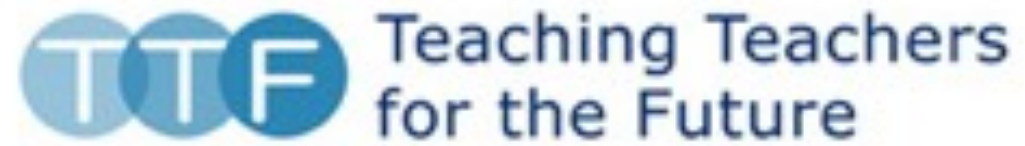
Support at each institution



=







Tremendous opportunities

Along with some challenges

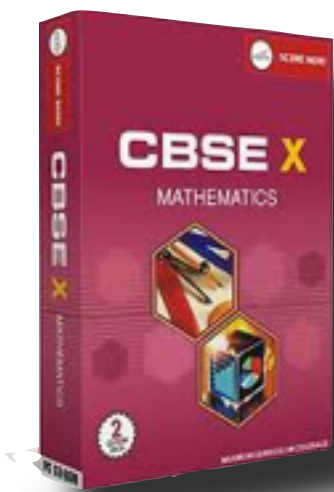


Some examples...

Lets get real!



# What is an Educational Technology?



There is no such thing

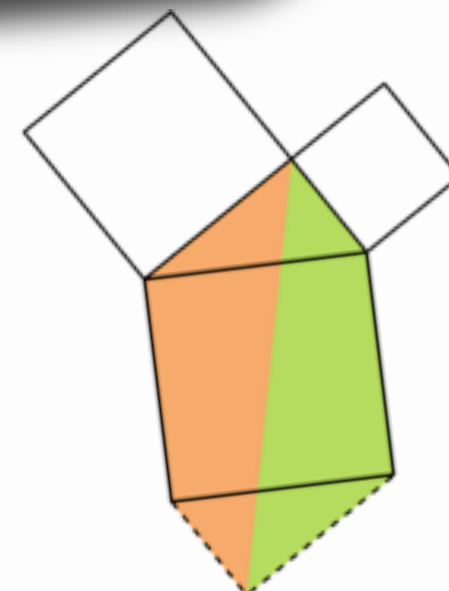
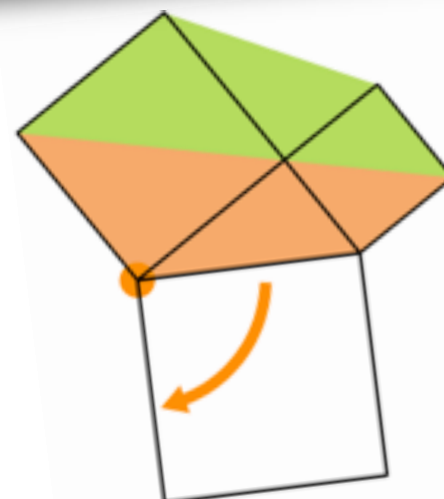












# The problem

Most technologies are  
**NOT** designed for  
education!

But

Users redefine  
technologies

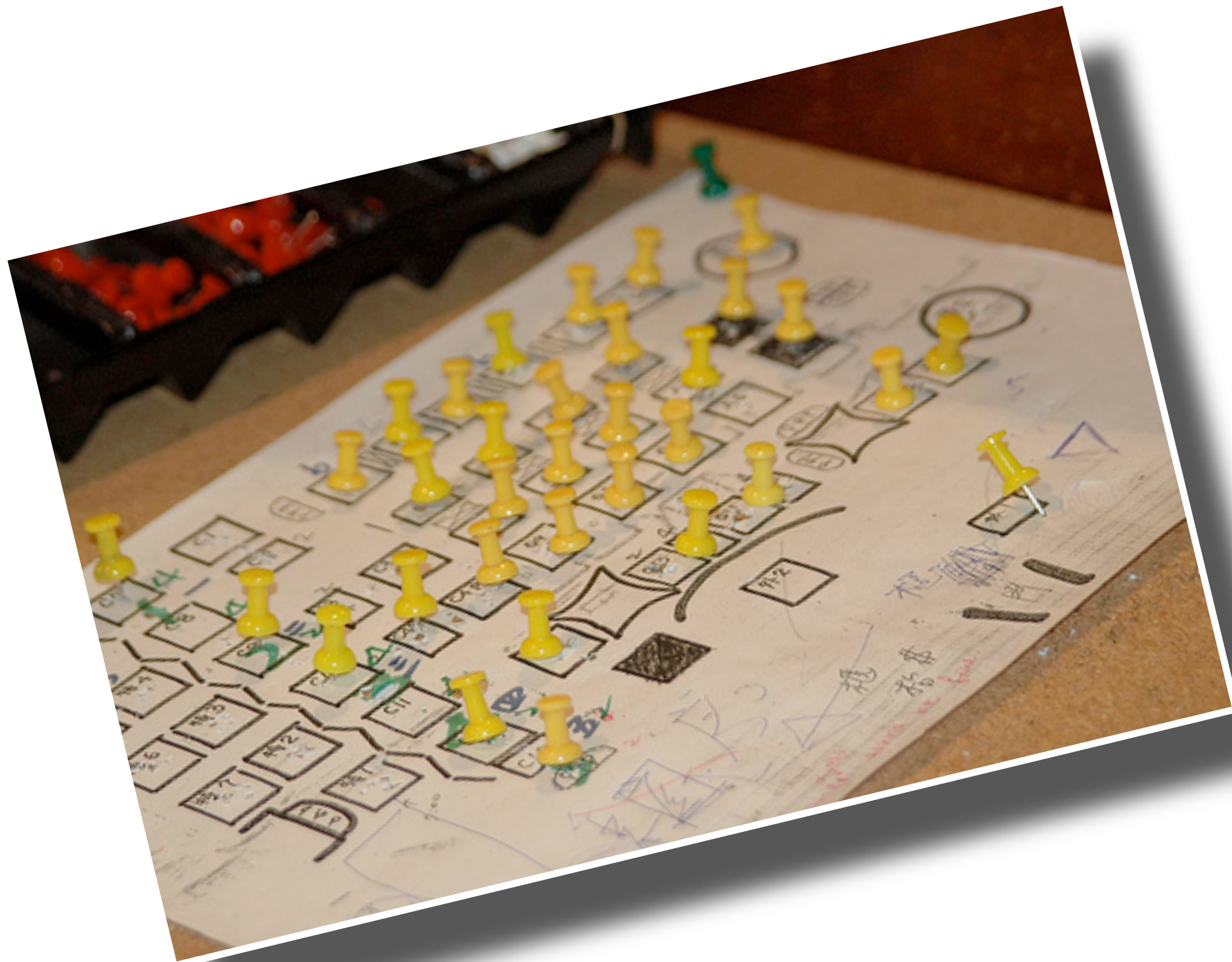












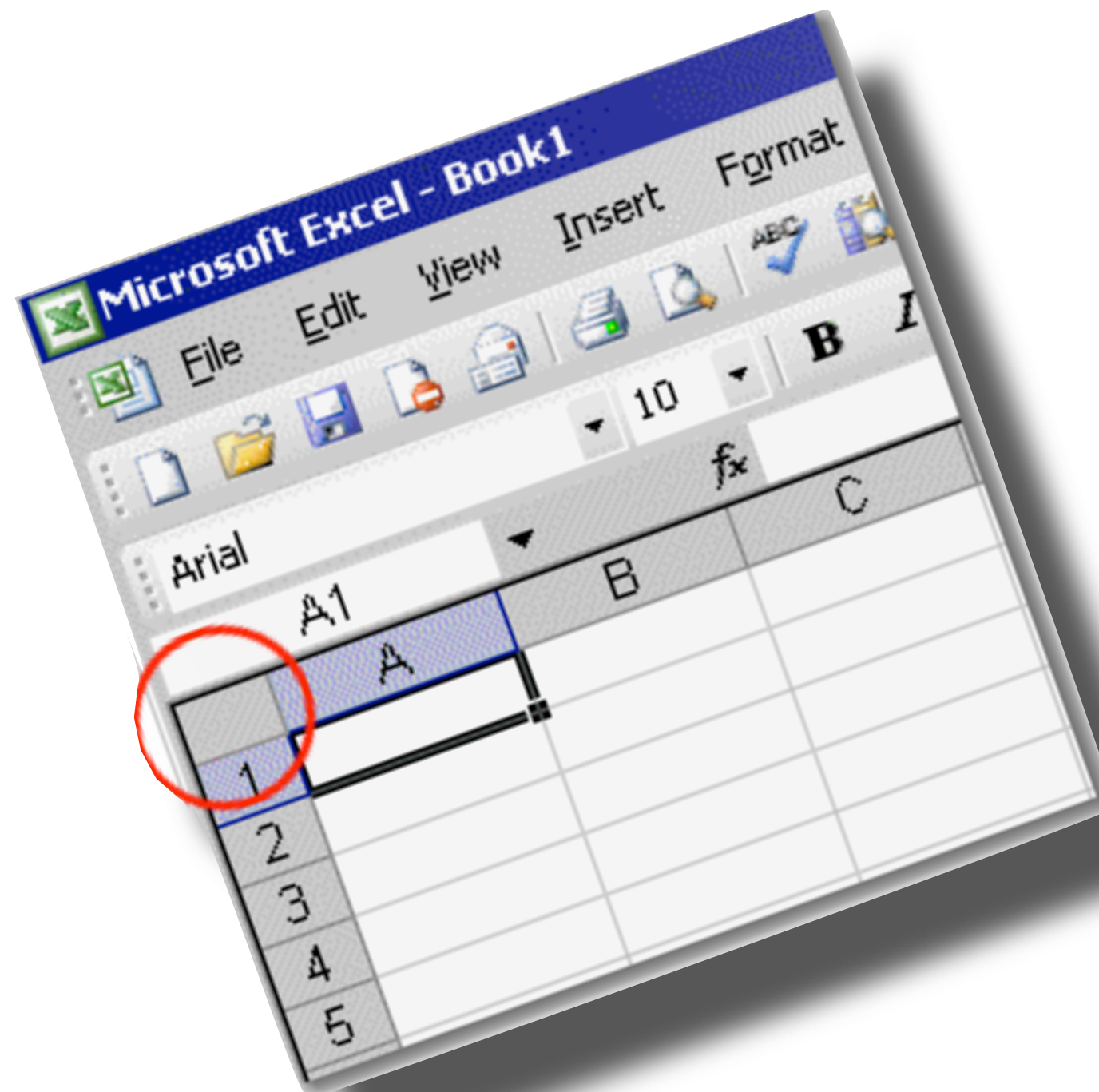




Why is this important?

Only repurposing makes  
a technology  
an educational technology..







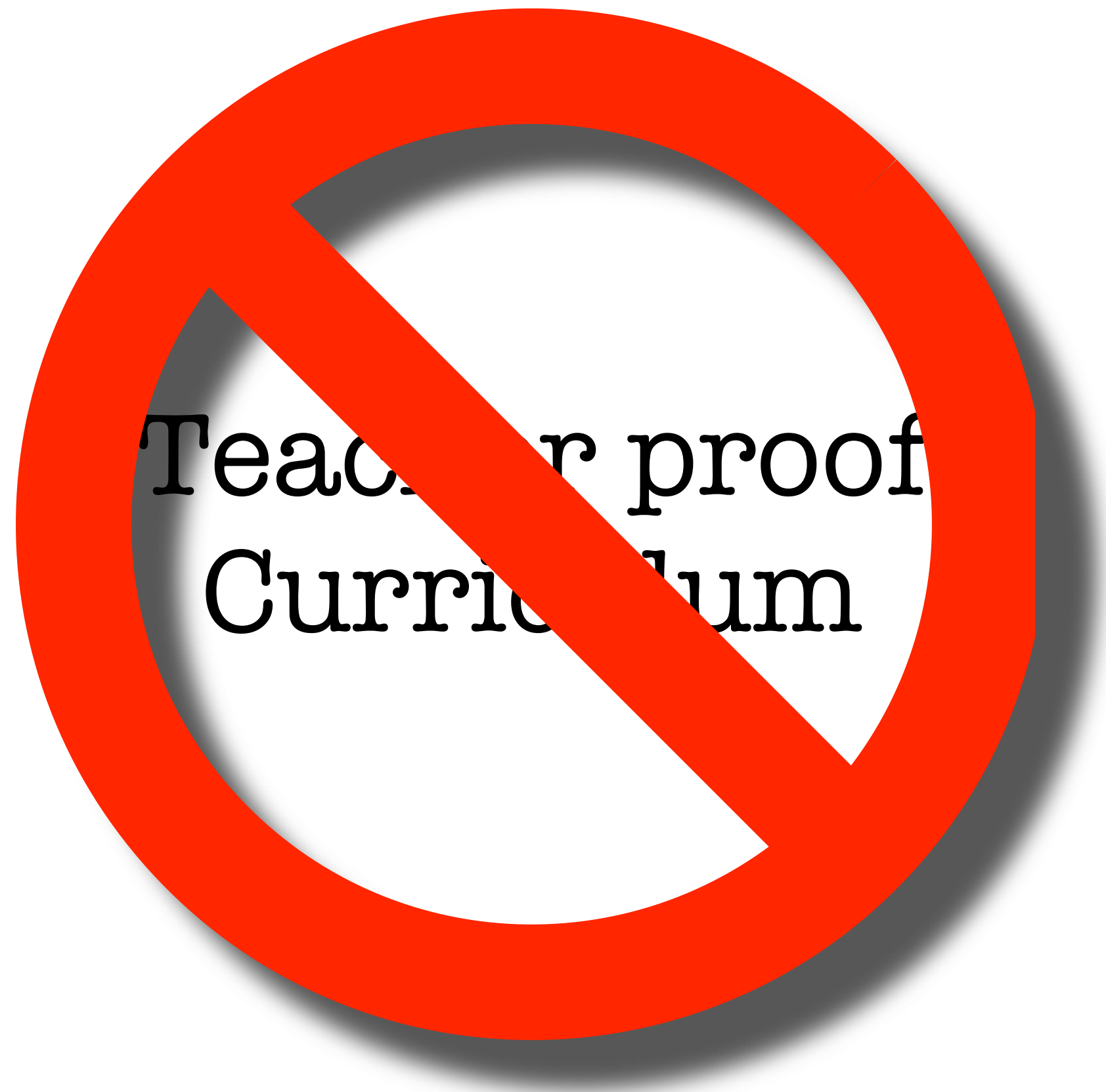


# Textbooks

Repurposing is  
a creative  
& innovative act



The crucial mediating  
role played by the  
teacher...



Teacher proof  
Curriculum

# Break out of the box



# The transformative aspects of technology

Technology  
Use

Technology  
Integrate

Technology  
Innovate



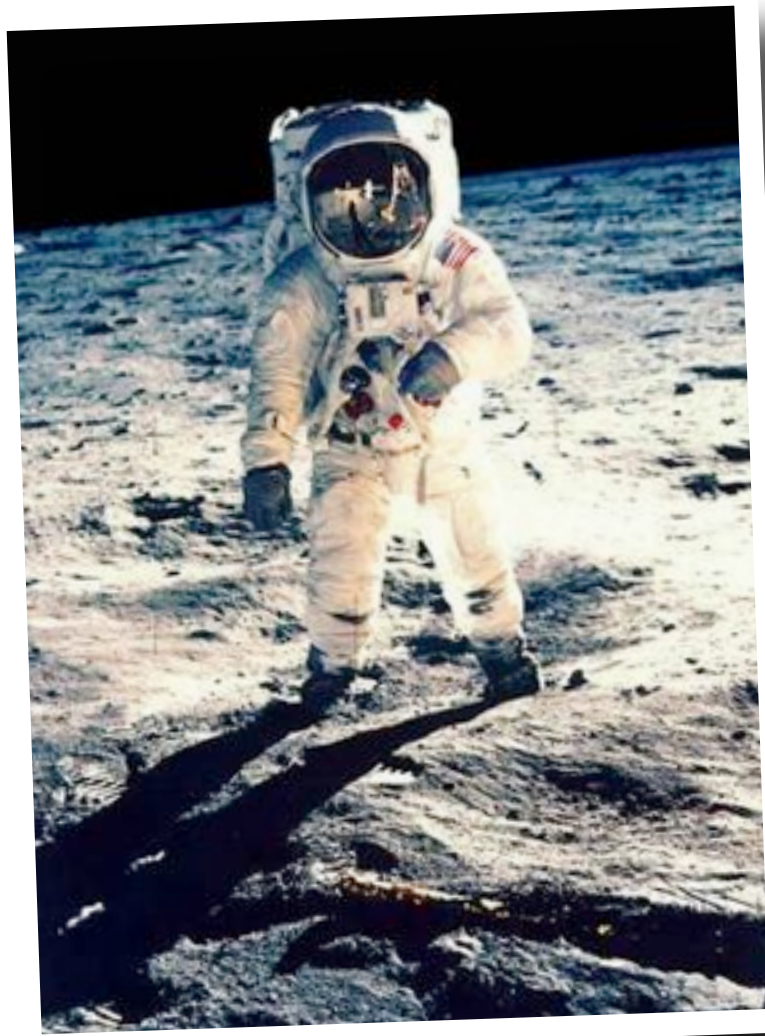
examples!

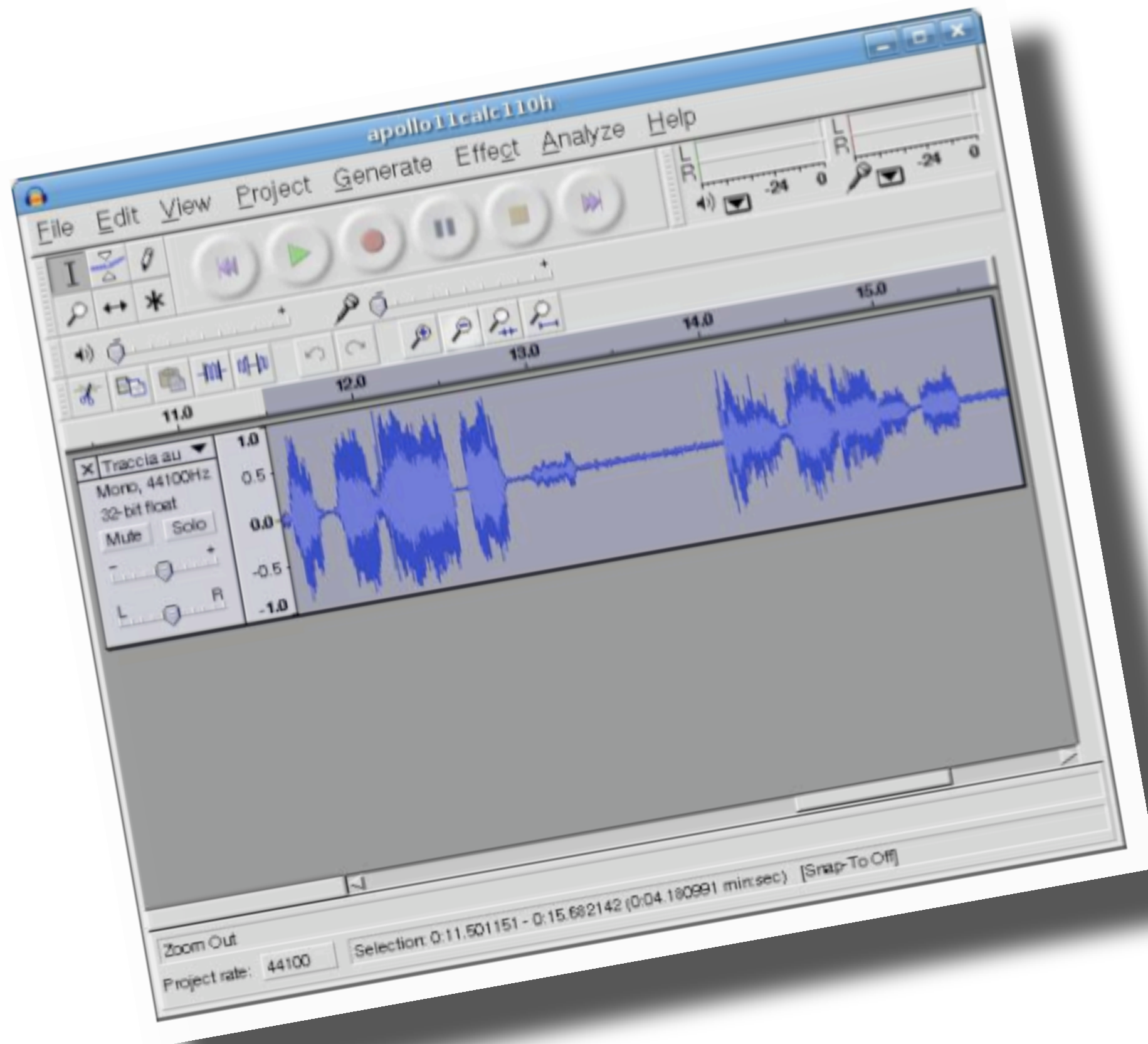


# Distance to moon

Girlanda, L. (2009). Echoes from the moon.  
arXiv:0903.3367v1 [physics.ed-ph]. Retrieved April 1, 2008,  
from <http://arxiv.org/abs/0903.3367v1>









since the tape was recorded at Houston. From the minimum delay in Armstrong's replies (last column of the 2nd row) an upper bound for the Earth-Moon distance was found,  $d_{EM} < (4.5 \pm 0.7) \cdot 10^8$  m.

Replies from	Time delays (s)					
Houston	$1.55 \pm 0.15$	$0.35 \pm 0.15$		$1.35 \pm 0.25$	$1.7 \pm 0.2$	$0.85 \pm 0.15$
Armstrong			$4.05 \pm 0.25$			$3.0 \pm 0.2$

TABLE I: Time delays of the replies in the 3-minutes conversation between Houston and Armstrong during which the famous sentence "one small step for man, one giant leap for Mankind" can be heard. The errors represent the ranges of values measured by the 10 groups of students with





# Representing educational tensions







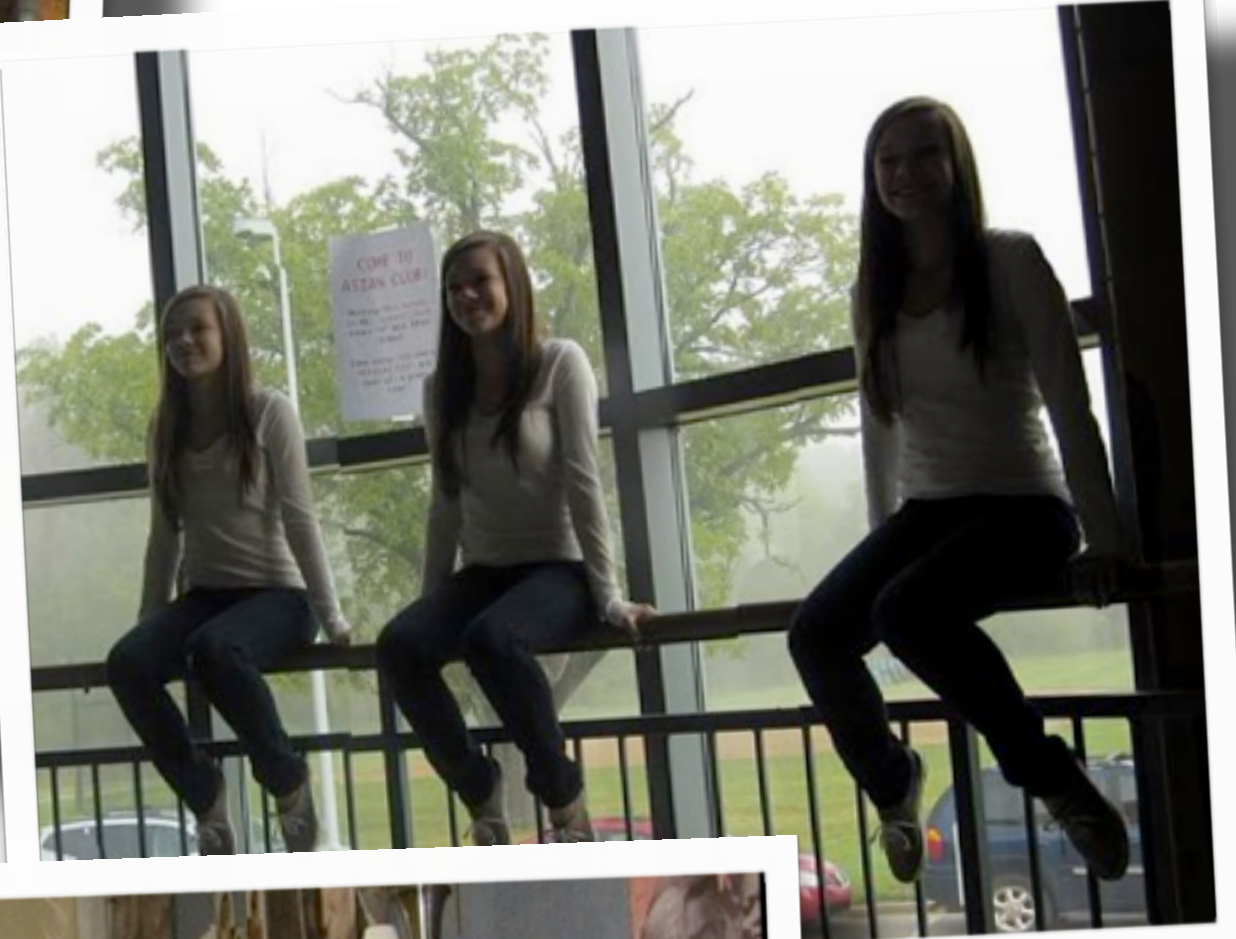






And now repurposed!

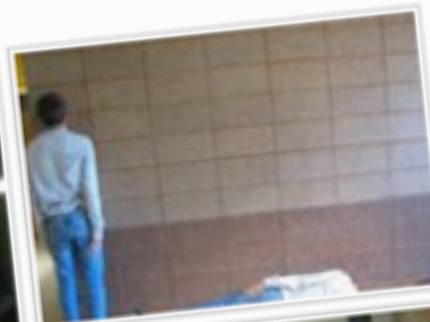
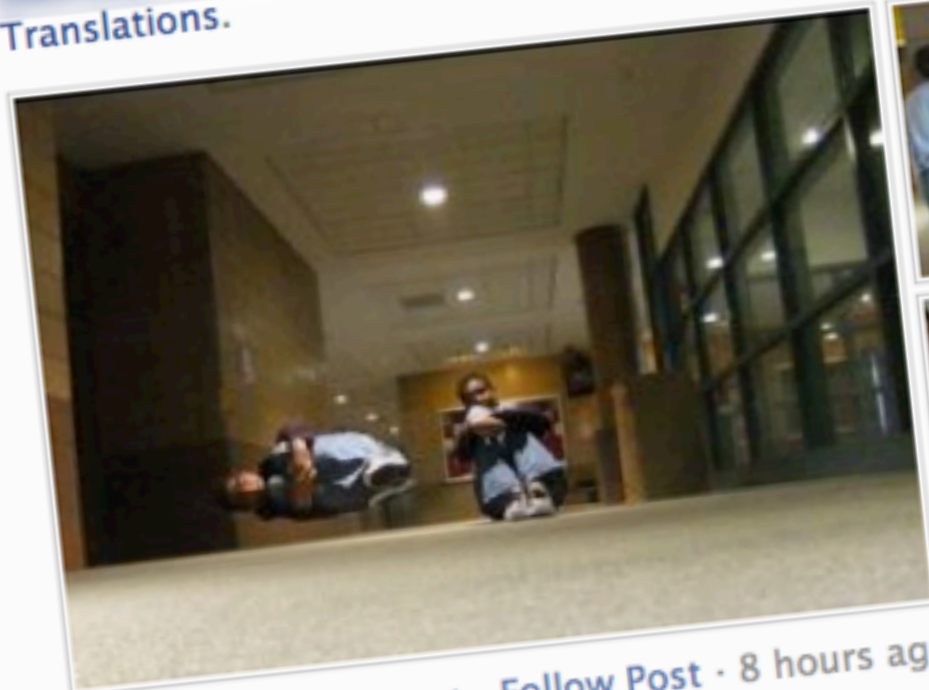








Translations.

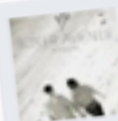


Unlike · Comment · Follow Post · 8 hours ago

You and 2 others like this.



Had some fun with cloning and transformations in geometry. Some groups got it and others...not so much. Made for great discussions, though, about transformations and isometry. And they learned a little bit more technology, too :)  
8 hours ago · Like



This is an amazing idea! Can I share this with one of my colleagues that teaches geometry?  
6 hours ago · Like



I bet they had fun doing it! Did you use the tripod like in class, or did a friend just hold the camera? I plan on doing this with my classes also. :-)  
6 hours ago · Like



This album was awesome to look through...such an awesome use of tech!  
4 hours ago · Like



share! I would love to see what the other students come up with as well. - Please  
- I had 3 mini tripods (the one from this summer and two that I purchased at Best Buy) so some use desks and other objects to rest the please share



# Moving to mathematics





# Kinect Math - A Kinesthetic Learning Experience

jackwei0831

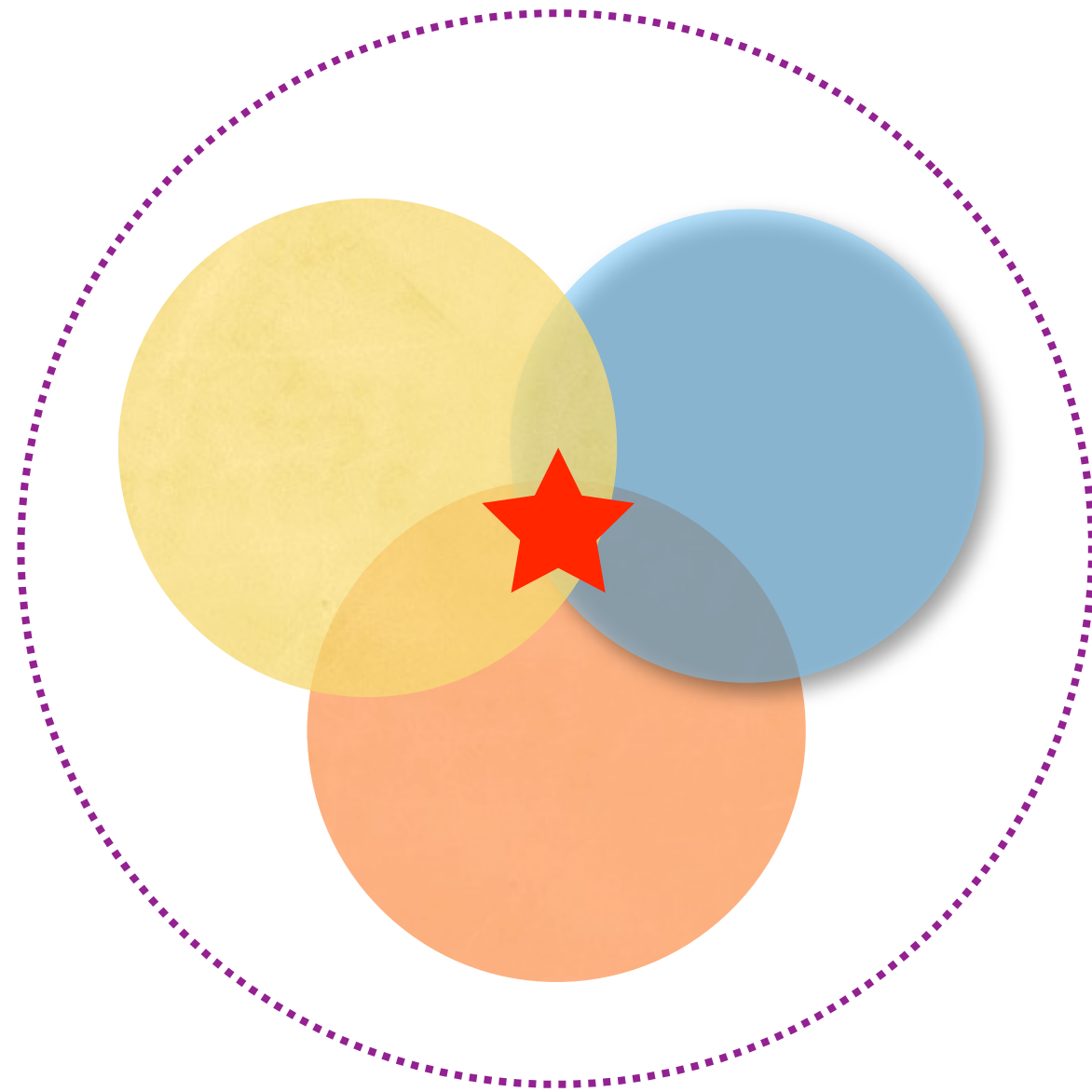


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2 videos ▾







# Key question(s)

How do we develop it?

How do we measure it?



# Developing TPACK (Many ways...)



Learning by Design

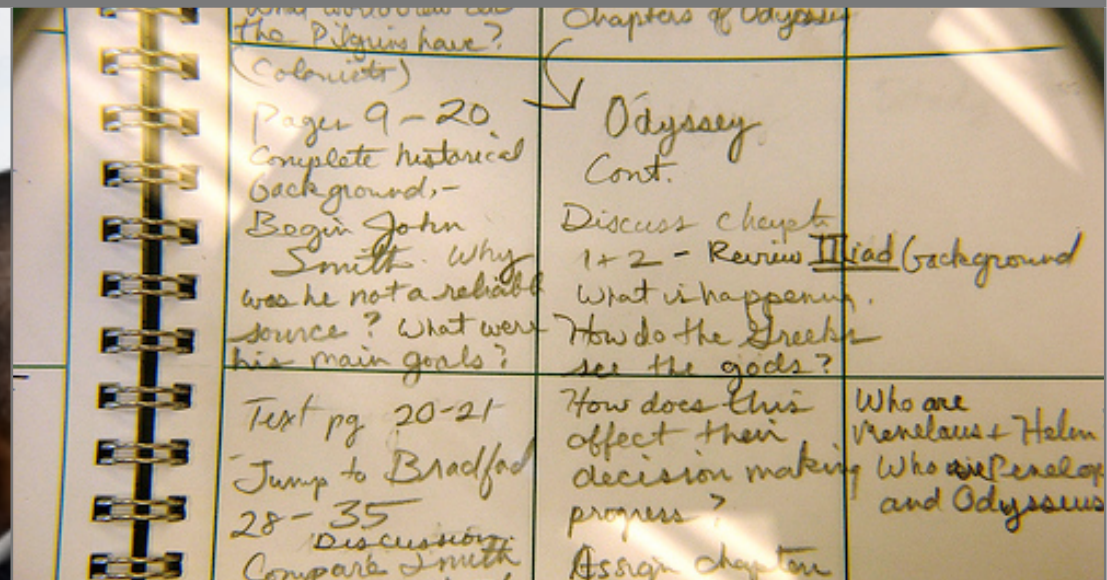


Teaching & Reflection

## TPACK Development



Instructional Modeling



Learning Activities



# Measuring TPACK



# Inter-connected Issues

# Finding TPACK

Where do we look?



# 1. Knowledge

A. Knowledge in  
each of the seven  
components

B. Self-report of  
knowledge, and  
connections between  
T, P, and C

## 2. Artifacts

A. Speech

B. Lesson Plans

C. Documents (e.g., Syllabi)

# 3. Practice

A. Classroom  
Observations

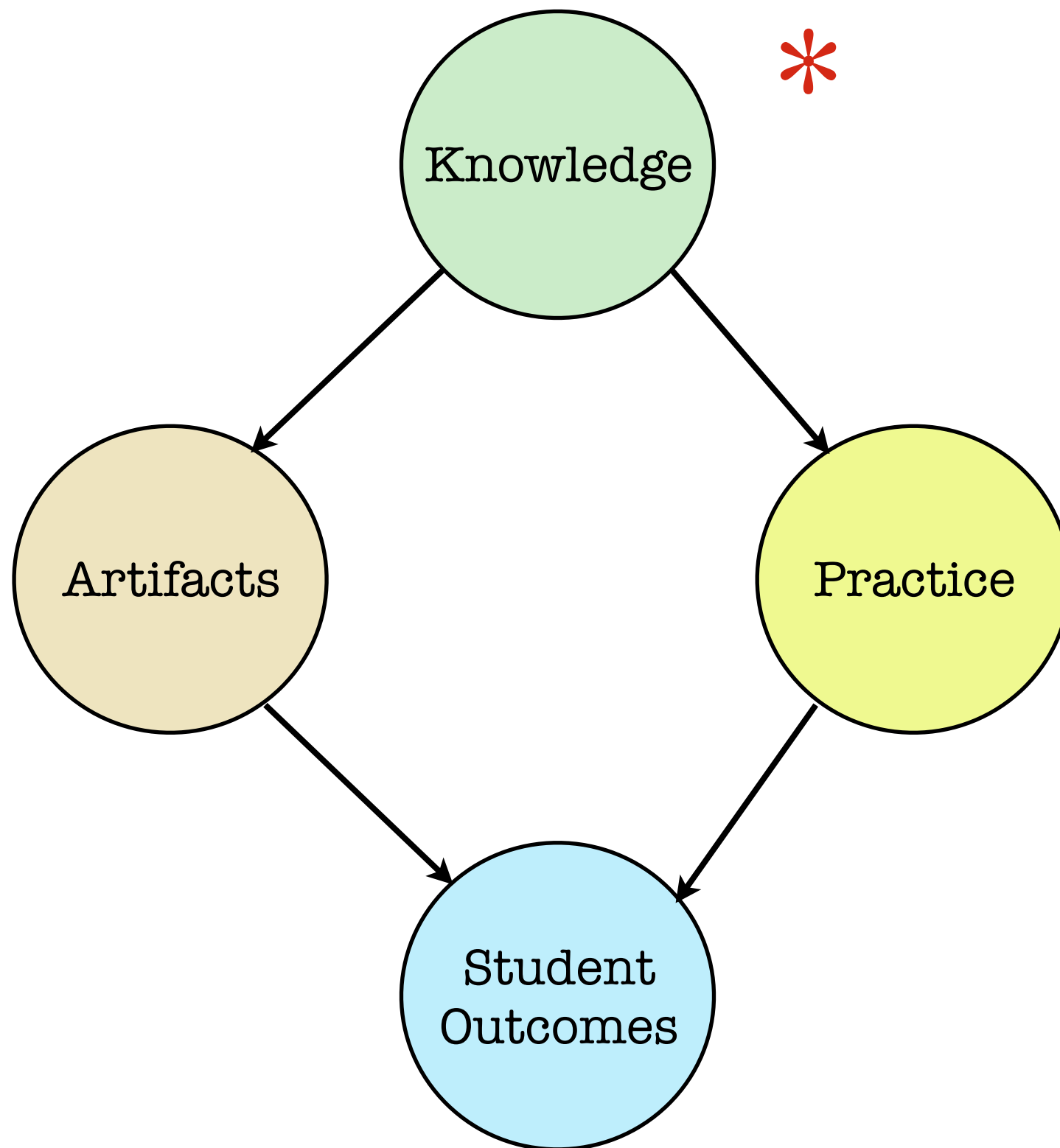
B. Self-reported Practices

# 4. Impact on Students

A. Understanding

B. Motivation

C. Test Scores



# One example



From our masters program

Year 2 - Summer

Four years of data

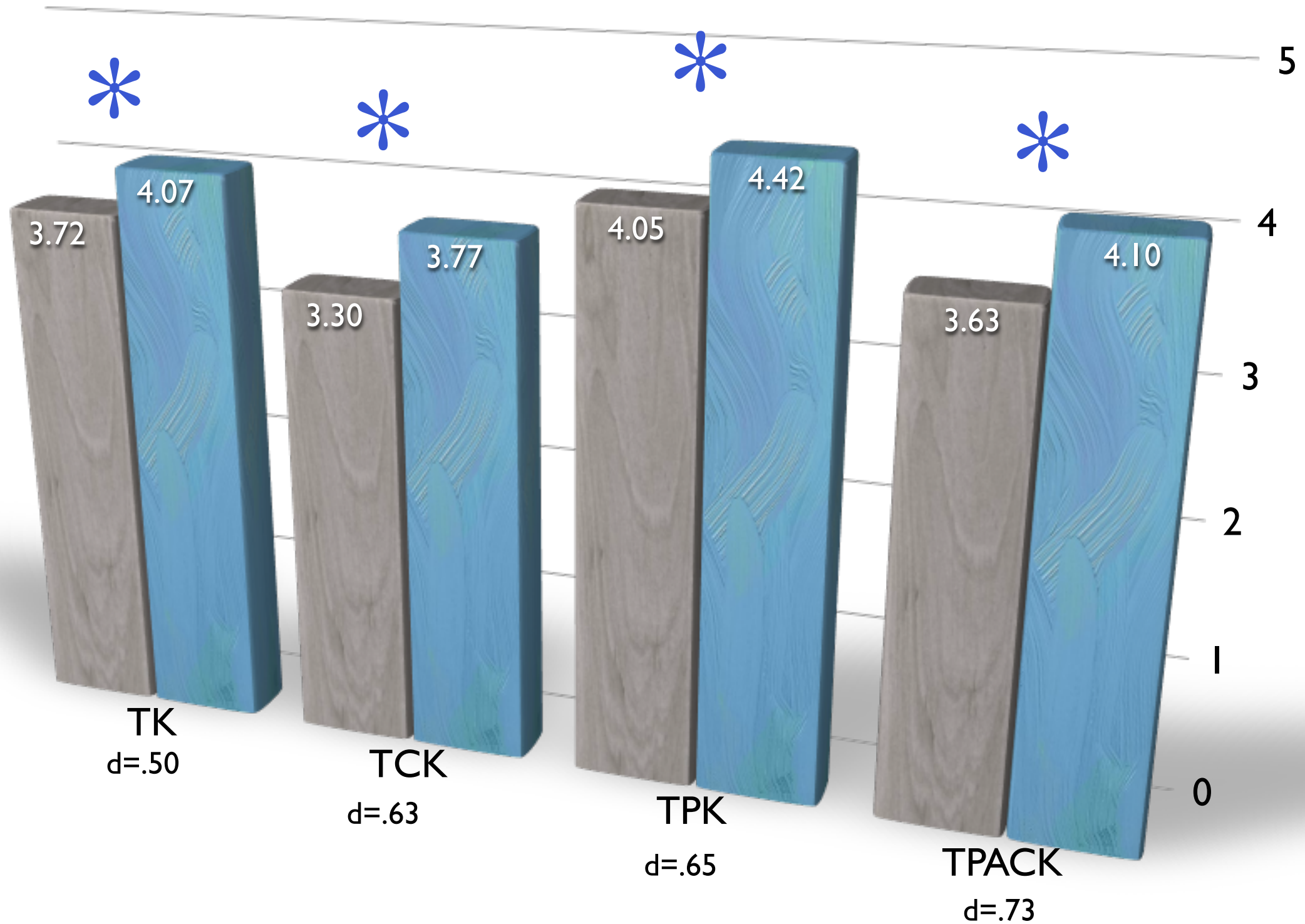
Four years of data

Schmidt, D. A., Baran, E., Thompson A. D., Koehler, M. J., Mishra, P. & Shin, T. (2009). Technological pedagogical content knowledge (tpack): The development and validation of an assessment instrument for preservice teachers. *Journal of Research on Technology in Education*, 42(2), 123-149



Pre  
Post

# In our Masters Program



# One example

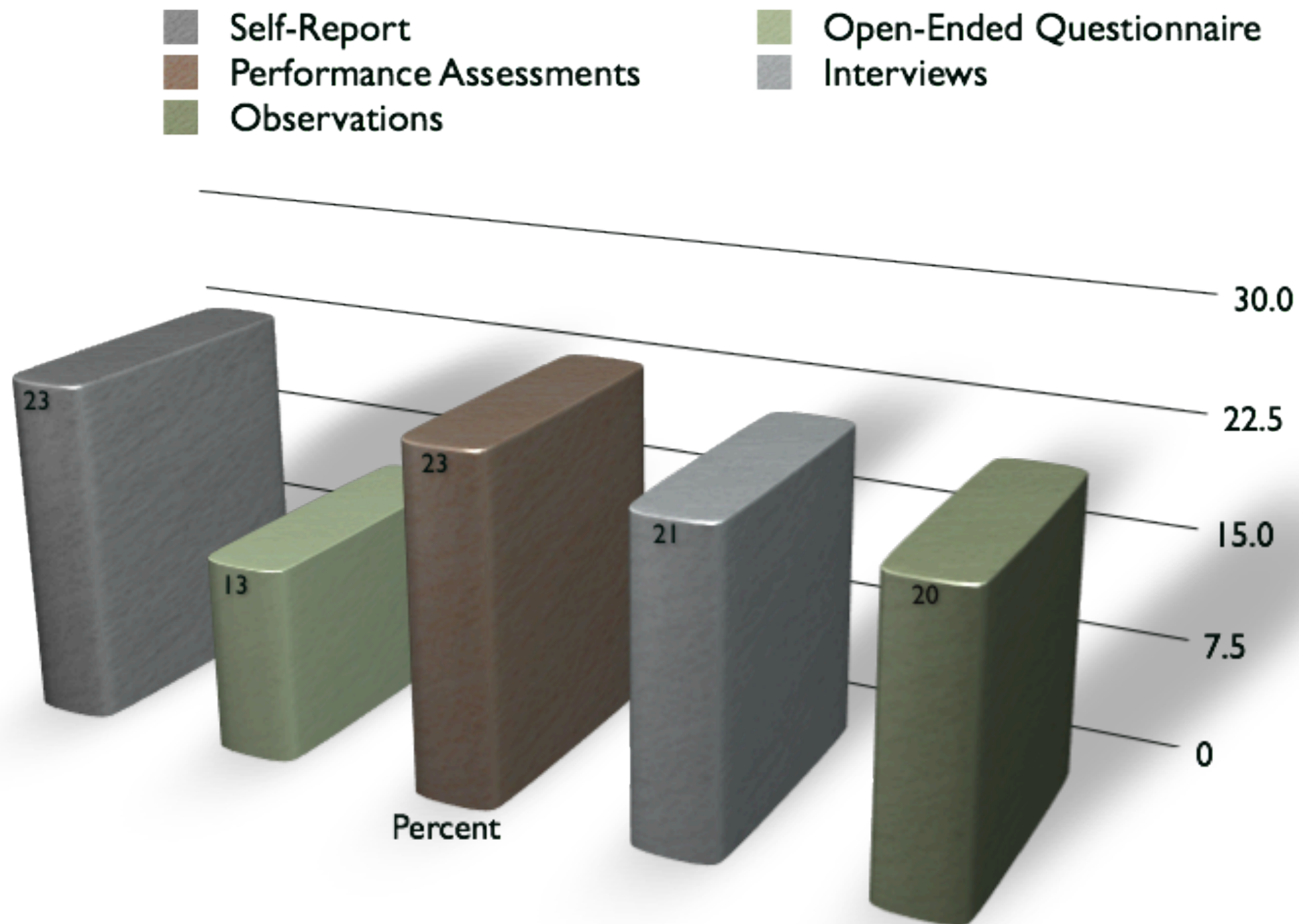


Used one survey only

Of teacher knowledge

In one program

Let Me Count the Ways



Source: Koehler, M. J., Shin, T. S., & Mishra, P. (2011). How do we measure TPACK? Let me count the ways. In R. N. Ronau, C. R. Rakes, & M. L. Niess (Eds.), *Educational technology, teacher knowledge, and classroom impact: A research handbook on frameworks and approaches* (pp. 16-31). Hershey, PA: IGI Global.

# Let Me Count the Ways



Lots of TPACK work (several hundred papers)

Only a small percentage of that work tries to measure TPACK outcomes

Most of it is in Math-Science

# Let Me Count the Ways



Much of the work is idiosyncratic

Great diversity in measures of TPACK

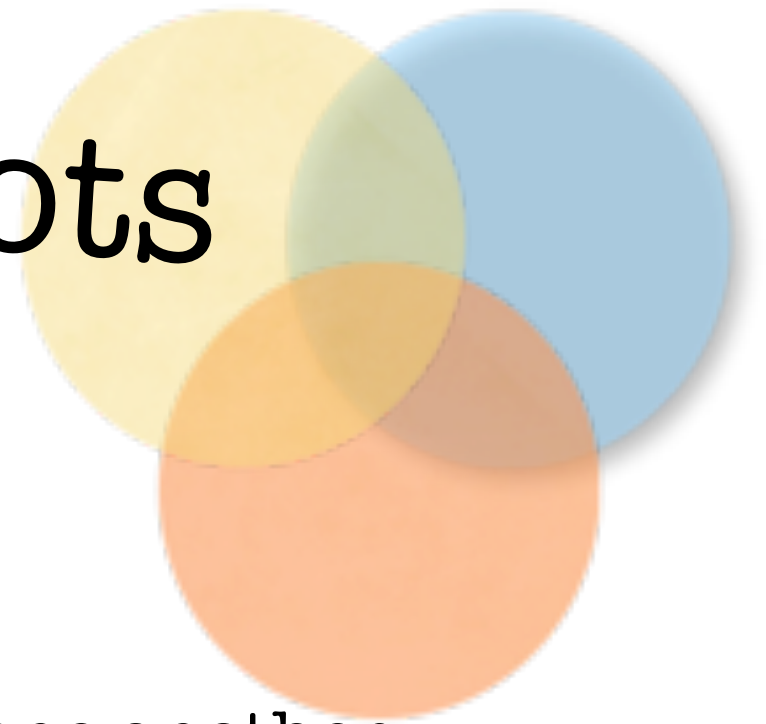
Not a lot of attention being paid to Reliability and Validity



# Connect the Dots



# Connect the Dots



Work is needed to connect these measures to one another

Surveys of teachers perceptions

Assessments of teacher knowledge

To assessments based on teacher observations

To assessments of teacher artifacts (lesson plans)

# Effectiveness



# Effectiveness



# Effectiveness

What counts as a TPACK intervention?

How to pool results?

Using different measures?



# Summary

Working on ...

Finding TPACK - (Measuring it)

Counting TPACK - (Tracking the Field)

Connecting the Dots - (Lining up the Measures)

Effectiveness - (Meta Study)





Looking ahead...



Learning for the new  
millennium...

# 2 Views



$$\left( \sum_{k=2}^{n-1} \frac{n!}{k!(n-k)!} \right) + 1$$

$n, k \geq 2$



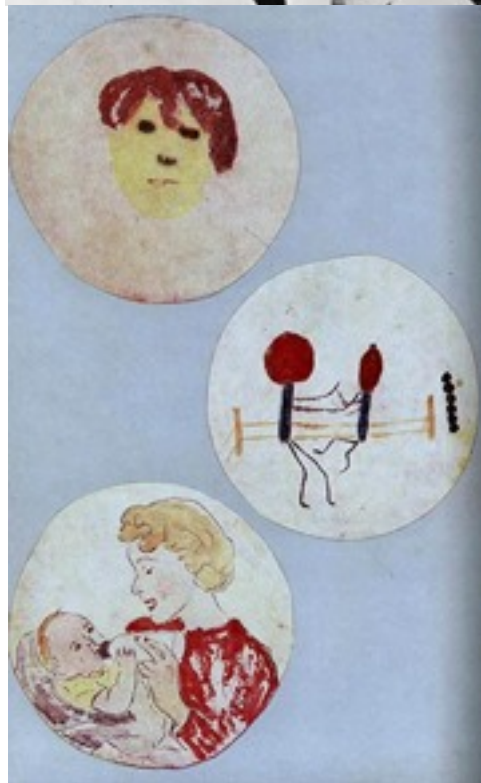
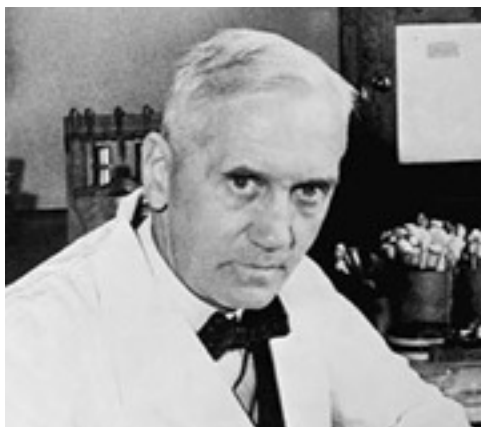
Foundational  
Disciplinary  
Knowledge

Creativity  
Collaboration  
Innovation

# A false dichotomy





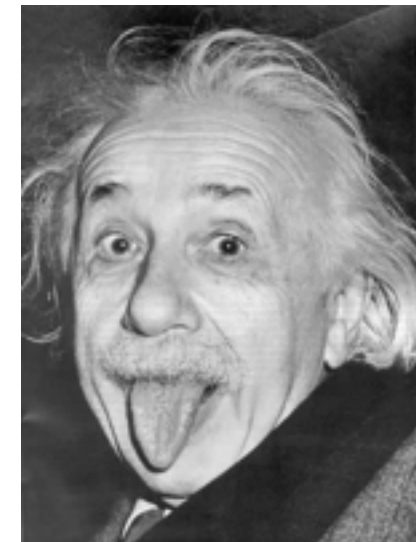
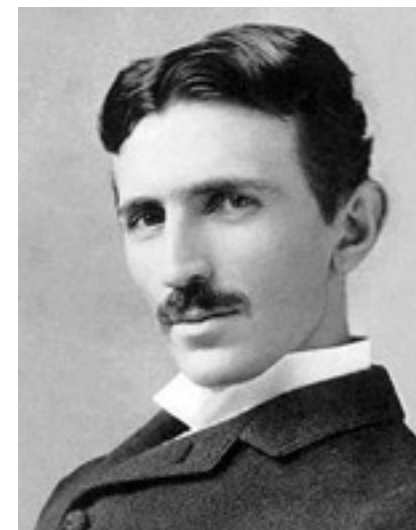


Foundations

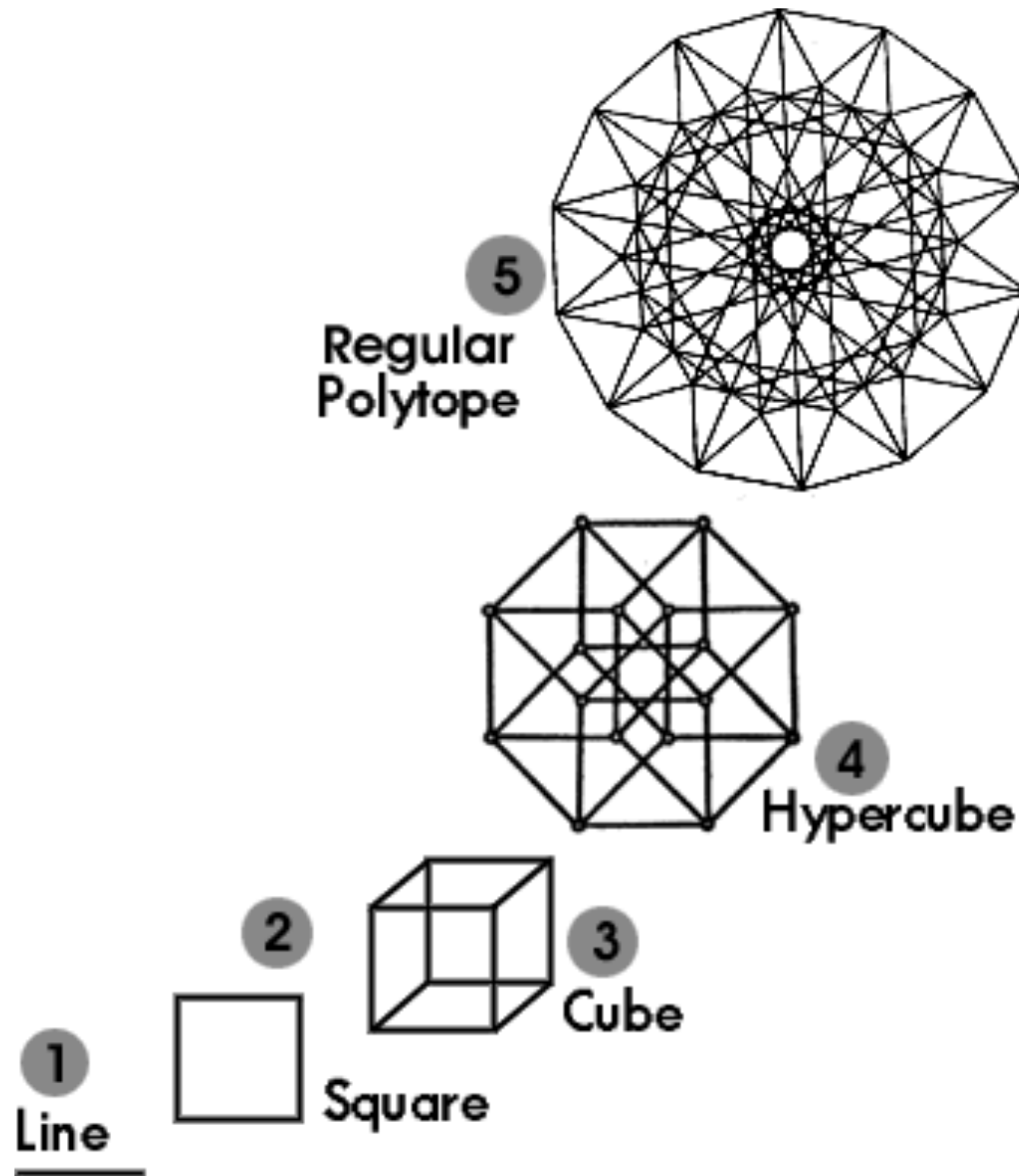
Science

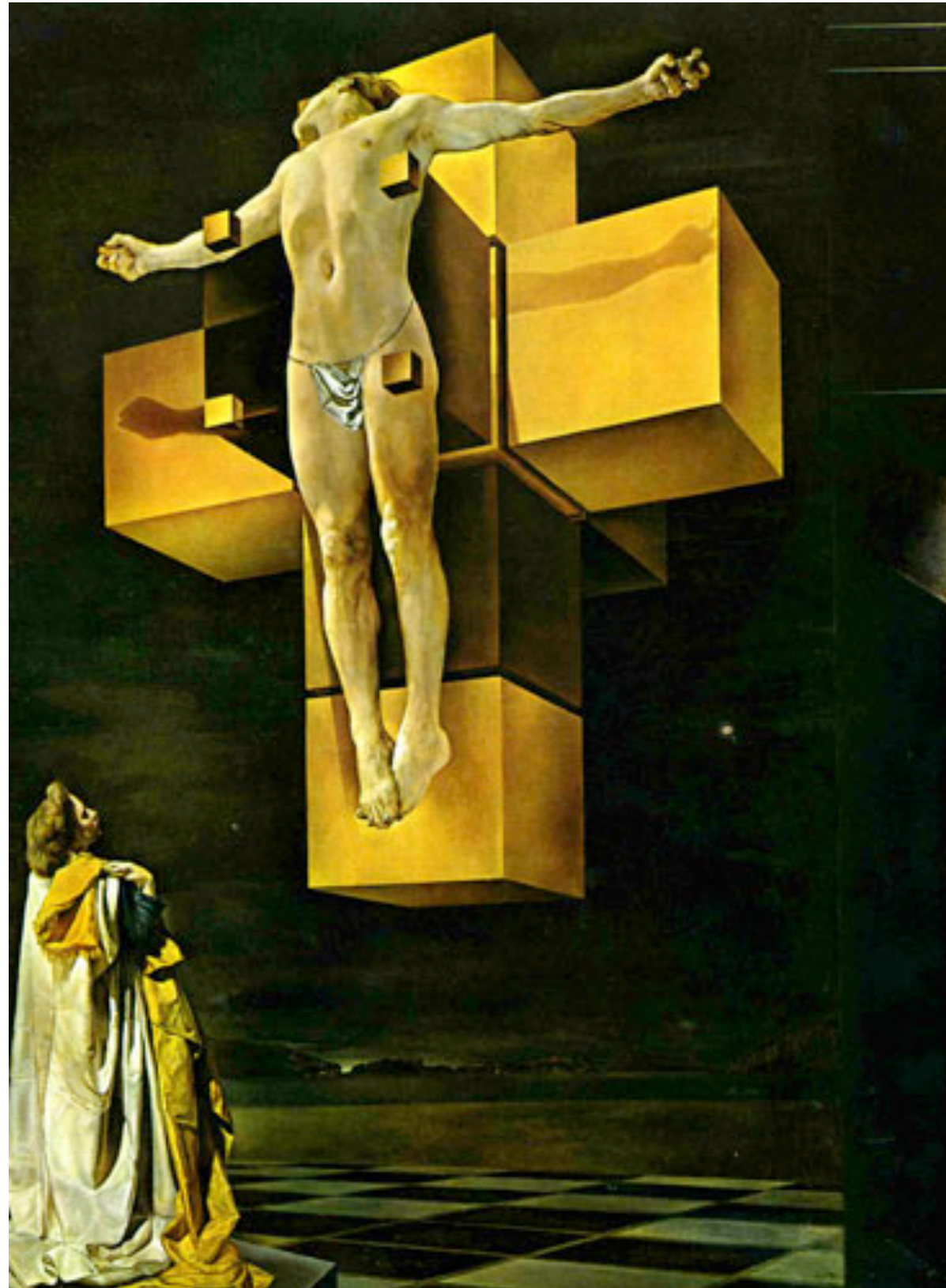
Art

Creativity



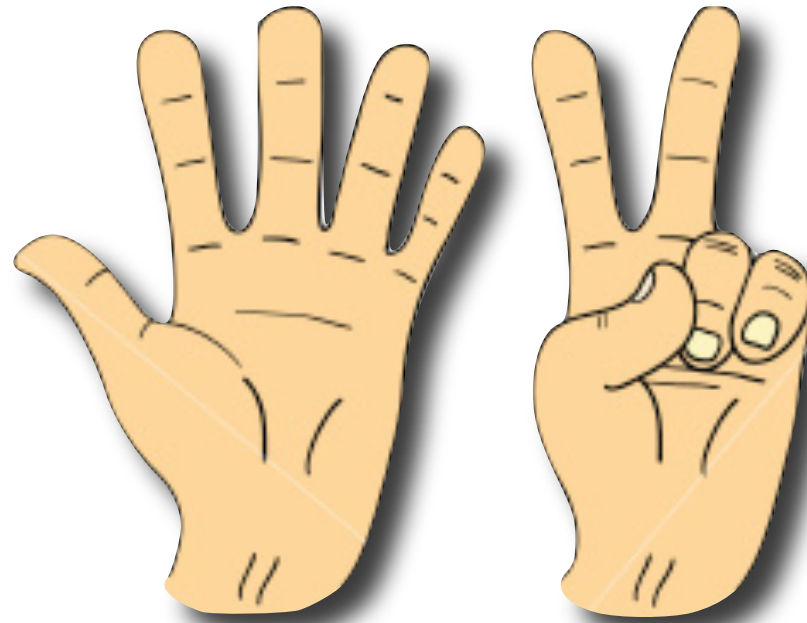
(in) Disciplined  
learning







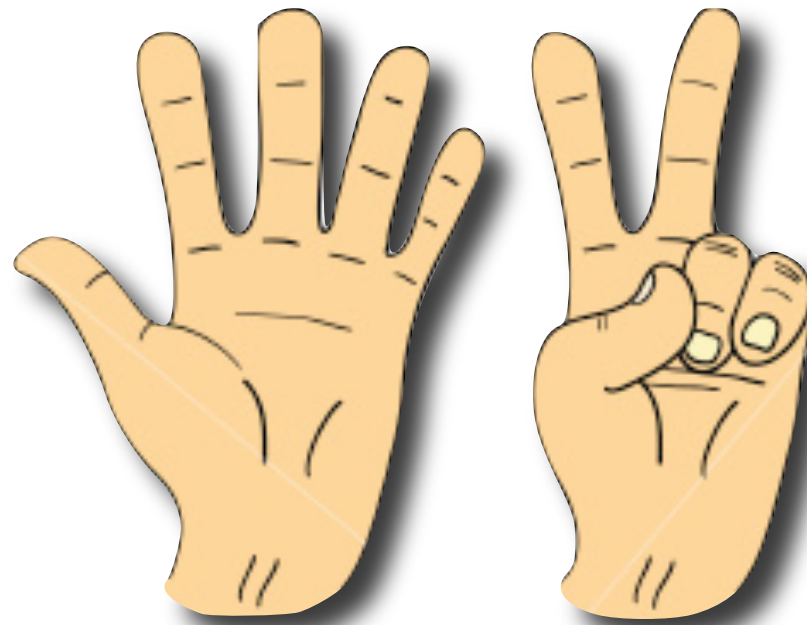




# 7 trans-disciplinary habits of mind (for the 21st Century)

Mishra, Koehler, & Henriksen (2011)

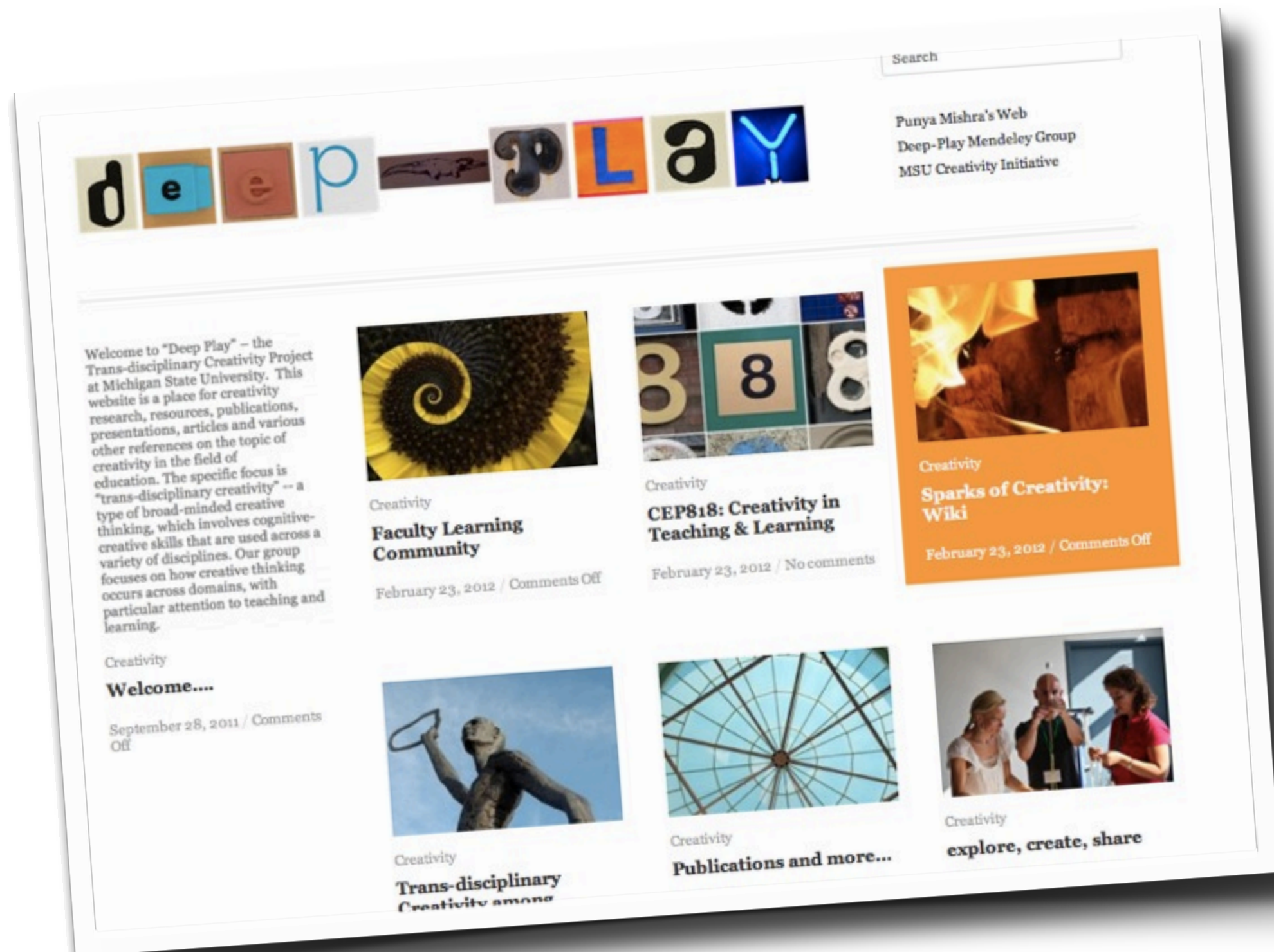




# 7 trans-disciplinary habits of mind (for the 21st Century)

Perceiving, Patterning, Abstracting,  
Embodied Thinking, Modeling, Playing  
Synthesizing

# deep-play.com



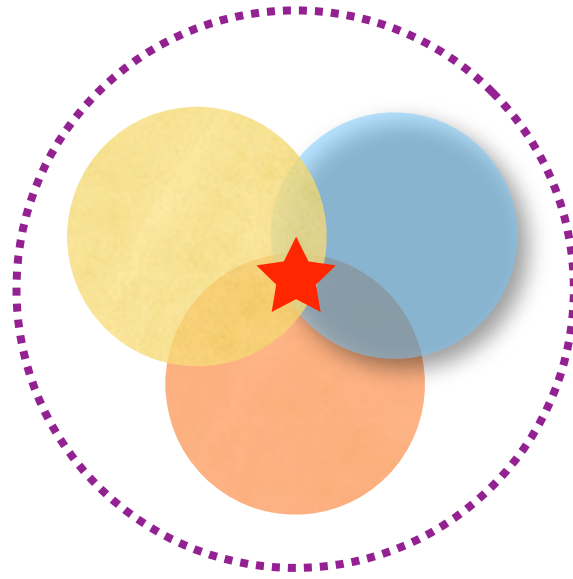
# Summing up

# New ecology



Creativity  
Is the **only** solution



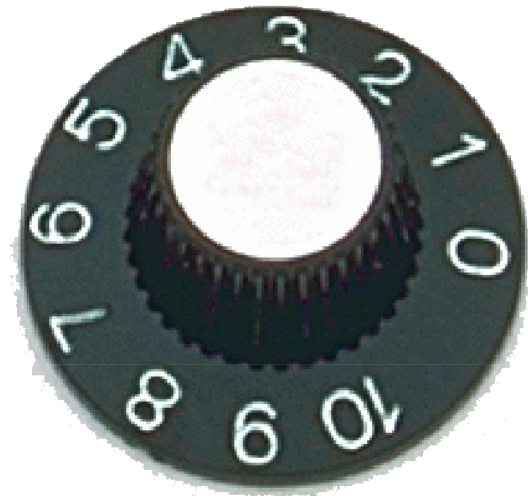


Consider the  
Total **PACK**age

and we get there...



playful process



repurposing existing tools

An advertisement!

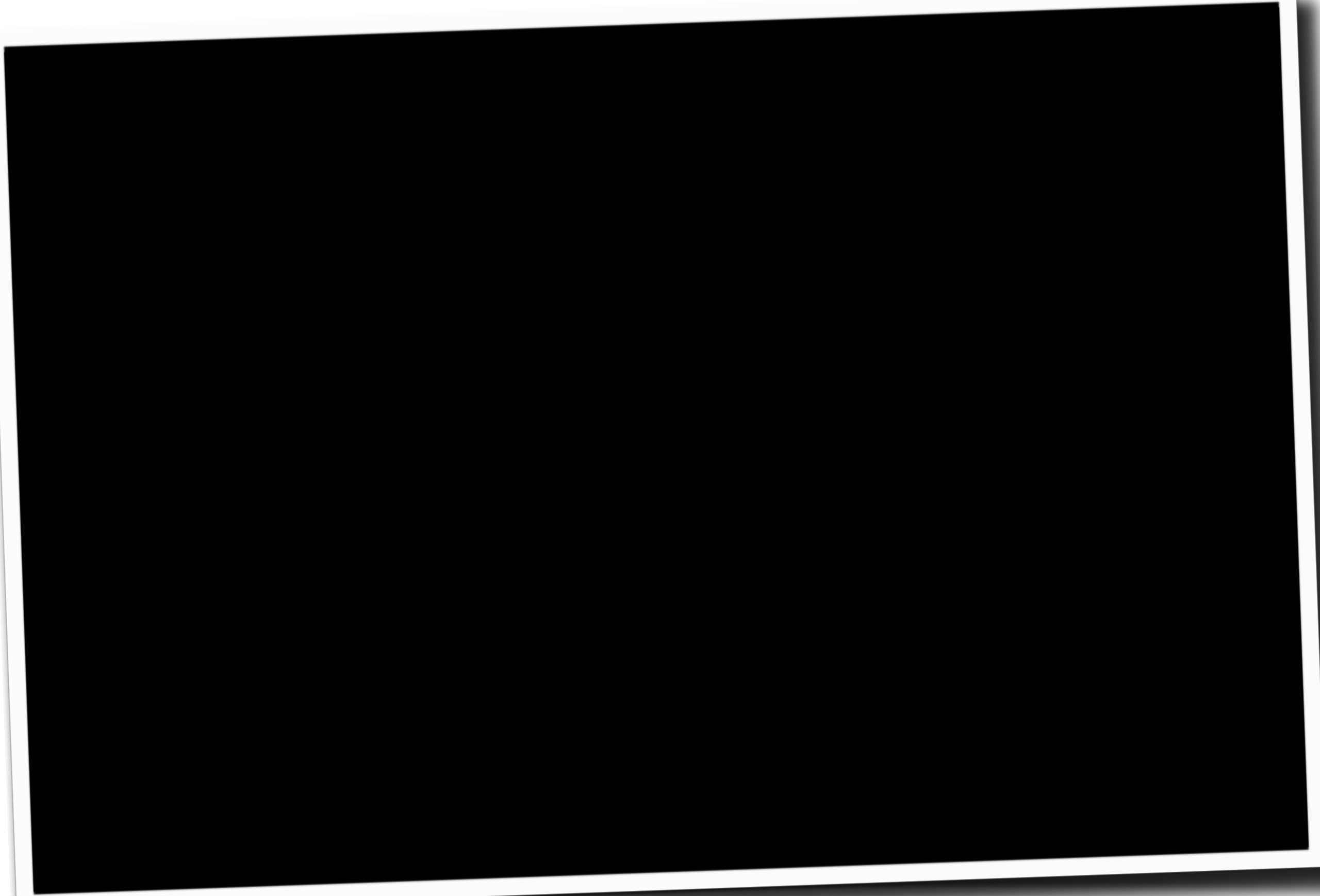




Something was not right!

Now for the...





Explore | Create | Share

That's wonderful, but what are they going to talk about — G. B. Shaw, (when told that India and Britain were joined by cable)

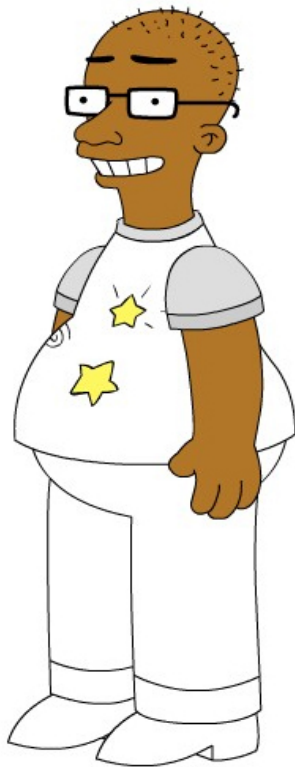
The technicalities matter a lot, but the unifying vision matters even more — T. Nelson



# Thank you!



<http://tpack.org>



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