Technology Use in Post Secondary Agricultural Sciences Classrooms: What does the research say about instructor implementation of educational technologies as applied to the Technological Pedagogical Content Knowledge (TPACK) framework?

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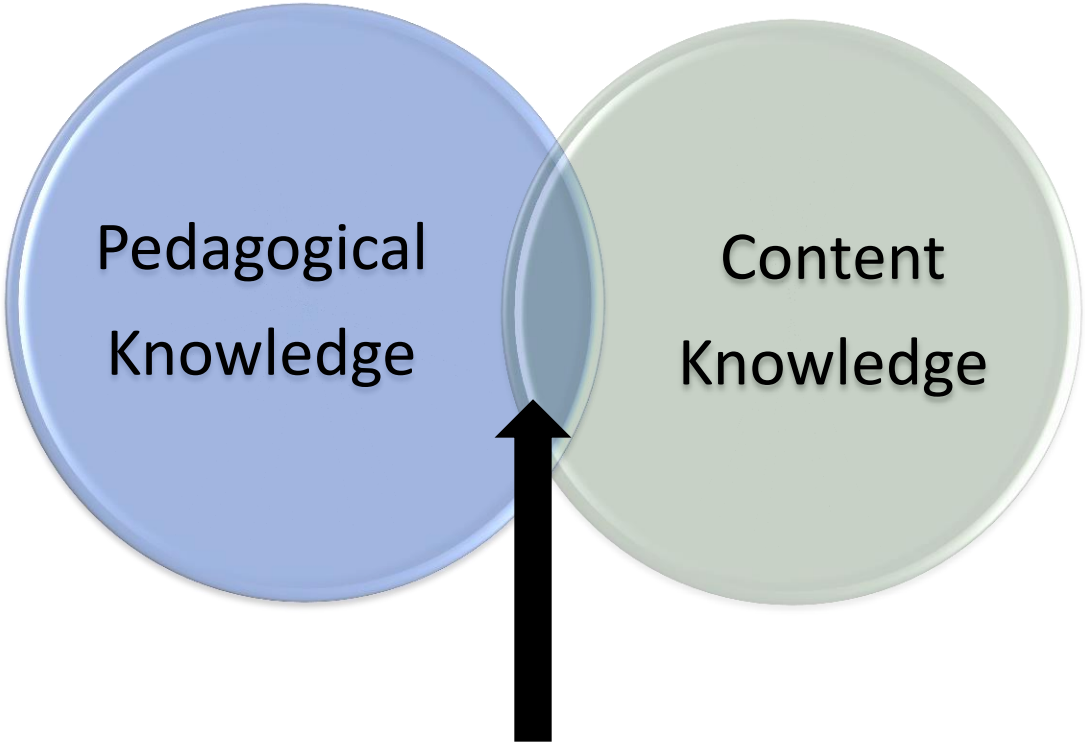
University of Nebraska Lincoln

Pedagogical Content Knowledge (PCK)

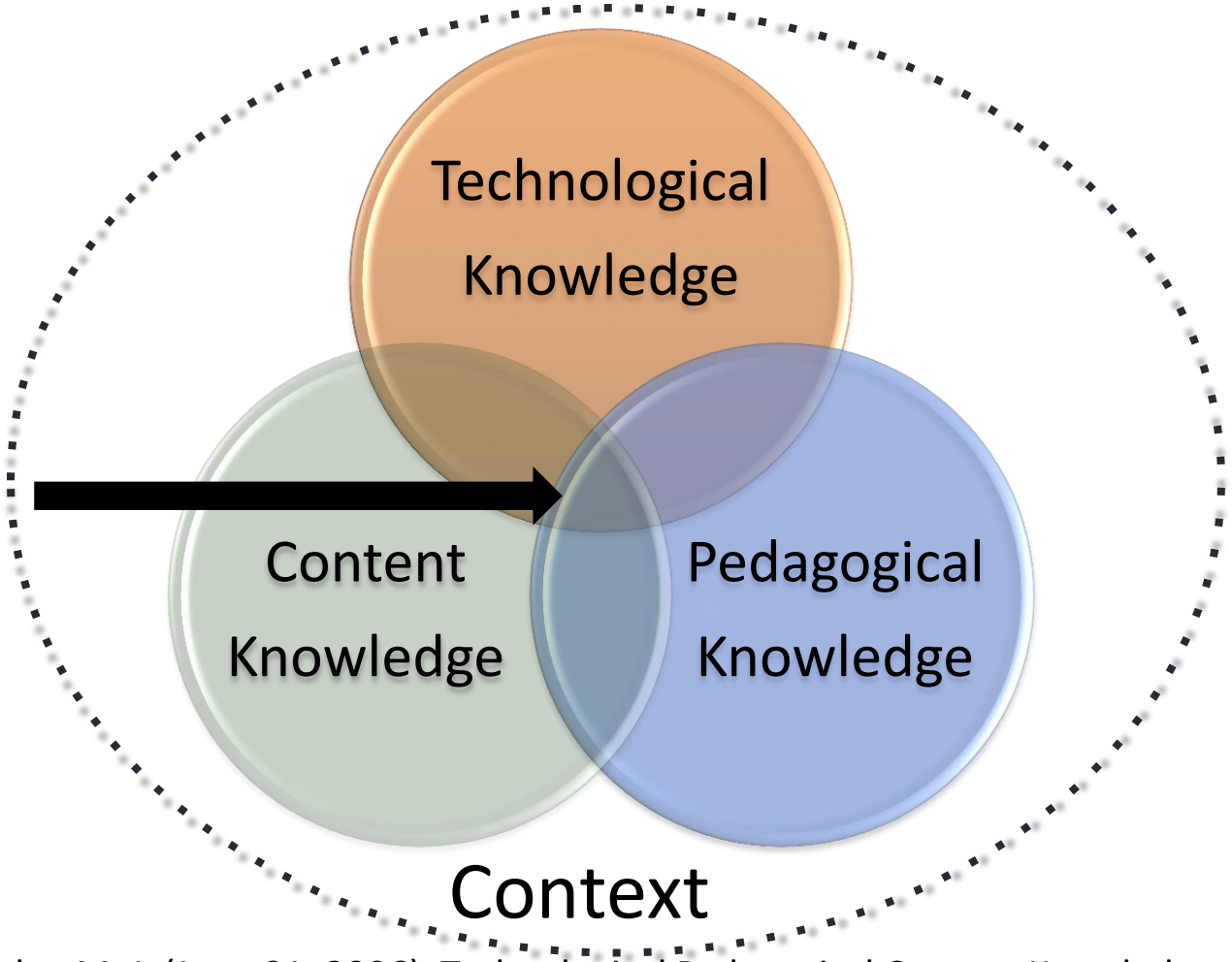


Pedagogical Content Knowledge

Shulman, L. S. (June 06, 1986). Those Who Understand: A Conception of Teacher Knowledge. American Educator, 10, 1, 9.

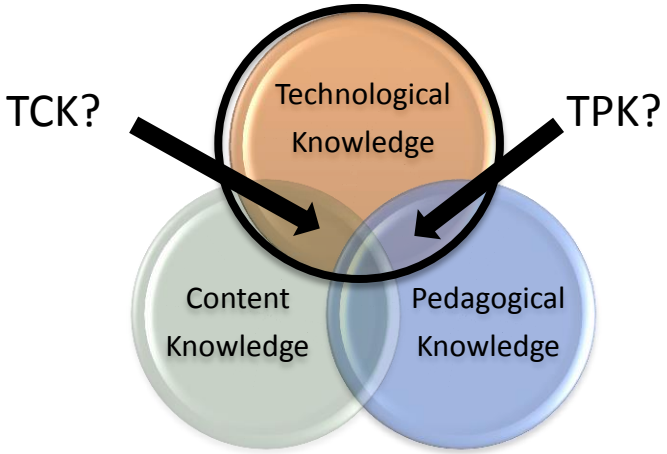
Technological Pedagogical Content Knowledge (TPACK)

TPACK



Mishra, P., & Koehler, M. J. (June 01, 2006). Technological Pedagogical Content Knowledge: A Framework for Teacher Knowledge. Teachers College Record, 108, 6, 1017-1054.

How has this framework been used?



Lack of studies

- STEM
- Undergraduate
- Student Outcomes
- Discipline based work

Chai, C. S., Koh, J. H. L., & Tsai, C.-C. (January 01, 2013). A Review of Technological Pedagogical Content Knowledge. Educational Technology & Society, 16, 2, 31-51.

Methodology

- **Search ERIC and Google Scholar and Individual targeted journals 2000-2015**
- **Search Terms Used: Undergraduate, Agriculture, Technology, agricultur/al/e education, agronomy, Entomology, + specific technologies**
- **31 papers + 13 found**

For each paper, the following information was recorded:

- **The type or types of technology**
- **The way students were expected to use this technology**
- **The content or topic that the technology was supposed to be used for**
- **The extent to which they discussed pedagogy, themes related to pedagogy or evidence-based instructional practices**
- **Student outcomes including learning, perception or behavior**
- **The unit of analysis and method of analysis**
- **Type of institution**
- **Course-level (underclassmen, upperclassmen or graduate)**
- **The sample size**

	A	B	C	D	E	G	H	I	M	S	T	V	Y	Z	AA
1	Journal	Authors	Article Name	Year	Technology								Content		Pedagogy
2					Visualization or video resource	How do they expect stude	Data Acquisition	Prototype models	Internet Search	Moodle/Blackboard (Content management Systems)	Email	Website/ Database		Do they discuss pedagogy or something related?	Is the discussion about th pedagogy cited? In other there papers that support argument for the effectiv the pedagogy.
3	Journal of Agricultural Education	Robert Strong, Travis L. Irby & Larry M. Dooley	Factors Influencing Agricultural Leadership Students' Behavioral Intentions:	2013		They don't - student survey about behavior and mobile							No-Not agricultural content specific but is correlating use of technology on educational content	The article discusses the stages of self-directed learning and how a instructor can affect a students self-direction.	Cites article that describe stages of self-direction (G 1991). Cite article that dis mobile phones and learni Wu, Huang, Tan, & Yan, 2 Bandura and self-efficacy
4	Journal of Agricultural Education	Donald M. Johnson, Leslie D. Edgar & Casandra K.	Student and Faculty Perceptions of ICT Use in Undergraduate Agriculture Courses	2013		They don't - students and faculty report on technology relat			Yes	Yes- Blackboard mentioned in article as one of the ICTs	Yes- Email is mentioned in article as a type of ICT		No- does not go into detail of how any of the ICTs can be used for agri. content	Suggests that ICTs can help students learning but does not go into very much detail into how	Cites article of a theoretic framework that can be us assess how ICTs are integ curriculum. (Davis, 1986)
	Journal of Agricultural Education	Donald M. John	Student Computer Use in Selected	2000		They don't - this is a			Yes- dicusses tasks students did		Yes- is mentioned in article		No - general technology use in assignments as reported by ag faculty	Did not have any detail about how the computer tech. can be used to improve students learning, but suggests	Cites articles that cover w students need skills in co tech. for the future Donal Thomson, Whittington, a

Analysis of all Papers | Results Type of Tech | No General Technology Included | Results Type of Tech no General | Types of Content | Student Outcomes | TCK an

Analysis

1

Technology Used In Lecture

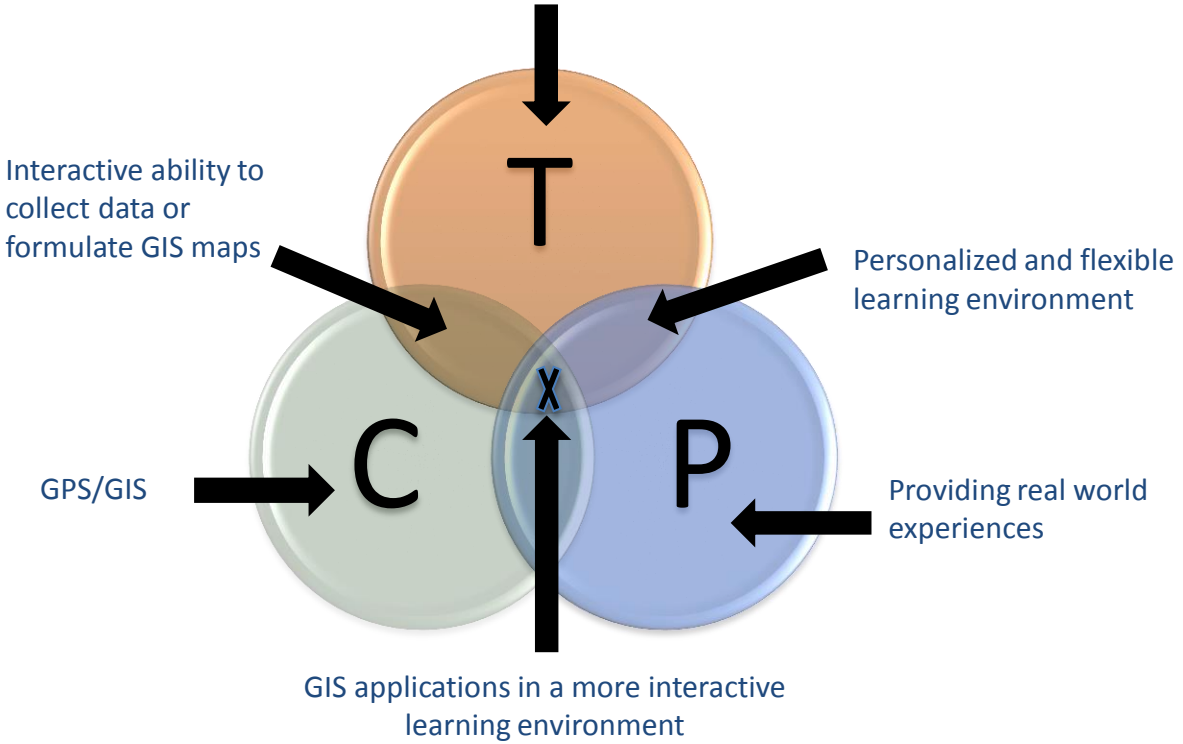
Example: **An Analysis of a Tablet PC Enhanced Learning Environment in the Agricultural Sciences.** Jaron L. Jones, Antoine J. Alston, Chastity W. English, & Godfrey Gayle, *NACTA Journal* **2013** *57* (3), 20-26

2

Classification

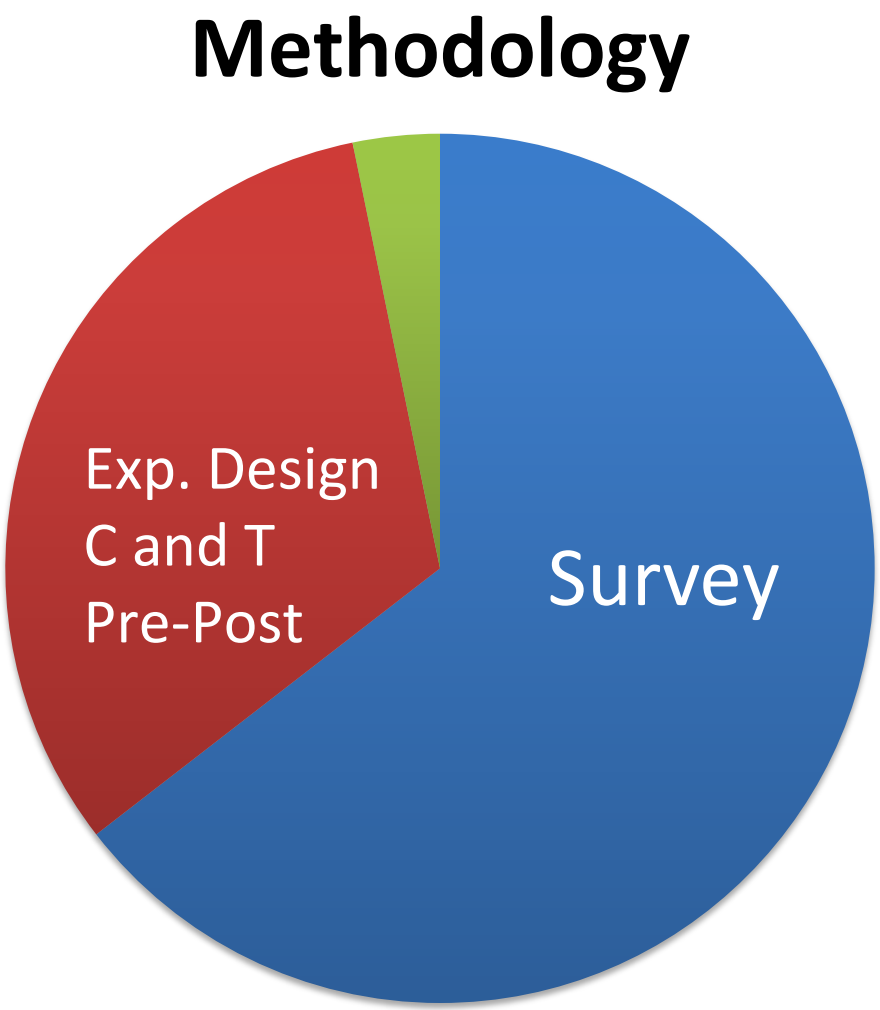
3

Student Outcomes

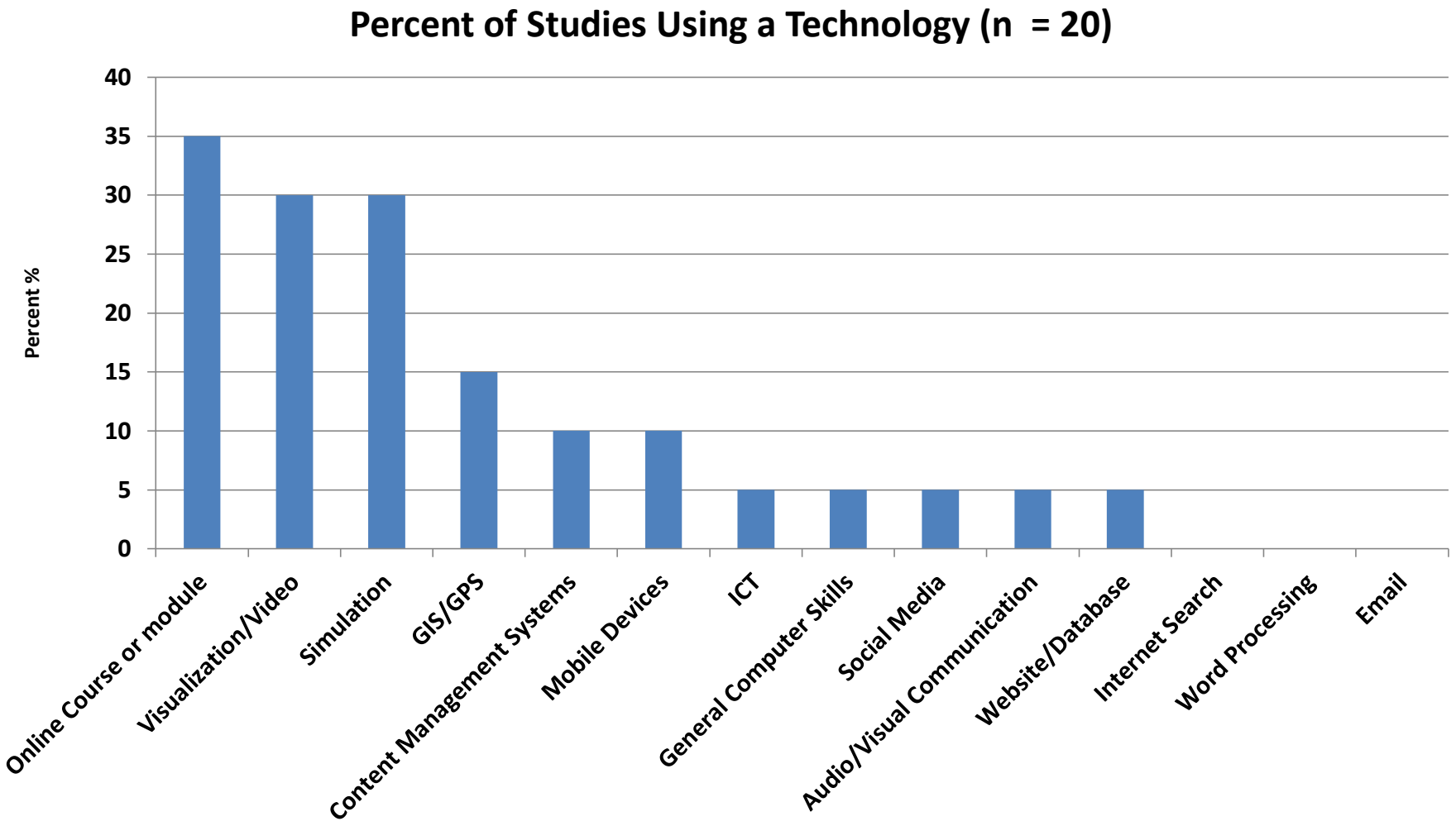


Overall students (n = 46) perceived tablets heightened learning, increased interactivity. There were perception differences between males and females.

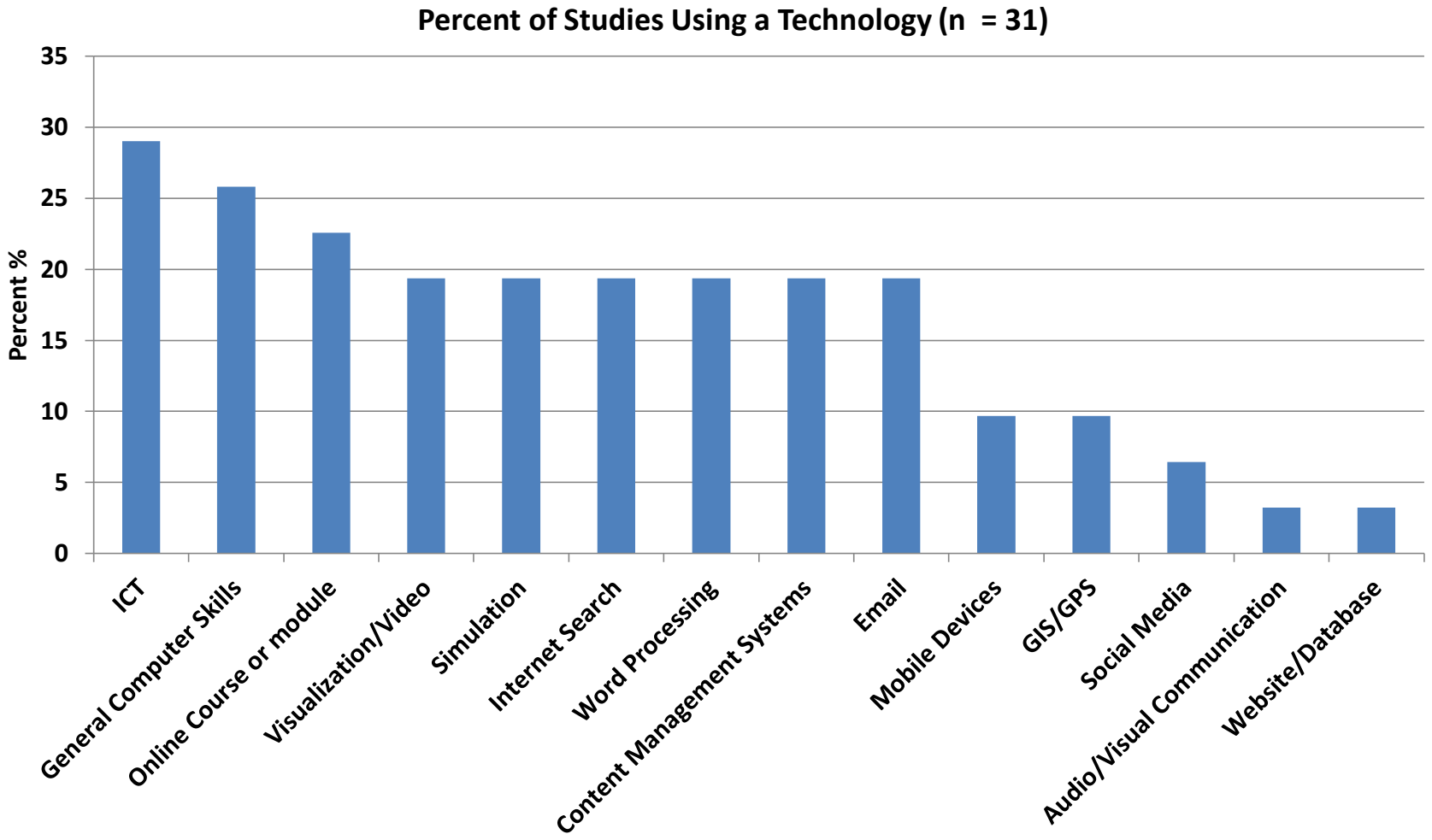
Study Types



Minus Papers Researching Student General Technology Skills



Technologies Covered



Results

N = 31

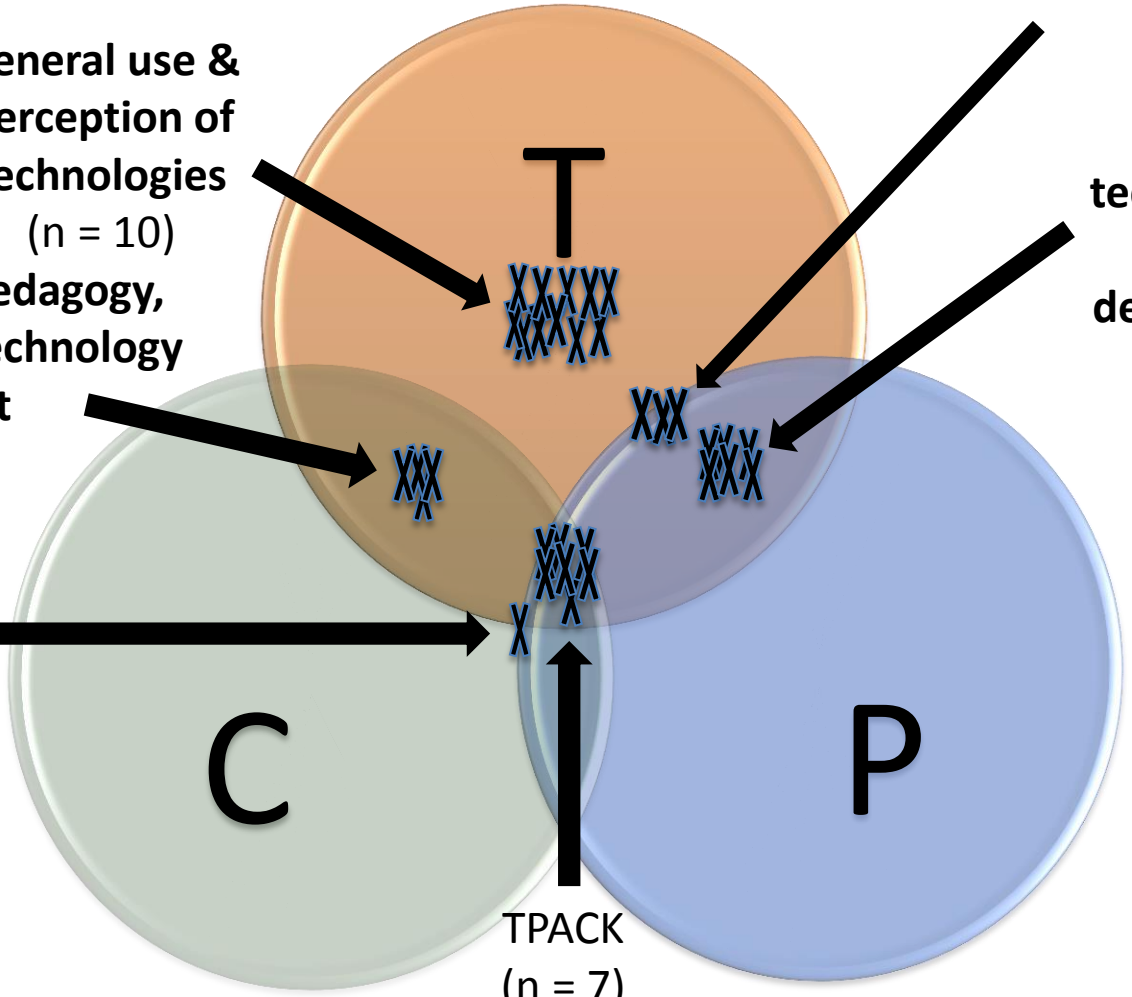
Mention pedagogy with limited discussion/citation
(n=3)

General use & perception of technologies
(n = 10)

General technology in course development
(n = 6)

Do not mention pedagogy, but have specific technology for content
(n = 4)

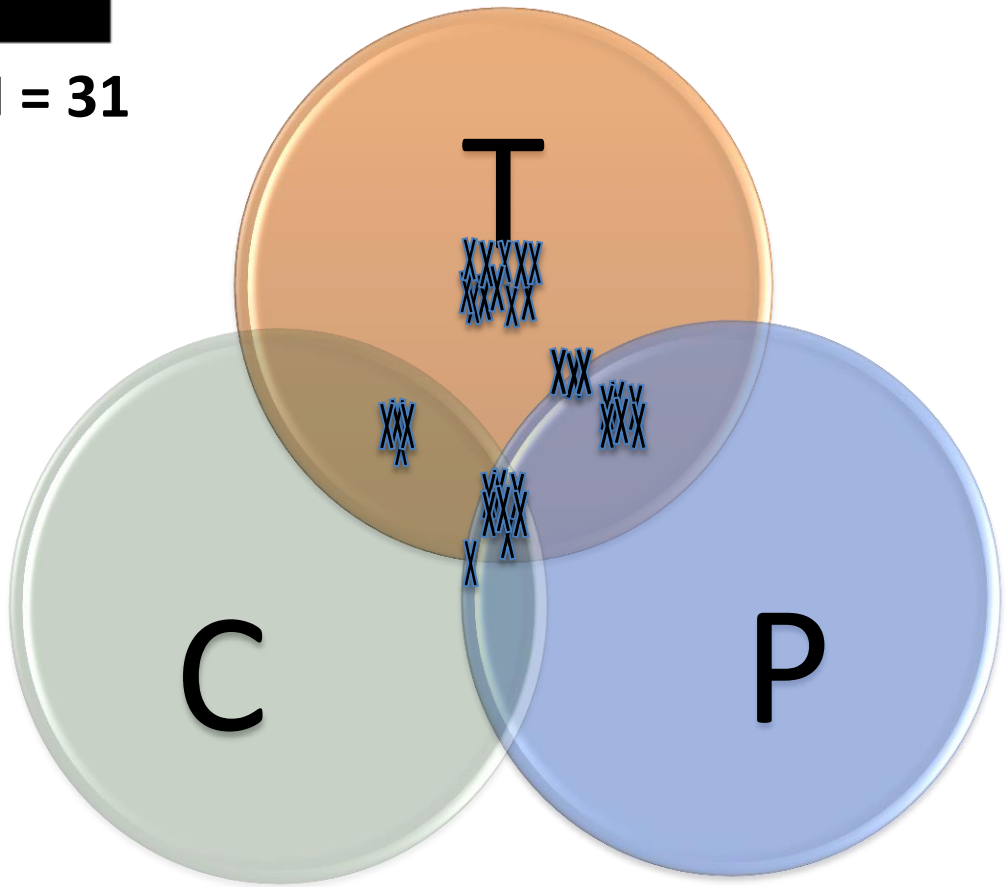
Online course design
(n = 1)



TPACK
(n = 7)

Results

N = 31



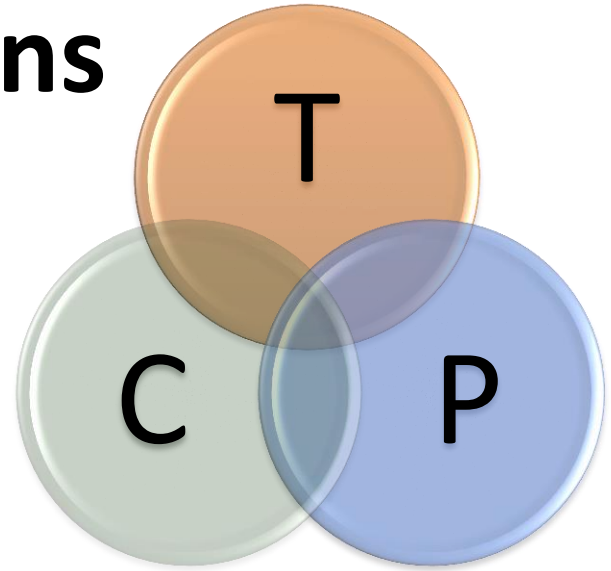
Outcomes	# Studies
Std. Perception	**20**
Behavior	**11**
Learning	**7**
>1	12

Most studies measured perception and behavior, but not learning.

Results TPACK Framework

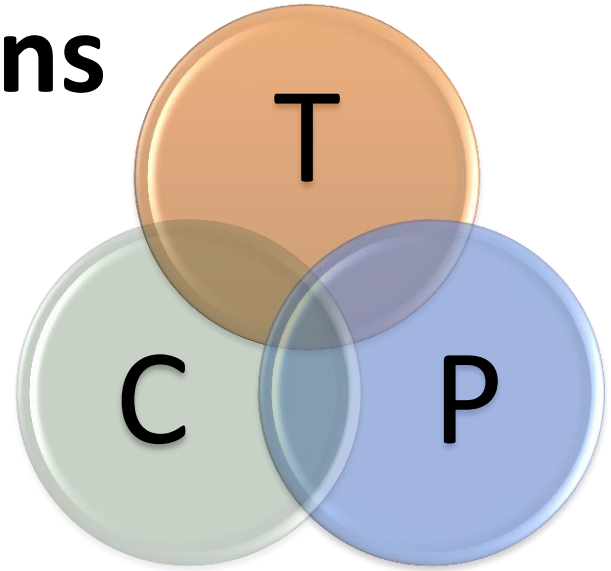
- Studies with topic specific TCK: 39%
- Number of studies with clear TPK: 48%
- Number of studies with no topic specific TCK or TPK: 26%
- Number of studies with both topic specific TCK and TPK: 23%
- **Number of studies with full TPACK: 22%**

Recommendations

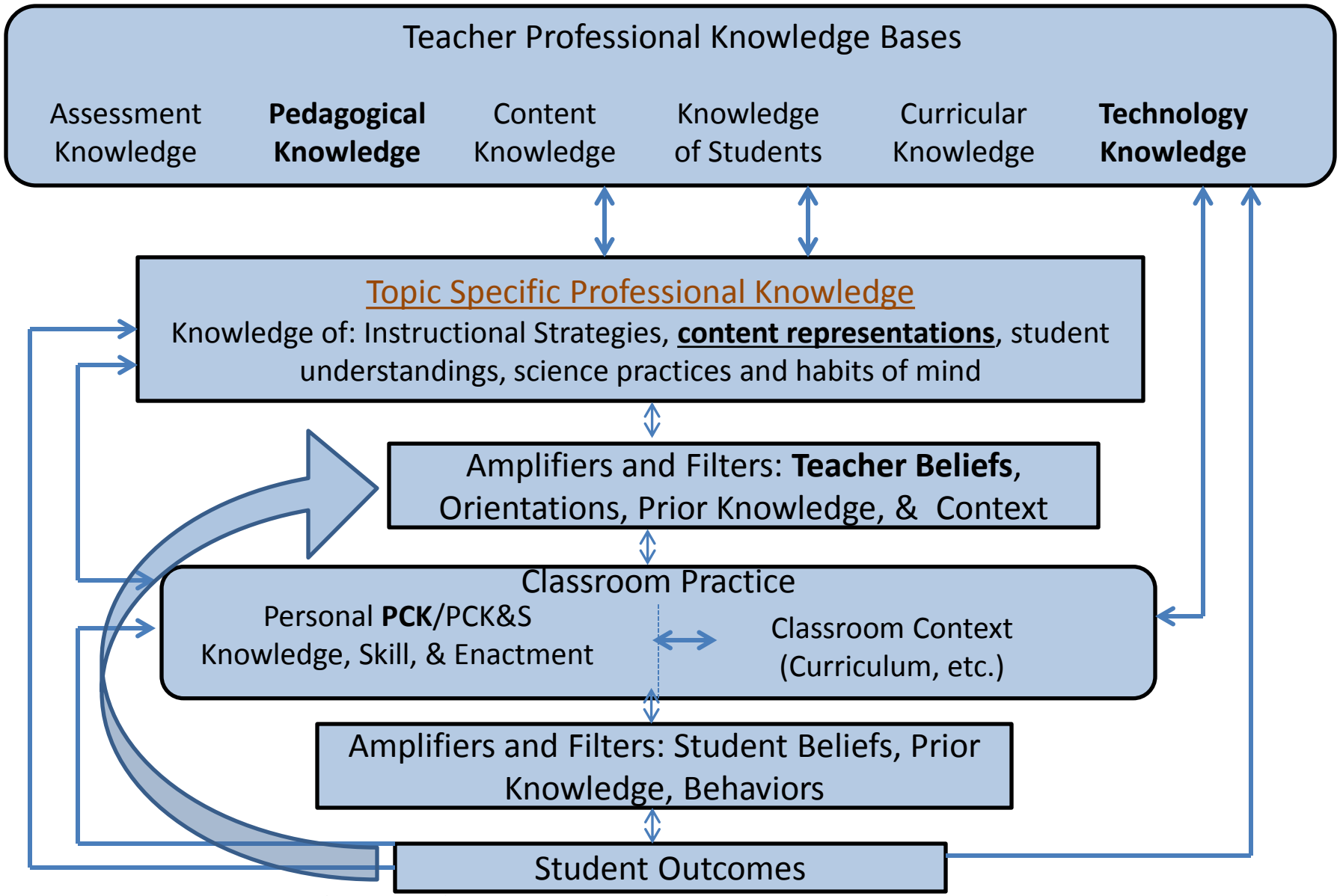


- Continue to conduct student learning (outcomes) and perception research
- Less equivalency studies
- More content specific studies driving how to teach a particular concept
- Better tags/keywords for articles

Recommendations



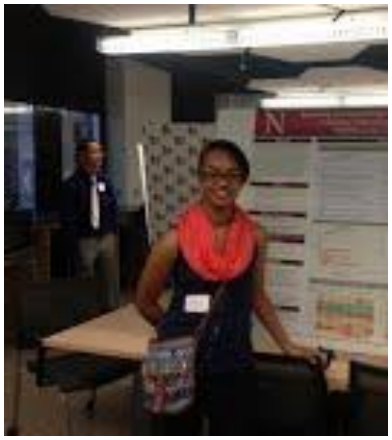
- **More Exp. Design Studies**
- **Modification of framework**
  - Pedagogy is critical to TPACK
  - Student outcomes should be incorporated
  - Differentiation of disciplinary and topic specific content
  - Incorporation into modified PCK framework and revised TPACK framework



Gess-Newsome et. al. (in press)

Figure 1: Model of Teacher Professional Knowledge and Skill Including PCK and Influences on Classroom Practice and Student Outcomes

Questions and Acknowledgments



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