

Geoscience and Digital Technologies: Context and Considerations

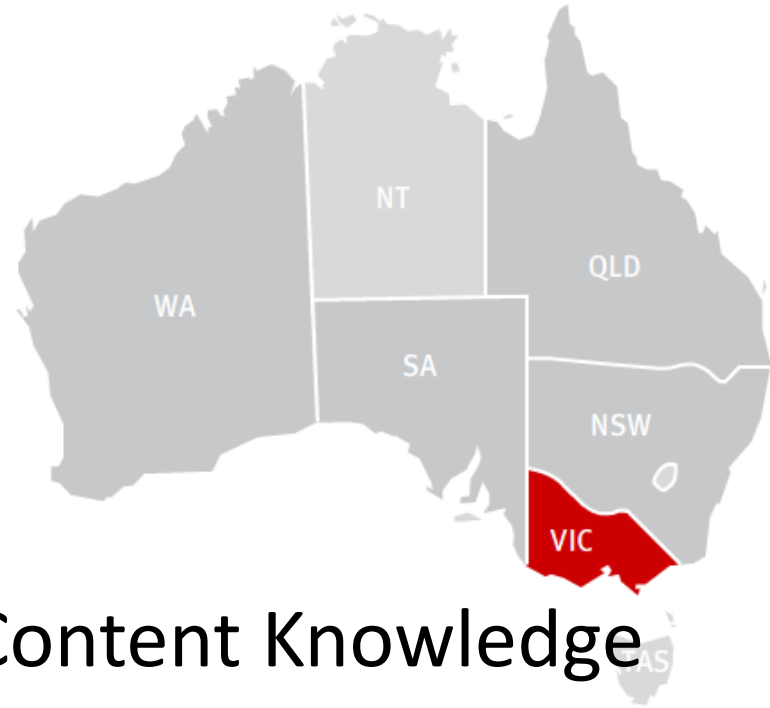
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Introduction

- Curricular expectations of science teachers
- Geoscience
- Digital technologies
- Technological Pedagogical Content Knowledge (TPACK) (Koehler & Mishra, 2009)




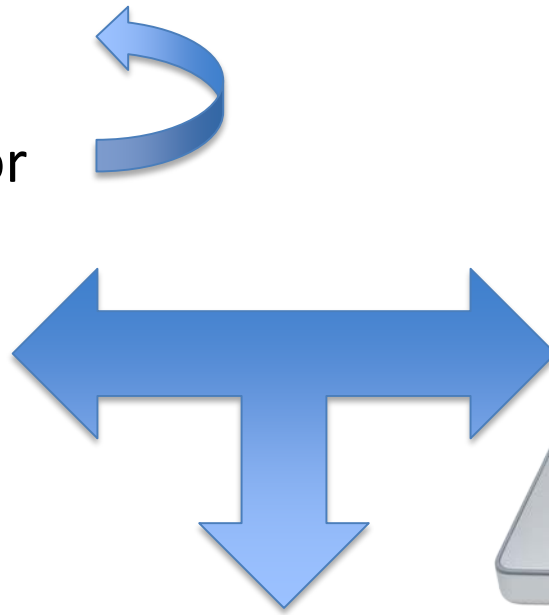
From Australian to Victorian Curricular Contexts

- Science Curriculum

- Understanding
- Inquiry
- Human endeavor

- Digital Technologies

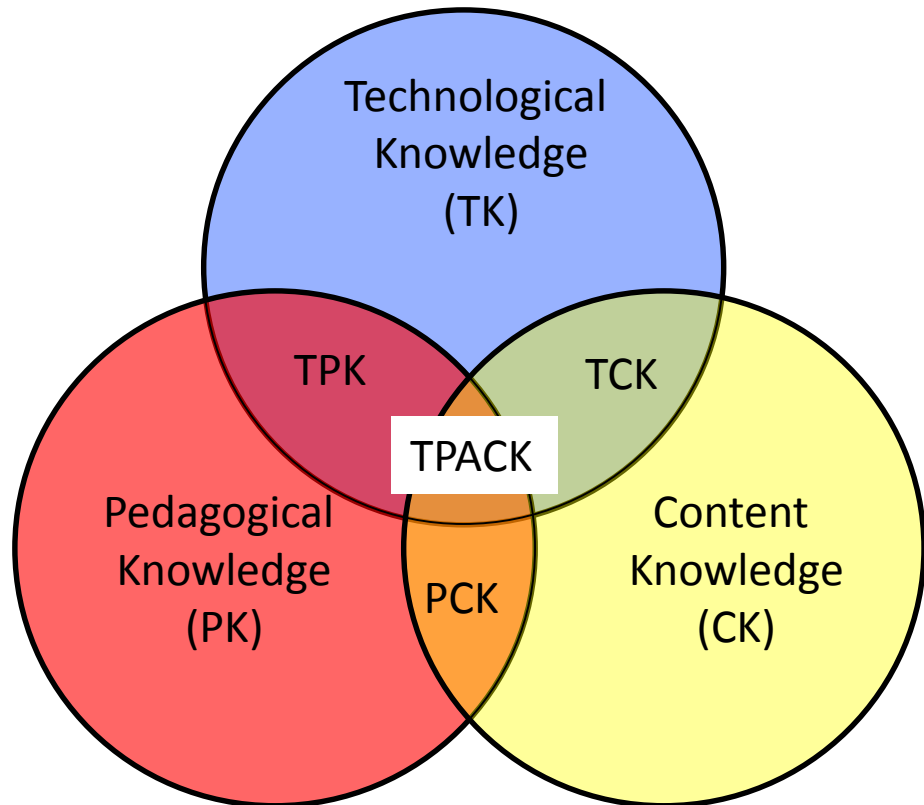
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- Knowledge
 - Understand
 - Skills
 - Behaviors
 - Dispositions



Technological Pedagogical Content Knowledge

How technologies can:

- Be utilized in constructive ways to teach content;
- Help redress the difficulty in students' understanding or applying concepts;
- Be used to build on existing knowledge or develop new epistemologies



(Koehler & Mishra, 2009)

PCK and Out of Field Teaching

Less rigorous

Lewis & Baker (2010), Underwood (2008)

Small numbers of qualified teachers = students with limited conceptual understanding

(2015)

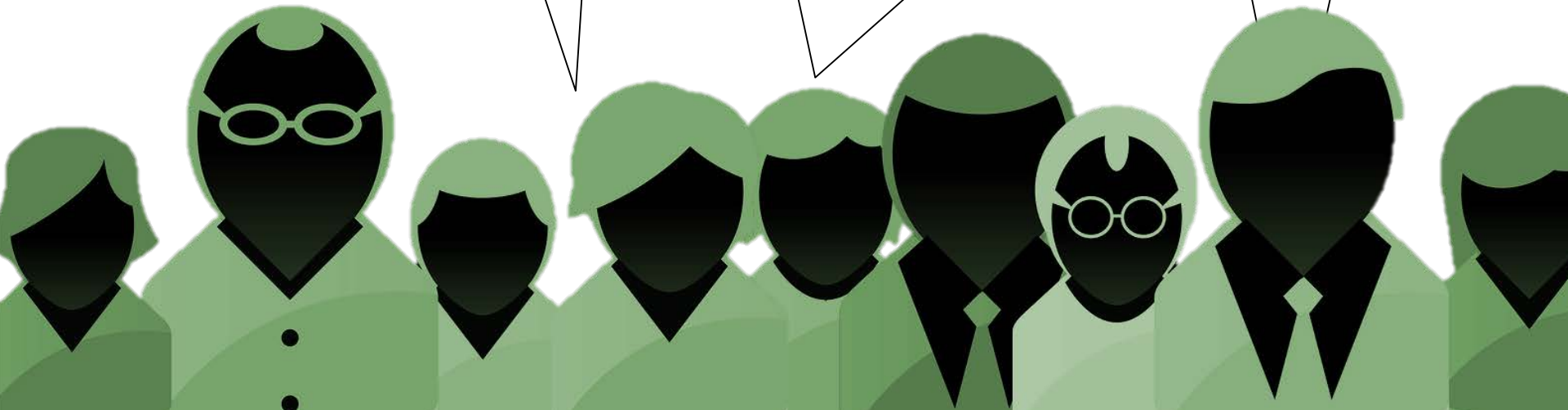
Yoon

Out of field teachers

King (2008), Lewis (2010)

Opportunities!

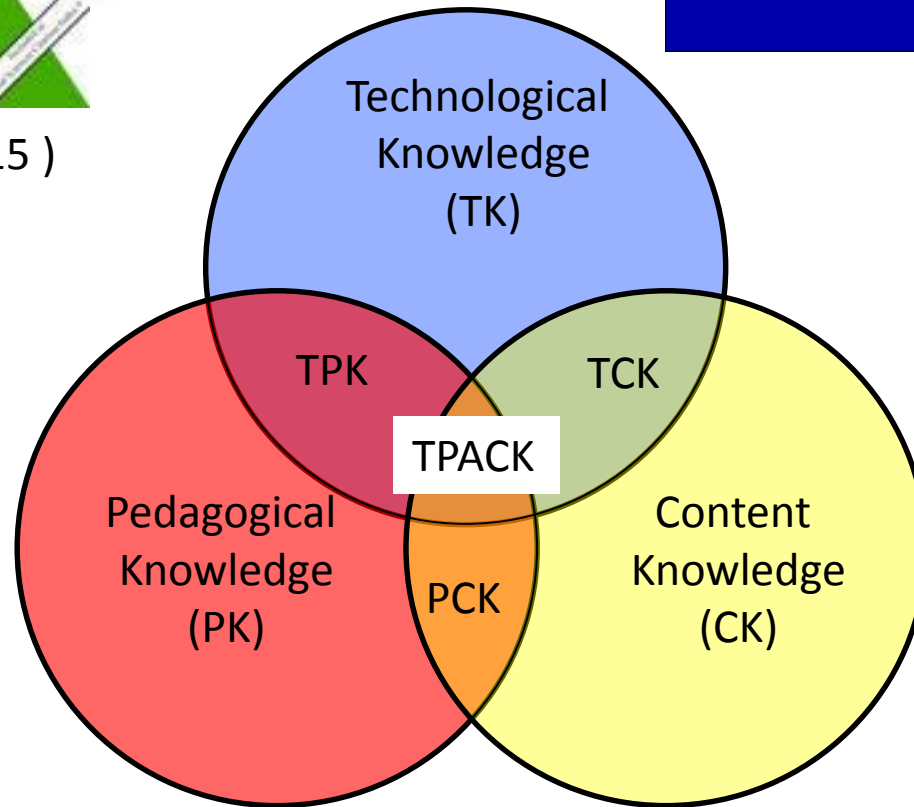
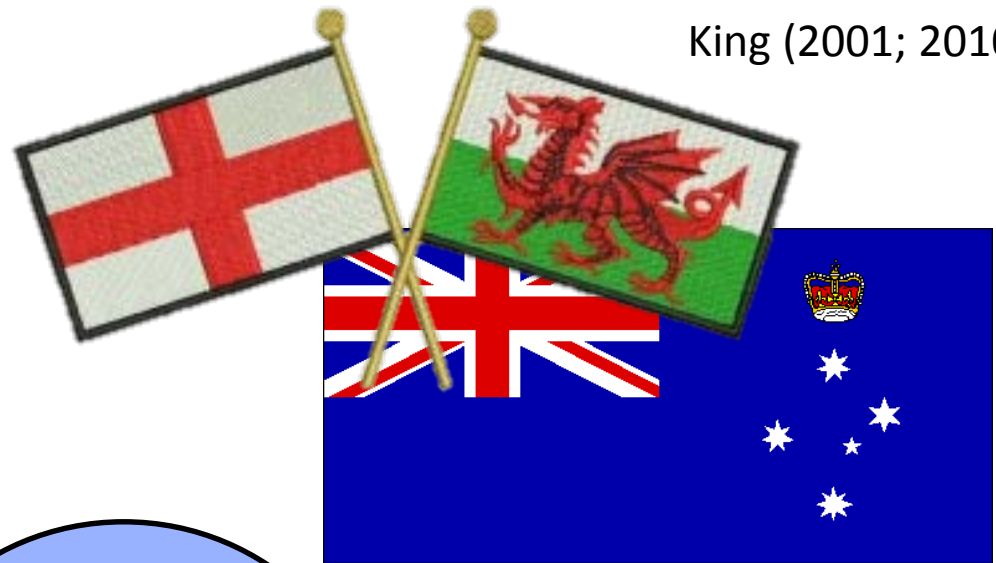
Hobbs (2013)





McDonald (2015)

King (2001; 2010)

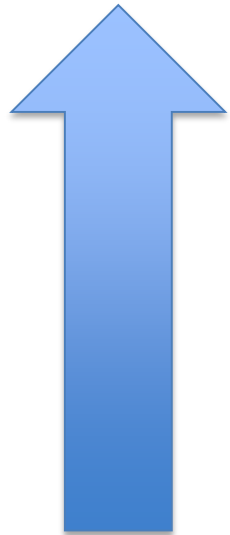


(Koehler & Mishra, 2009)

Digital Technologies in the Professional Knowledge Landscape

We need to harness the transformative potential of digital technology to support new approaches to innovative learning centered around the development of 21st century learning skills.

(DEAG, 2013, p. 4)



- Efficiency
- Equality
- Engagement

Positive Ideologies:

- **Techno-fundamentalism**
- **Efficiencies of education**
- Communitarianism
- Anti-institutionalism
- **Learner-centered learning**

Selwyn (2014)

Techno-fundamentalism



It's a
scandalous
waste!
(Vallance, 2016)

- Improved learning outcomes due to ICT remains elusive and overemphasizes technology

Teachers need
a broad range
of knowledge!
(Webb, 2013)

Significant improvements
(OECD, 2015)

Mama, 2013; Munro,

ent = no

movements

The Efficiencies of Education

- Data-driven educational provision
- Profitability optimization of education
- Economic success in terms of labor and knowledge production

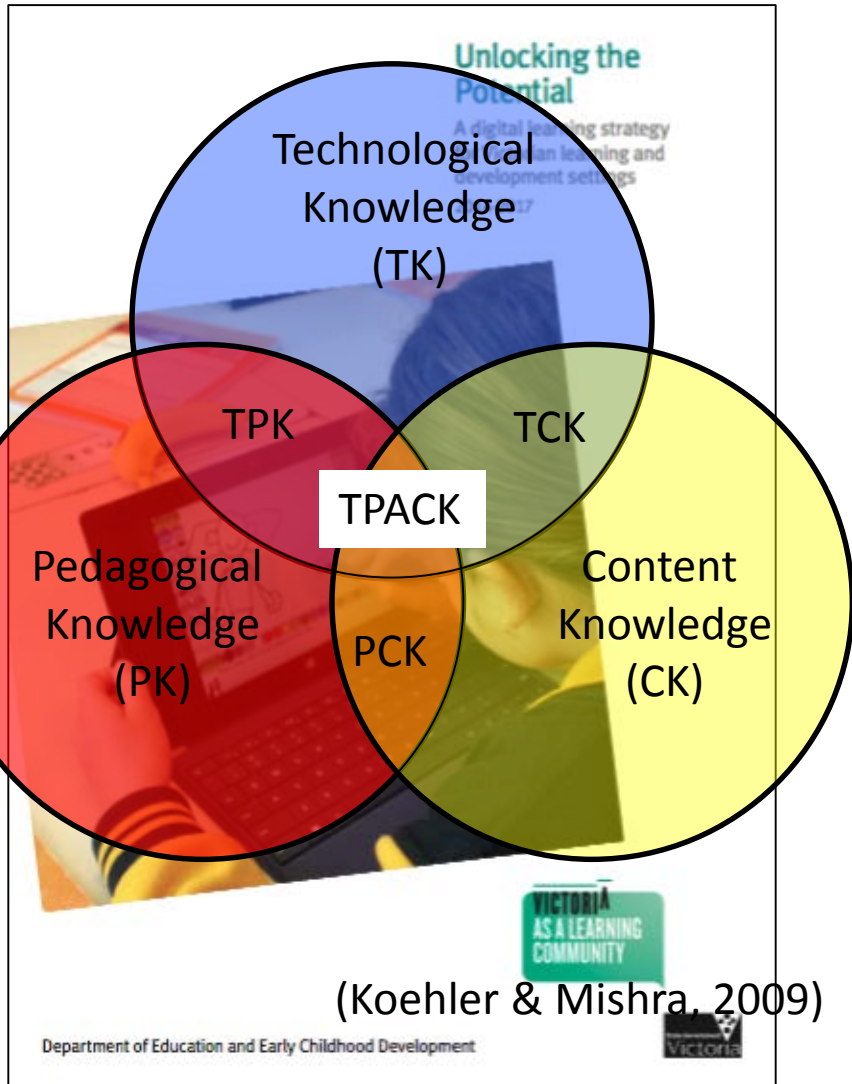
Ok, where to begin?



My STEM skills will help the nation's success!



Learner-Centered Learning



- Augment pedagogical capacity of teacher
(Toyama, 2015)
- Learner-centered learning facilitates use of ICT
(Petko, 2012)
- Learners perform better in blended learning environments
(Means et al., 2013)

Students' ICT Capabilities

- Strong web-browsing skills (OECD, 2012)
- Above average skills in digital reading and mathematical problem solving (PISA 2012)
- 2011-2014 overall decline in ICT competencies (Fraillon, 2015)

Interpretations of Declining ICT Capabilities

1. ↑ use of mobile technology devices

- ↓ emphasis on skills with info management/processing
- ↑ emphasis on communication apps

(Fraillon, 2015)

Today'sMeet

Create a Room.

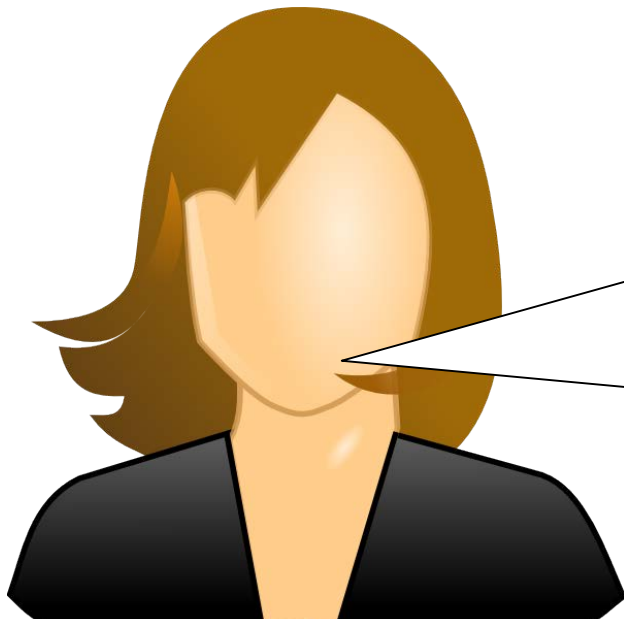


Interpretations of Declining ICT Capabilities

2. ICT competencies are ↑ taken for granted

- ↓ less emphasis on the teaching of skills for ICT literacy

(Fraillon, 2015)



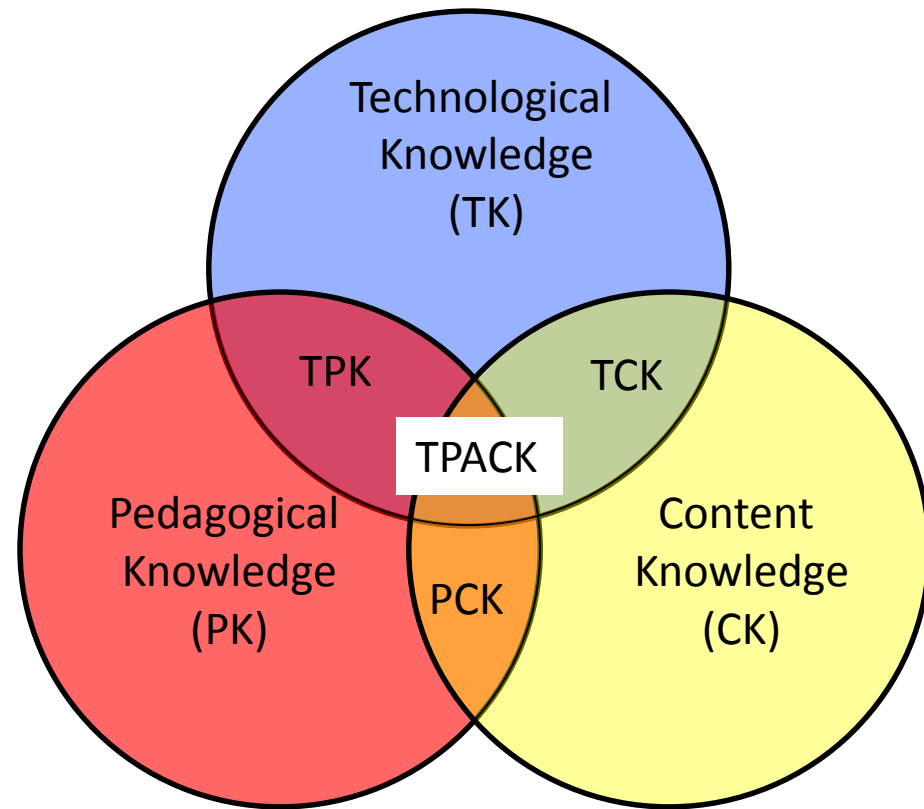
I'm making greater use of computers for school and it may be that I attribute my ICT skills with school...

Geoscience and Digital Technologies: Opportunities

- Internet-based approaches are important (Lee, 2005)
- Networked computing presents opportunities in geoscience (Feig, 2010)



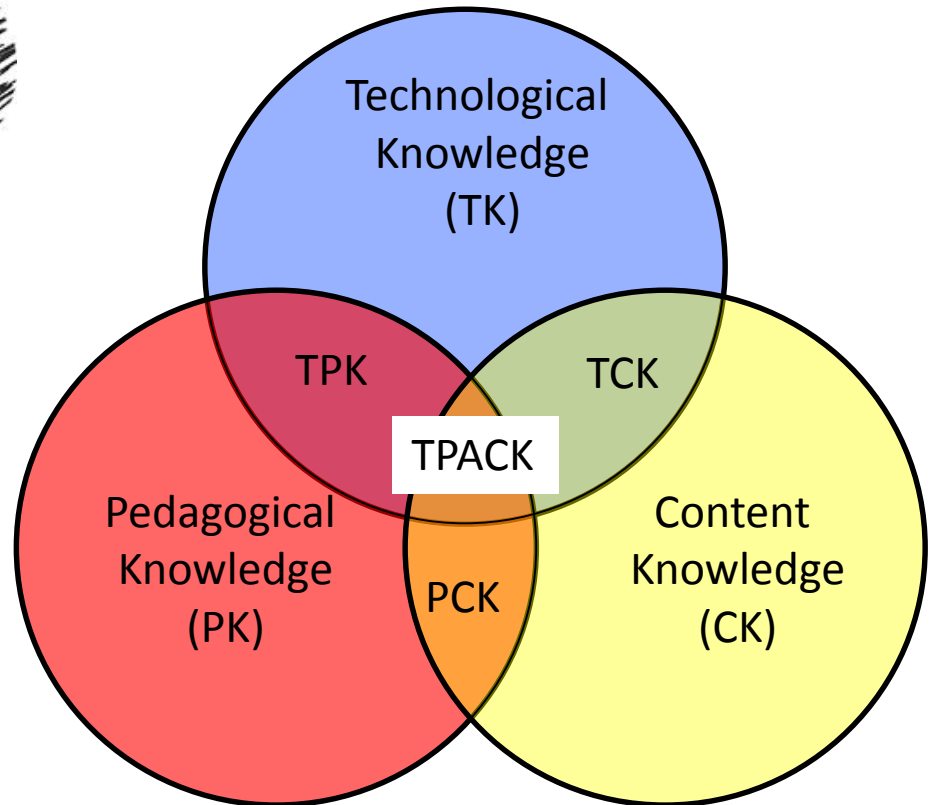
- Activities short-lived and passive (Almquist, 2012)
- Cyber Enabled Earth Science Exploration Curriculum (Almquist, 2012; Blank, 2012)
- Students' understanding and scientific reasoning (Blank, 2016)
- Grasp of using Google Earth depends on students' grasp of geoscience knowledge (Georgis, 2015)



(Koehler & Mishra, 2009)



To conclude... Wheeler (2014), Phillips (2016)



(Koehler & Mishra, 2009)