Capturing knowledge from the minds of teachers to understand teachers’ reasoning with information and communication technology

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My presentation outline

- The purpose
- The literature
- The project
- The approach
- The teachers
- The conclusion (so far)
- Your thoughts
The purpose

- This project seeks to understand how teachers' reason with ICT and what influences them to use ICT in their teaching.

- The purpose of this study is designed to reveal the voices of teachers, at multiple career points, to determine how they develop Technological Pedagogical Reasoning.

- Career points are defined as: Graduate, Proficient, Highly Accomplished and Lead teachers (as defined in the new teaching National Professional Standards).

- This project is being completed for the award of Doctor of Education.
The literature – Pedagogical Reasoning

- Model of pedagogical reasoning and action (Shulman, 1987)
- Model of pedagogical reasoning (Wilson, 1987)
- Model of pedagogical reasoning with ICT (Webb, 2002)
- Framework for pedagogical practices relating to ICT use (Webb and Cox, 2004)
- Revised framework for pedagogical practices relating to IT-use (Webb, 2011)
- Model of teacher pedagogical reasoning and action for the digital age (Starkey, 2010a, 2010b, 2011)
Shulman’s Model of pedagogical reasoning and action

**Comprehension** is based on the idea that teachers need to understand what they are going to teach.

**Transformation** is about transforming the content or what needs to be taught into a format that will motivate the learner. Shulman suggests the following processes for Transformation: Preparation; Representation; Selection; and Adaptation.

**Instruction** is the act of teaching including the many aspects of pedagogy including “organizing and managing the classroom; presenting clear explanations and vivid descriptions; assigning and checking work; and interacting effectively with students through questions and probes, answers and reactions, praise and criticism” (1987, p. 17).

**Evaluation** occurs as teachers check for student understanding.

**Reflection** is what teachers do when they “look back at the teaching and learning that has occurred, and reconstructs, re-enacts, and/or recaptures the events, the emotions, and the accomplishments” (1987, p. 17).

**New comprehension** represents what the teacher has learnt as they have completed all previous processes, that is their new understanding of what works and what doesn’t.
Shulman’s Model of Pedagogical Reasoning and Action

Diagram:
- Transformation:
  - Critical interpretation
  - Representation
  - Adoption
  - Tailoring
- Comprehension
- Instruction
- New comprehension
- Evaluation
- Reflection
Model of pedagogical reasoning with ICT
Framework for pedagogical practices relating to ICT use
Revised framework for pedagogical practices relating to IT-use
Model of teacher pedagogical reasoning and action for the digital age

**Model of teacher pedagogical reasoning and action for the digital age**

**Comprehension** of subject (content knowledge) including:
- substantive knowledge (concepts and principles) and
- syntactic knowledge (subject methodologies).

**Enabling connections** - preparation for teaching (pedagogical content knowledge) including:
- selecting appropriate resources and methods to enable students to make connections between prior knowledge and developing subject knowledge;
- transforming existing knowledge into teachable content;
- enabling opportunities for students to create, critique and share knowledge;
- enabling connections between groups and individuals to develop knowledge of the subject;
- adaptation and tailoring (personalising) learning for the students being taught.

**Teaching and learning** - (knowledge of context) including:
- formative and summative evaluations of student learning with feedback to the students (from a variety of sources), and modification of the teaching process where appropriate

**Reflection** - reviewing and critically analysing teaching decisions based on evidence

**New comprehensions** - about the subject, students and teaching
The project

This study is designed to understand teachers’ reasoning in deciding to incorporate ICT in their teaching practices and understand what influences teachers in developing technological pedagogical reasoning. This study will use multiple teachers at different career stages, to understand how Technological Pedagogical Reasoning is developed across these career stages.

This leads to the key research questions of this study being:

How do teachers develop technological pedagogical reasoning across career stages?

What influences teachers in developing technological pedagogical reasoning?
Theoretical framework

- Qualitative paradigm
  - Exploratory and descriptive focus
  - Emergent design
  - Purposive sample
  - Data collected in the natural setting
  - Researcher plays a key role in the research process as both collector and interpreter
  - Data collection methods capture peoples words and actions
  - The analysis is inductive – beginning early and is ongoing
  - The results are presented with rich narrative
The approach

- Using a qualitative approach, a case study methodology has been used with each teacher forming a case. Semi-structured interviews with video-stimulated recall has been used to document the voice of teachers.

- Each teachers has also completed a concept map to help explain their technological pedagogical reasoning.

- Some teachers have provided access to their Education Queensland Smart Classrooms Professional Development Framework (SCPDF) ICT Certificate and Digital Pedagogical License. These SCPDF portfolios provide rich descriptions of the beliefs, attitudes and actions of teachers using ICT.
Concept Maps

- Concept have been used in research and evaluation in science education (Novak and Gowan, 1984).

- Used in understanding teachers cognitive processes because they provide access to teachers’ tacit knowledge (Chen and Ennis, 1995; Clark and Petersen, 1986; McMeniman, Cumming, Wilson, Stevenson and Sim, 2000).

- Chosen as an alternative strategy to provide a 2 dimensional representation of knowledge structures.
Protocol

- Explained to teacher how it be used – to provide an understanding of teachers’ Pedagogical Reasoning with ICT

- An example is given on an unrelated topic (concepts are circles; arrows/lines are drawn between concepts; draw first concept in center and add further concepts as required; add labels to concepts; add words or phrases to lines)

- Add numbers to show the sequence of activities.
The teachers

- Teachers have been purposely sampled and invited to participate in this project.

- Fifteen teachers have volunteered from eight schools in South East Queensland.

- Teachers from all career stages are involved: from graduates; to those who have recently moved from provisional to full teachers registration; teachers that have been teaching for many years; and those teachers now leading others.

- Included in the group are early childhood, primary and secondary classroom teachers, teachers that deliver distance education programs and teachers delivering vocational studies.

- There are teachers using a variety of ICT including 1to1 laptops, iPads, interactive whiteboards, video conferencing tools.

- This project provides an opportunity to see what teachers are using in the classroom today.
The conclusions

This research has the potential to make the following contributions to practice and scholarship. These contributions include:

a) to provide a definition of Technological Pedagogical Reasoning and expand the current knowledge on pedagogical reasoning with technology;

b) to provide an understanding as to what influences the development of Technological Pedagogical Reasoning;

c) to add to the knowledge base on Technological Pedagogical Content Knowledge (TPACK) proposed by Mishra and Koehler (2006);

d) to make an original contribution on how Technological Pedagogical Reasoning skills are developed over a teaching career; and

e) to provide a greater understanding of teaching career stages.
The findings so far...

- Technological issues
- Seen a variety of ICT used
- ‘In the moment thinking’, have seen many teachers having to improvise due to technical issues
- All female participants....all from the state education system
- All different subject areas
- All career stages represented
- Evidence of Shulman’s Model of Pedagogical Reasoning
Cross case comparisons?

- Inside teacher eg early childhood vs early childhood
- Across teacher type - early childhood vs primary vs secondary
- Inside career stage
- Across career stage
- Post-graduate vs bachelor qualified teachers
- Distance education vs traditional classroom
Your thoughts

Do you mind if I record this?
The research process

In practice, I suggest research is always a fumbling act of discovery, where researchers only know what they are doing when they have done it; and only know what they are looking for after they have found it.

(Hamilton, 2005, p.288)

Thank-you for attending and adding to my research...