RESISTANCE TO ADVOCACY: PRE-SERVICE TEACHERS RECOGNISING THE POTENTIAL OF CURRICULUM-BASED VIRTUAL WORLDS FOR TPACK-FRAMED SCIENCE TEACHING

Helen Doyle & Chris Reading
Australian Computers in Education Conference
October 2012

The *Teaching Teachers for the Future* (TTF) Project was funded by the Australian Government Department of Education, Employment and Workplace Relations (DEEWR) through the ICT Innovation Fund.
Background

• ICT ubiquitous
• Engenders discussion from learners, parents, teachers & teacher educators around implementation & professional development
• Teachers and teacher educators need to integrate ICT into curriculum
• Groundwork needs to occur at pre-service teacher level
Resistance

• Research into the resistance of teachers to ICT
• Pappert (2001) resistance prevents the good things should happen in schools from happening
• ICTs & curriculum-based virtual worlds offer the potential to develop global perspectives (Barab, et al 2005)
• Teachers are potential change agents in schools
Change Agents

• Critical role in successful implementation of technology
• Positive attitudes to computers & using technology in the curriculum linked to successful learner outcomes from using ICT (Teo, 2008)
• Pre-service teachers who move along a continuum from resistance to advocacy increase the potential for their own students to develop their ICT competencies
TTF Project @ UNE

• Secondary science methods unit
• Integrated a curriculum-based virtual world
• Mandatory
• Incorporated into the outcomes
  – Content
  – Learning activities
  – Assessment
TPACK

• Integration was framed around TPACK
Most Significant Change (MSC)

• Four pre-service teachers story as they move from resistance to advocacy
• Use a curriculum-based virtual world
Curriculum-based Virtual Worlds

• Distinguishing between VWs and online games
  – Avatar is critical to the play
  – Real world spatial activities such as navigation must occur

• Definition:

  ...using the set of subjects of a prescribed course of study of the relevant education system to define the activities within its space
CBVWs cont

• In use for more than two decades
• Winn & Bricken (1992) experimented with VWs to assist the teaching of Maths
• They believed that early adopters of technology were trying to replicate “the teacher” – a didactic approach
• Winn & Bricken believed learners learn best by constructing learning for themselves
Research Focus – It’s time

• ICT cross-curricular priority of Australian Curriculum
• Use of Virtual Worlds to increase
• Largest user group under the age of 15 (Watters, 2010)
• NMC Horizon Report: 2011 K-12 identified game-based learning being adopted within 2-3 years
• Therefore relevant for pre-service teachers to be able to teach using virtual-worlds
• This research aimed at gauging current knowledge of the potential of CBVWs & attitudes
QA @ UNE
Quest Atlantis

- An interactive 3D virtual world
- Designed for 9 to 16 year olds
- Theory of transformational play
Taiga

Ranger Bartle

[The ranger looks very alarmed when you approach him again.]

"What are you doing back here, helendUNE? You can't solve the mystery of Taiga's dying fish population by standing around here. I need you to talk to Abi right away."

"I'll turn on those path lights again to help you find your way. Notice that you'll have to cross the river... look for the sign to turn on more lights on the other side."

"At the cave, click on the stone blocking the entrance. Find Abi's cavern down a branch of the tunnel on your right."

"And please hurry! More fish are dying every minute."
Why assign this mission?
This is the 1st main Mission in the Taiga Unit, following the Abby Pre-Mission. In this Mission, students travel to Taiga and interview people from groups that depend on park resources. At some point, they will receive an alert calling them back to Abby to learn more about erosion and how it could be affecting the fish in Taiga. The Taiga Unit presents an innovative way of approaching the complexities in decision-making that exist in all communities. Your students will become an integral part of a rich narrative about a world with ecological problems. These worlds are presented as a simulated aquatic habitat, and your students will assume the role of expert helpers as they interview people, collect data, and develop and test a hypothesis. Please review the Unit Guide (located in the resources section). The Taiga Unit is made up of a series of 6 Missions that usually take around 14-15 days to complete.

Fish are dying in Taiga National Park and nobody can agree about the reasons why. The public demands a solution immediately. Ranger Bartle needs to make important decisions and is looking for help. Maybe you will be the one to solve this problem! If you think you can help, you'll need to learn about what is going on here. To get to Taiga, look for any of the glowing teleport crystals. You'll find them here. 

Task 1: Talk to Bartle
He is outside the Ranger Station, to the west when you first enter Taiga (7S 11W).

Task 2: Talk with Jesse
Jesse can usually be found at the Ranger Station (6S 11W).

Task 3: Talk to Jose, Ella, and Norbe
Jose is at 4N 6W. Ella is at 7N 12W. Norbe is at 9N 12W. NOTE: You can complete tasks 3-6 in any order.

Task 4: Talk to Lisa and Hidalgo
Lisa and Hidalgo are in the logging camp, at 11N 9E NOTE: You can complete tasks 3-6 in any order.

Task 5: Talk to Markeda and Sara
You can find Markeda down at the K-Fly Fishing Camp (9S 3W). Sara is nearby at 11S 3W. NOTE: You can complete tasks 3-6 in any order.

Task 6: Talk to Lim and Maria
Manager Lim is down at the logging factory (11S 7E). Maria is...
Most Significant Change (MSC)

• 4 pre-service teachers were interviewed post the completion of the unit
• Focus group interview (Adobe Connect)
• Two page story was collected
• Accuracy was checked by sharing with the participants before publishing
• Thinking about ICT changed whilst undertaking the unit of study
Interview protocol

• development of their ability to use ICT in their teaching to improve student learning in effective and innovative ways;
• the learning activity that was most influential in developing their ICT proficiency;
• identifying the most significant change in their thinking about ICT and the activities that they participated in that contributed to that change;
• components in the unit that led to successful development of their ICT proficiency;
• ways in which they would use their new ICT skills in their future classrooms.
Results

• Reported as
  – Reluctance
  – Technological knowledge (TK)
  – Technological Content knowledge (TCK)
Reluctance

• Initial reluctance
• Three main aspects
  – Mandatory nature of the virtual world component
  – Time required (imposition on their own time)
  – Opinion of just another meaningless online game
• Range of interactive learning activities
• Cybersafety quests – “fun & engaging”
• Adobe Connect was the next most significant ICT
• One PST noted that his computer use went for 30 to 80%
• All noted an improvement in their ICT literacy
• Responsibility that their students become computer literate
• Developed an awareness of how specific ICTs can be used
• Increased appreciation of why their students need this knowledge
• All agreed that QA was the most significant ICT that they had experienced in their course to date
• Involvement with QA was the most significant learning activity within unit
TCK

• VWs allow students to engage in situations & visit places not possible in real life
• Time consequences of decisions
• Feedback can alter the course sequence
• Learners see visible consequences – meaning that they take responsibility for their actions
• Ability to resubmit tasks by taking into account of feedback
TK cont.

• Learning how to give feedback was considered very valuable
• Ability to customise content of the US based program
Update Quest

Before a Quest is updated you must make some important choices about the Quest. Please consider the following options. When you’re ready, click the Update Quest button.

Quest: Taiga Q2-b: Sorting Out Diagrams

Required: Yes
Reflection: Yes
Questions: Default

Review Type: Community
Goals: Default
Resources: Custom

Label Custom Resources:

Description:

These are Abby's drawings, labeled number 1 and number 2. Click on the image to examine each more closely.

Customize Web Sites

1. Label: Click here to chat with
2. URL: http://atlantisremixed
TPK

• Developed by PSTs
  – Specific ICTs can suit different learning styles
  – QA scaffolding allows content to be customised to suit learner needs
  – Assessment can be embedded within QA tasks

• Extremely useful to experience the student view as well as teacher view
Discussion

Digital technology opens possibilities for children to carry out projects that are more complex and also far more connected to sophisticated powerful ideas than anything children could do in the past (Papert, 2001, p. 9)

• PSTs clearly demonstrated resistance to using VWs in science teaching
• Justified as QA was mandatory!
• Not getting value for the time spent on learning a new ICT
Discussion cont.

• Evidence of development of the PSTs TK, TCK and TPK
• Transformation of their attitude to the use of ICT and in particular CBVWs
• Breadth of aspects of competence identified by the PSTs indicated that they had transformed from resistance to advocacy
Discussion cont.

• Potential for these PSTs to become change agents in their own schools
• Learnt about & experienced ICT
• How ICT relates to pedagogy
• Their own TPACK has improved
• Implement these ICTs in their own classrooms
Conclusion

• Clear demonstration of a change in attitude
• Three limitations to this research
  – 8% of cohort participated in focus group
  – TTF project restricted MSC to two pages
  – MSC focuses on capturing the positive and not the negative (if any)
Implications for further research

• Teacher educators should continue to embed unfamiliar ICTs into teacher training
• PSTs need to engage with new ICTs to increase their own TPACK to effectively integrate ICY in their own classrooms
• CBVWs ideal
  – Integrate technology (virtual interactive environment)
  – Content (curriculum-based quests)
  – Pedagogy (engaging immersive interfaces)
Implications for further research cont.

• Increased published research into CBVWs in Australian classrooms
• Attitudes of larger groups of PSTs need to be investigated to develop a more detailed story of how resistance can change to advocacy
• More research needed for the unexpected finding that students in QA found it possible to be themselves & not subjected to peer pressure
Final comment

• Transformation from resistance to advocacy
• Unique opportunity
• All believed that there is a place for CBVWs in pre-service teacher education
Available in paper: **RESISTANCE TO ADVOCACY: pre-service TEACHERS RECOGNISING THE POTENTIAL OF CURRICULUM-BASED VIRTUAL WORLDS FOR TPACK-FRAMED SCIENCE TEACHING**

Helen Doyle & Chris Reading  
*University of New England, Armidale*  
[hdoyle2@une.edu.au](mailto:hdoyle2@une.edu.au)  
[@hihelen18](https://twitter.com/hihelen18)  
[creading@une.edu.au](mailto:creading@une.edu.au)
Thank you

• Dr Terry Lyons
• Dr Frances Quinn
• Dr Bronwyn Stuckey