Theory of knowledge influencing ICT practices in the International Baccalaureate Curriculum

Paul O’Neill
Leanne Nixon
Lissa Hodson
Queensland Academy Health Sciences, Southport Queensland.

ABSTRACT

Social constructivism emphasises how meanings and understandings grow out of social encounters and what occurs in society, and as a flow on, constructing knowledge is based on this understanding (Pear & Crone-Todd, 2002). This paper identifies a project that explores knowledge creation with ICT tools. Specifically, this project explores how the contextualisation of knowledge for individuals might influence the teaching spaces and teaching practices that are emerging in eLearning environments. The Theory of Knowledge (ToK) program in the International Baccalaureate Curriculum (IB) provides a scaffold to interrogate information and in turn influence knowledge construction. This paper outlines a professional development approach and an action learning program for teachers in an IB school to begin to create new ways of working with ICT. The project evaluation through surveys, forums, blogs and dialogue will form recommendations for further work. Case studies of individual teacher exemplars will provide models for new strategies and new ways of working that link knowledge production with ICT tools.

INTRODUCTION

In a world where change and uncertainty are the only certainty (Anderson & Krathwohl, 2001; Nowotny, Scott & Gibbons, 2002) schools and teachers are being challenged to maintain relevance in an information rich world. The digital age has resulted in rapid changes in how information is created, published, stored, read and retrieved, and is challenging the foundation upon which schools and educators build pedagogy and instruction. The fundamental shift in the role of the teacher is to move from being the source of knowledge to becoming the initiator of environments where students create and interact with knowledge in real, relevant and contextualised situations. (ISTE, 2007; Siemens, 2004; Siemens, 2006; Senge, 2007; UNESCO 2008). Web 2.0 tools now provide platforms for collaboration, interaction and knowledge sharing and construction with peers, community and experts. Teachers need to reframe pedagogy in order to embrace these environments and ensure students have the skills to make meaningful use of the tools (Driscoll, 2000; ISTE, 2007; Siemens, 2006; UNESCO, 2008).

This is a concept paper outlining exploratory case study research to be undertaken in an International Baccalaureate (IB) school in Queensland. The research will explore the Theory of Knowledge (ToK) process in the IB curriculum for its capacity to inform knowledge acquisition and creation. This process will then be expanded and applied to ICT rich environments to investigate new ways of working with ICT informed by ToK.

The increasing number of new ICT tools requires learners in a digital world to adapt and apply the theory of knowledge to new and unfamiliar processes. These tools provide different arenas for students to collaborate and to create knowledge. Current thinking around teaching practices with ICT (Anderson & Krathwohl, 2001; Downes et al, 2001; Beethan & Sharpe, 2007; Siemens,
(2006; UNESCO, 2008) is to shift from technology literacy to environments where teachers engage students in knowledge deepening and knowledge creation.

It is proposed in this paper that the ToK process can be used to enhance instructional design strategies or pedagogies that teachers use to engage ICT in more meaningful ways. In doing so these processes of knowledge acquisition and creation can be transferred to new tools and learning environments as they develop. This has potential to create new skills for C 21st learners and new learning environments for C 21st teachers. The process of capturing, engaging and transforming knowledge and playing in new spaces will also have implications for professional development in this environment.

**THEORY OF KNOWLEDGE**

The IB curriculum is prefaced by a learner profile. It is desired for a learner in an IB school to be one who is: an inquirer; knowledgeable; a critical thinker; a communicator; a risk taker; disciplined; caring; open-minded; well balanced and reflective. The ToK program is a course within the IB curriculum that underpins all other courses linking discipline subjects as areas of knowledge to processes developed in the course, namely ways of knowing and thinking.

The ToK process enhanced in this course has three stages, as outlined in figure 1. The process is not linear and has scope for many entry points and sequences. The knower at the centre of the model is empowered by a range of processes: to question, justify, reason and hypothesise. This stage is referred to as ‘knowledge issues, knowers and knowing’ and explores in depth the nature of knowledge and the relationship of the knower to the known, and how students can interact with knowledge, interpret authenticity and develop an understanding of the context and source of the knowledge.

The next phase, defines four ‘ways of knowing’ as a sensory background to identifying how we interpret reality. This is explained in the program as a foundation to knowing and challenges to explore new ways of knowing. What is defined as important in this stage is the need to question and understand how we see and perceive what we consider we know. This stage in the ToK process challenges a learners perception and asks them to critically analyse their perceptions. ‘Because sensory perception is an important dimension of our understanding of the world, its function and scope should be examined and critically evaluated’ (IBO, 2006).

The third stage in the ToK process involves linking to ‘areas of knowledge’, effectively, yet not limited to, discipline areas studied in the school, enhanced by the mention of ethics.
The ToK process has relevance for contemporary Web 2.0 environments, and ICT tools in general could influence and guide exploration in the stages of the process. The research question to be asked for this project is: How does online collaboration framed in terms of the ToK process provide opportunities for students to create a deeper knowledge or understanding of a topic and to create new knowledge?

**NEW TOOLS – NEW LEARNING**

To assist teachers in an IB school make the transition to utilise more ICT tools, devices and support material, this project has been developed to enhance and build upon current mechanisms within the IB. Salmon (2004) refers to this as ‘new learning’ where traditional teaching methods are challenged and new ways of working are determined through using ICT tools. The strength of this project will be in its capacity to build on current perspectives and understandings of knowledge acquisition and construction from ToK and apply them to new tools and new contexts.

New tools available to teachers are loosely coupled under the banner of Web 2.0 tools. The progression of web tool design best described by the shift from Web 1.0 to Web 2.0 has created a different genre for web applications where interaction, social networking and authoring of web material is now a routine behaviour for web-users. Teachers need to adapt to maintain relevance in a world dominated by digital communication.

The role of the teacher is changing as a result of local and global policy that places ICT at the forefront of preparing students for a digital world (DETA, 2006; MCEETYA, 2006; QCT, 2006). This change epitomises new learning for the profession. It requires teachers to consider rapid changes in how students now create, publish, retrieve and interact with information. There is a need to reframe thinking about ICT use in education to focus on learning needs and pedagogies.
rather than the ICT tools and the functions they can perform. The new learning for teachers is not about learning ICT skills, but about grounding the use of ICT in the needs of the students and creating clear links to student curriculum, assessment and reporting (MCEETYA, 2005; UNESCO, 2008). The term ‘new learning’ can be associated with ‘new pedagogies’ or ‘digital pedagogies’, where ICT is integral to learning and teaching and learning outcomes are subsequently enabled in ways that were not previously possible without ICTs (DETA, 2007). This project proposes to challenge teacher perceptions of pedagogy and to create an environment where teachers can experiment with new tools coupled with ways of thinking for their students.

THE PROJECT

The project is designed to be delivered in one school in Queensland as a professional development initiative to assist teachers to better understand the capacities of online tools and to engage with them more fully in the design of learning through ICT. This project will be developed in three stages: professional development; action learning and case studies.

Professional Development

Each teacher in this school will be a teacher of ToK and there is an expectation that ToK processes are used in other courses and teaching generally in the IB curriculum. Teachers will be supported through a process to help them understand the ToK program and underpinning philosophies and approaches. Teachers will also be supported with a professional development program. This will be in the form of facilitated workshops to help them understand the scope and possibilities available for developing eLearning spaces and using online communication tools. It is the intersection of these two elements that will be the observable substance of this research to help consider the research questions. How does online collaboration framed in terms of the ToK process provide opportunities for students to:

a. create a deeper knowledge or understanding of a topic and;
b. to create new knowledge when using online communication tools or eLearning spaces?

These two questions influence a third question: how does online collaboration affect the way teachers teach in a classroom context?

It is proposed that teachers engaging with the ToK process and new ICT tools will be able to respond to the key questions of the project that seek to identify how the process may influence the development of digital (new) pedagogies and new ways of working. To assist teachers to be creative in the use of ICT tools, the facilitated workshops will encourage teachers to think beyond the current purposes of the ICT tools. For example a blog may be a tool that can be used for multiple purposes other than a journal. This will give the teachers freedom to experiment with the tools and not define their work by what these tools are already known for.

The process of capturing, engaging and transforming knowledge and playing in new spaces will also have implications for professional development in this environment.

Action Learning

Action learning is a specific process for workplace-based professional development (Revans 1980; 1982 and 1983) that has been widely used in British industry since about 1945 (Keys, 1994). An experiential process, action learning involves a cycle of events. The elements of the cycle are usually: an action; a reflection that considers the effects, successful and unsuccessful, of that action; generalisation to identify new learning from this experience, that can be applied; and planning - on the basis of generalisations, deciding how to act in the future (Preston and Biddle
A key objective of the action learning facilitator is to ask appropriate questions in order to guide the reflections and to seek generalisations and future actions from these narratives or conversations (Revans, 1982).

In this project the action phase will be defined by individual teacher’s response to the professional development. Teachers will develop a range of learning experiences influenced by the challenges explored in the facilitated workshops.

The reflection process will be ongoing over a period of time in both formal and informal situations. The reflections will be gathered in focus groups sessions where groups will share and explain the processes used and the outcomes of their projects. They will also be gathered in informal ways as narratives through teacher participation in blogs and forums. In addition an informal focus question interview will be conducted. There will be three action learning cycles in this research. The action phase will be drawn from elements of the ToK process that will be developed, responsive to the participant’s level of comfort and understanding, as the group engages with the process.

The generalisations of the action learning will be discussed as a part of the reflection process and focus interview questions. Focus questions that prompt responses to how and why teachers would approach the planning and design of learning differently in the future may elicit generalisations for this research. Outcomes from the research may be able to inform planning and further professional development opportunities for teachers.

Case Studies

Case study methodology was chosen over other methods due to the nature of this study observing participants going about their work in a real life context. Case Study methodology as used in this research is defined by Yin (2003) as an ‘investigation of a contemporary phenomenon within its real – life context’, especially when ‘the boundaries between phenomenon and context are not clearly evident’ (p.13).

Case studies will be collated on each teacher who participates in the research. Each teacher will be treated as an individual case. The phenomenon to be examined is the deployment of ICT tools influenced by ToK processes. The case studies will document the work each teacher engaged in the design of learning experiences. The studies will explain the individual approaches each teacher underwent and document the narratives and conversations with the researcher. What is important in these case studies will be the documentation of the processes and not the content the teachers were teaching. For example, if a teacher is focussing on sense perception, then what the teacher does in the topic or content will be specific to the ToK process and will most likely be highly unique.

A distinct outcome of the case studies will be exemplar models of ICT instruction where ToK processes influence the pedagogical decisions and where new learning or new ways of working are evidenced.

Data Collection

Data collection will be evidence of teacher planning, teacher perceptions and student learning outcomes. Teacher planning will be collected through lesson plans and conversations explaining the processes teachers developed in the design of learning. Teacher perceptions will be collected through narratives in online forums, blogs and in focus group sessions or interviews. Student learning outcome data will be collected through observation and collation of online forums and collaborative content development in the online tools. Teachers will also be asked whether ToK
processes are evidenced in student work in other subject areas and whether they are evident in samples of work, and student activity within student digital portfolios.

Analysis of data

Data analysis will be undertaken to examine the research questions. How does online collaboration framed in terms of the ToK process provide opportunities for students to create a deeper knowledge or understanding of a topic? And how does online collaboration framed in terms of the ToK process provide opportunities for students to create new knowledge when using online communication tools or eLearning spaces? The exploratory nature of this research is not about proving one method is more effective than another, it is mostly concerned with how online collaboration may affect the way teachers teach in a classroom context. The analysis of the case studies will predominantly examine the ways that teachers have engaged with ICT and pedagogy and whether this has produced new ways of working and new ways of learning for students. Most importantly, what was the impact on student learning outcomes through this process?

Timeline

The Professional development and action learning stages in this research are outlined in the following timeline.

<table>
<thead>
<tr>
<th>Date</th>
<th>Activity</th>
<th>Personnel</th>
</tr>
</thead>
<tbody>
<tr>
<td>April 2008</td>
<td>Intro and Group Selection</td>
<td>Facilitator</td>
</tr>
<tr>
<td>April 2008</td>
<td>ToK PD session</td>
<td>Facilitator</td>
</tr>
<tr>
<td>April 2008</td>
<td>Capture narrative blog</td>
<td>Participant</td>
</tr>
<tr>
<td>May 2008</td>
<td>1st Action learning cycle</td>
<td>Facilitator and Participant</td>
</tr>
<tr>
<td>June 2008</td>
<td>Capture reflections blog and focus group</td>
<td>Participant</td>
</tr>
<tr>
<td>July 2008</td>
<td>2nd Action learning cycle</td>
<td>Facilitator and Participant</td>
</tr>
<tr>
<td>August 2008</td>
<td>Capture reflections blog and focus group</td>
<td>Participant</td>
</tr>
<tr>
<td>September 2008</td>
<td>3rd Action Learning cycle</td>
<td>Facilitator and Participant</td>
</tr>
<tr>
<td>October 2008</td>
<td>Capture reflections blog and focus group</td>
<td>Participant</td>
</tr>
<tr>
<td>October 2008</td>
<td>Focus interviews</td>
<td>Facilitator and Participant</td>
</tr>
<tr>
<td>November 2008</td>
<td>Share exemplars</td>
<td>Whole group</td>
</tr>
<tr>
<td>November 2008</td>
<td>Develop case studies</td>
<td>Facilitator</td>
</tr>
<tr>
<td>November 2008</td>
<td>Publish School Intranet</td>
<td>Facilitator</td>
</tr>
</tbody>
</table>

Significance

The significance of this research will be monitored through observing student behaviours and work that is produced as a result of these activities. For example the school is developing digital portfolios that will document each student’s learning journey. Teachers will observe student work to see how they are developing and using the ToK processes in their work as evidenced in their portfolios. Given that the ToK process is about empowering the knower, a significant outcome for this research would be that students are applying these processes across a range of subject areas or disciplines. This may be evidenced in their digital portfolios or through anecdotal responses from teachers. Students applying these processes across disciplines may highlight a transformation in student behaviour and potentially indicate a practical and self regulated demonstration of the student attributes identified in the IB learner profile. This may identify significant evidence supporting a transformation in teacher pedagogies.

Another significant outcome for this research will be to challenge the traditional timetable and structure of a school day. Challenging teachers to think differently about the concept of ‘teaching
content’ will have impact on the necessity to engage face to face with their students. Through a process of empowering students to engage collaboratively with knowledge in different forums, supported by the teacher as mentor and learning manager, may result in demonstration of more flexible or bended delivery models. The outcomes of these models may have significant impact in the way teachers see their role and see the structure of a school timetable and school day.

Conclusion

It has long been stated that what is important in this changing educational environment is the pedagogy and not the ICT tools (Beethan & Sharpe, 2007; Salmon, 2004). What is important is that new pedagogies and new learning move beyond using ICT for efficiency, motivation and effectiveness to new methods and new ways. Salmon (2004) explains that new learning requires teachers to discard old teaching methods and processes in order to engage new ones. Senge (2007) refers to this as letting go of our anchors; that many of our teaching process actually anchor us to the past.

This research challenges teacher pedagogy by valuing the way students learn (IBO, 2008). It uses professional development that encourages teachers to design learning experiences using ICT based on how the learner transforms information and data into knowledge. What will be significant in this research is how teachers see that they can use ICT tools in both a face to face and blended learning environment to challenge traditional models of teaching. They will explore how these tools can fit within a current paradigm that may also challenge the current teaching – learning paradigm making ways for new ways of working. Teachers will be able to explore other ways of ‘delivering content’ through a process of creating engaging blended learning environments using ICT tools.

References


