Deep Learning, ICT and 21st Century Skills

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The Current Context

- Australian Curriculum
- NAPLAN
- My School
- School Improvement
- Improving Student Learning Outcomes

- Impact on Catholic schools
- Implications for Catholic School Leaders
Leadership and student learning

“(Various) labels primarily capture different stylistic or methodological approaches to accomplishing the same two essential objectives critical to any organization’s effectiveness: helping the organization set a defensible set of directions and influencing members to move in those directions. Leadership is both this simple and this complex”

(Leithwood et al., 2004, p. 6).
Silva (2008) argues that, “integrating 21st century skills into teaching and assessment, then, is not only an economic imperative, driven by changes in the workforce, but a vital aspect of improving learning.” The link between education and employment is highlighted in both the US and the European Union. For example, the report “The New Commission on the Skills of the American Workforce” (2006) concluded that it is basic skills, along with creativity and innovation, which are essential for future economic and job security.
The need to forge a new learning approach has resulted in the development of a number of major skills definitions of which we focus on three. The combined Commonwealth and State Government body MCEETYA (Ministerial Council for Education, Employment, Training and Youth Affairs), the American Management Association (2010) and AT21CS (2012), (a world wide collaboration amongst ICT industry and educational institutions) have all attempted to identify the essential and necessary skills for teachers and students into the 21st century.
The 4Cs identified were:

Critical thinking & problem solving
Effective communication
Collaboration & team building
Creativity & innovation

The American Management Association (AMA) commissioned a study called the Critical Skills Survey in 2010. It identified the skills that employers wanted their employees to have beyond the 3Rs. In fact, the survey emphasised that employers wanted their employees to have further developed skills in the 4Cs for workforce readiness in the 21st century. The 4Cs identified were:

Critical thinking & problem solving
Effective communication
Collaboration & team building
Creativity & innovation
These essential skills are categorised as:

Ways of thinking-creativity, critical thinking, problem-solving, decision-making and learning
Ways of working-communication and collaboration
Tools for working-information and communications technology (ICT) and information literacy
Skills for living in the world-citizenship, life and career, and personal and social responsibility
From the end of the last century, there has been a saturation of information and communication technologies (ICT) in both education and industry. While students have demonstrated their enthusiastic use of ICT, teachers have been challenged in the use of these technologies for pedagogical applications.

MCEETYA 21 C Skills

- To have the essential skills in literacy and numeracy and are creative and productive users of technology, especially ICT, as a foundation for success in all learning areas
- To be able to think deeply and logically
- To be creative, innovative and resourceful, and are able to solve problems
- To be able to plan activities independently, collaborate, work in teams and communicate ideas
4 Cs

- Critical thinking & problem solving
- Communication
- Collaboration & team building
- Creativity & innovation
Critical thinking is vital for problem solving. Often situations that are complex, uncertain and have no precedent require employees to solve problems. Critical thinking is the discipline of actively and skilfully conceptualizing, applying, analysing, synthesizing and/or evaluating information gathered from, or generated by observation, experience, reflection, reasoning or communication.
Whilst students take for granted that they can communicate with others, there are various degrees of communicating effectively. To explain complex ideas, a concise, organized and measured approach is necessary.
To solve problems, students need to interact in teams. This provides the necessary social and learning environment to solve problems. Often educators underestimate the importance of working globally in virtual teams and asynchronously. As we are now heavily reliant on technology, and can use tools to assist in communicating with teams that may be dispersed internationally, collaboration and team building are necessary skills.
Creativity may be defined as pushing the boundaries to develop new ideas, and innovation is the development of these ideas into actuality. For example, though mobile phones were around for at least 20 years, the late Steve Jobs was able to convince the public in June 2007 that his new creation of the iPhone© (Isaacson, 2011) with its multimedia, touch screen, combined a number of innovative technologies such as a music player, camera, wireless internet connection, Bluetooth and Apps, was the mobile phone to have!
For example, the report “The New Commission on the Skills of the American Workforce” (2006) concluded that it is basic skills, along with creativity and innovation, which are essential for future economic and job security. A “21st Century Skills Discussion Paper” prepared by the Universiteit of Twente on behalf of Kennisnet, acknowledged that: “Information and Communication Technology (ICT) is at the core of 21st century skills. Specifically, it is regarded as both (a) an argument for the need of 21st century skills, and (b) a tool that can support the acquisition and assessment of these skills. In addition, the rapid development of ICT requires a whole new set of competences related to ICT and technological literacy. (Voogt & Roblin, 2010, p. i)”
Students need to be prepared for the 21st century in which they require a skillset that is broader than the 3Rs of reading, writing and arithmetic, which have long been considered to be foundations of learning. The ability to read text, the ability to write and importantly - communicate and the ability to count – even if it is simple mathematics is necessary to function in society. I considered the 3Rs to be the bare minimal – in terms of a functional skill set to have when leaving school.
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The Centrality of the Learner

- Constructivism
- Metacognition
- Multiple intelligences
- Habits of Mind
- Surface and deep learning
Partly to take into account using technology as a mode of instruction, Bloom’s Taxonomy was later revised to reflect the changes in the educational landscape. The revised taxonomy replaced the nouns with verbs to form the following categories: remembering, understanding, applying, analysing, evaluating and creating.
Understanding the difference between surface learning and deep learning is important. The distinction between surface and deep learning is a key feature of the SOLO Taxonomy. The SOLO Taxonomy describes how, once students move beyond unfamiliarity with the material, surface learning responses require one idea or many ideas. Whereas deep learning responses require students to relate ideas or extend ideas.
Surface learning is typically *quantitative* in nature where students recall facts or lists to put together. In contrast, deep learning is essentially *qualitative* where students are required to form judgements and think conceptually.
An understanding that decisions made by the learner determine the quality of learning along with a focus on deep learning for understanding has led to the development of the concept of personalised learning. The key features of personalised learning are:

- Learners are central
- Information and communications technology (ICT) is a key enabler
- Lifelong learning
- Communities of collaboration.
Personalised learning requires the connective power of ICT to develop ways of thinking and learning which empower the learner. While many traditional elements of education remain important “We need to move our thinking beyond our primary focus and fixation on the Three Rs (3Rs) – beyond traditional literacy to an additional set of 21st century fluencies, skills that reflect the times we live in” (Crockett, Jukes, & Churches, 2012, p. 17).
A useful schema for technology adoption was developed by Puentedura, known as the SAMR Model (substitution, augmentation, modification, and redefinition). This model divides technology usage into four levels and then further divides it into two distinct stages – Enhancement and Transformation. Generally, what happens in the classroom with technology usage occurs at the enhancement rather than transformative stage. Therefore we need to provide the appropriate situations that will allow students to develop a mastery of the 4Cs to work with the Transformative Stage.
In this model, *substitution* is the lowest level of technology usage and occurs when technology is used to simply replace whatever was being done without technology. For example, a word processor – without the use of enhanced features for editing - is used as a substitute for pen and paper. A text editor! The technology is really not being exploited or used to its fullest potential.
As we move up the levels – the next level is Augmentation. We are still operating in the Enhancement Stage.
At the next level is *augmentation* where the technology acts as a direct tool with some functional improvement. The difference between *substitution* and *augmentation* is the use of features to improve the product such as the use of, to follow the previous example, basic functions of the word processor such as cut, paste and spell checker. These two levels of technology use are defined as the *enhancement* stage.

Many teachers still work at this level – There is nothing transformative about using a word processor and just simply using some of the functions!
We now move up to the Modification level – where we are working in a Transformative space.
Here is where the fun begins!!

It is at the next level of *modification* that there are the more significant affects on learning. Whereas, at the previous stages, the task could have been completed perfectly satisfactorily without using technology, at the *modification* stage the task becomes something quite different. So that rather than complete a word-processed piece to be printed out, the writing becomes part of a blog, wiki or social network exchange. The learner becomes engaged with other learners, perhaps even providing an audience. The world of Web 2 opens up.
The final stage of the model is redefinition, where the technology allows for the creation of new tasks previously inconceivable. This final stage is hard to describe as we are constantly redefining what is possible through technology. These two levels of technology use are defined as the transformative stage.
According to Oostveen, Muirhead & Goodman (2011), “It seems that meaningful learning is far more likely if the new technologies are recognized as providing transformative opportunities.”
What happens in the classroom with technology usage in schools too often occurs at the enhancement rather than transformative stage and is therefore more aligned with surface rather than deep learning. Therefore we need to provide the appropriate situations that will allow students to develop a mastery of the 4Cs. Now and into the future students need the skills to operate in the 21st century. This requires a transformation in educational philosophy to focus on personalised education. The use of technology needs to align and adapt with what we know about learning in order to function in a transformative space. Therefore, using ICT in the transformative stage is crucial to enable students to be flexible in their critical thinking and problem solving methodology, be effective communicators, work collaboratively in teams and develop their creativity. The 3Rs alone are not sufficient to provide students with the appropriate skills required to function in the 21st century. Instead, there needs to be a fusion of the 3Rs with the 4Cs.
Focus for Leaders

- Deep Learning
- Surface Learning
- Transformative ICT Practice
- Enhanced ICT Practice
- 4Cs
- 3Rs
Whilst the 3Rs are important, as fundamental building blocks - there are additional skills that students need in order to contribute and function outside of school. As we know, a student today operates in a very different environment to what other generations operated in. Their world is one that is technologically rich, with many devices, different definitions about friends, communities and a variety of opportunities. These students are generally technically savvy, well adapted at communicating via the Internet, and used to instant action due to the Internet technology they have always known.
Questions? More Information?

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