

6-1-2011

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Recommended Citation

Kinash, Shelley, "Pedagogy: Telling, creating and sharing" (2011). *Learning and Teaching papers*. Paper 26.
<http://epublications.bond.edu.au/tls/26>

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Pedagogy:

Telling, Creating And Sharing

By Shelley Kinash, PhD

This is the first article in a regular column called The Next Step. This column is intended to inform primary and secondary school educators about what educational technology to expect when their students graduate and enrol in university. As a professional development tool, the content of these articles will help teachers ease their students' transition to university. The key focus will be to emphasise continuity of learning to ensure that students continue to receive the best possible education assisted by the use of technology. In order to achieve this goal, our aim is to ensure that all educators, at each stage of the education process, from primary to secondary to higher education, have a clear picture of how students have been using technology and how they can build upon what has been taught by the previous group of educators.

Like walking down an up-escalator, the next step also means that university educators reading Education Technology Solutions can use the articles to see how students are using educational technology before they arrive at university.

Because this is the first article in a series, it seems appropriate to introduce myself. My name is Shelley Kinash and I have been a university educator for seventeen years, first in diversity and teacher education and now directing academic development for university educators. My PhD is in educational technology and my PhD thesis was about the online learning of visually impaired university students. I am research-active and was the primary researcher on a project about students as researchers using educational technology as their tools at Flagstone Creek State School in Queensland. This project won two prestigious awards.

This article is about pedagogy. One of our most-used professional vocabulary words as educators.

Pedagogy is the co-constructed system of beliefs that determine how we facilitate teaching and learning.

To be blunt, so what? Why is *Education Technology Solutions* publishing this article? Why does pedagogy matter? The answer is easy. If we do not make decisions based on pedagogy, we are less likely to provide a quality education for our learners. There are many pressures in place that influence our decision making. For example, government implemented standards and audits for assurance of learning shape decisions. The school or university as a business must pay attention to budgets, expenditures and marketing messages to prospective students. All of this must be filtered through the privileged lens of pedagogy. Schools and regional universities must ensure that they are meeting the particular needs of community members. What do we know about teaching and learning that cannot be compromised in the education of our students?

There are many examples of key and core questions that can only be answered after deep and careful consideration of pedagogy. For example:

- What is the optimal educator/student ratio in classes, lectures, tutorials and labs?
- Will classes and lectures be recorded and posted online? If so, in what format?
- Should mobile devices such as smart phones and tablets be used in classes, or should students be forbidden to open their laptops at school or in university lectures?

There are numerous authors who have published their writing on the scholarship of teaching and learning and a growing collection of frameworks and descriptions of pedagogies. Each of these contributions has strengths, limitations and contentious issues. For this introduction, Terry Anderson's

framework is the selected pedagogy. Anderson's framework has been selected for three reasons:

- It is intuitive
- It is inspiring
- It is well-informed through years of collaboration, consideration and revision, and research on the use of education technologies.

This presentation of Anderson's theory of pedagogy has been written with his permission and his edits. Readers are encouraged to go beyond this secondary presentation of Anderson's ideas and read his contribution directly. Here are some links with which to begin:

Blog: terrya.edublogs.org
<http://www.slideshare.net/terry/hub-de-summit-sydney>
www.irrodl.org

It must be noted that Anderson walks the talk in that he created his pedagogical framework through deep and frequent conversation and debate with other scholars. As such, readers will discover similar pedagogical frameworks published by other authors. In addition, while some of Anderson's documents are published by him as sole author, more often he co-authors with such scholars as Garrison, Kanuka and Dron. Readers might also want to read the works by these authors.

The three pedagogies presented in this article are described as generations. They are generations in the sense that they build upon one another. They do not replace one another and all three pedagogies are necessary in good teaching. Each has strengths, limitations and challenges. The three pedagogies are:

- Cognitivist (sometimes called Behavioral)
- Constructivist
- Connectivist



Cognitivist pedagogies are effective for those elements of the curriculum that must be recognised, understood, remembered and reproduced. These elements are present at every level of education and in every discipline. For example, in order to do higher-order maths, primary students must practise quick recall of their times tables. Middle and senior school chemistry students need to know the periodic table. University medical students must be able to label nerve pathways. Film and television students must be able to identify appropriate shutter speeds. Cognitivist pedagogy requires that we have articulated clear and explicit learning outcomes. Our teaching methods must provide ample opportunity for repetition and application to varying contexts so that learning may be generalised.

There are numerous education technologies that support cognitivist pedagogy. In primary and middle school, two of the best examples are Mathletics (<http://www.mathletics.com.au/>) and Spelling City (<http://www.spellingcity.com/>)

These online systems provide immediate and specific feedback, support for remedial activity and frequent practice. They also make fact-learning fun through games and through creating a spirit of competition amongst peers.

In university, cognitivist pedagogy is supported through quizzes (either for self-monitoring or for a small number of grade points) through learning moderation systems such as Blackboard (<http://www.blackboard.com/>) or Moodle (<http://moodle.org/>). These systems allow educators to create multiple-choice tests in which wrong answers provide links to remedial instruction, and to other quizzes such as labelling diagrams or matching terms to their definitions.

Cognitivist pedagogy is effective in rote, conceptual understanding and numerous instances of apprenticed learning when there is a shared understanding of canon and standardised and established systems of knowing and doing. Despite their importance, there are numerous components of school and university education that do not fit this description. For example, in studies of society and environment (SOSE), school children are required to think beyond our current practices to envision what might make the future sustainable. Law and business university students and graduates are required to problem-solve and make ethical decisions on a regular basis. There are numerous and interactive contextual factors to consider in decision-making.

Constructivist pedagogy is required to facilitate problem-based and envisioned learning. Constructivist pedagogy asserts that people come to a shared understanding of phenomena in a time-and-place context. Through this pedagogical lens, the priority of school and university education is learning to learn rather than the content that is learned. The role of the teacher and the university educator is to foster the processes and the patterns of thinking in their students that will allow graduates to negotiate complex contexts and make informed decisions in the workplace. The primary means of applying constructivist pedagogy is through group work. Group work allows students to experience one another's diverse opinions, understandings and contexts and to practice collaborating to produce a co-designed process and outcome.

An exemplar of constructivist pedagogy in primary school is Optiminds (<http://www.opti-minds.com/>) Teams representing their schools (and an open category in which

other groups such as families) compete in challenges designed to promote thinking outside of the box. A key component of this initiative is that the competing children have sole responsibility for their process and outcomes. Adults are not allowed to interfere. The children frame their analysis, do their research through the internet and by consulting experts online and face-to-face and decide how to best present their findings.

An example of one of the past challenges was to design and build a model of a sustainable house using only natural and recycled materials. The primary school team met to research current best practices in sustainability online. They went beyond this to pose their creative idea that the house's energy would be powered by overweight animals from the local shelter running on a motion-powered treadmill. They built the bricks of their model out of clay they dug out of the stream bed. After their presentation, when questioned by the judges they emphasised their collaborative group process, addressing how they overcame clashing personalities to make the experience equitable.

An example of constructivist pedagogy in university is the Padagogy project at Bond University (<http://www.ascilite.org.au/conferences/sydney10/Ascilite%20conference%20proceedings%202010/Brand-concise.pdf>)

In this project, students enrolled in the 'Digital Media and Society' subject who do not have their own mobile devices such as tablets and smart phones, are loaned them through the university. To complement what they are doing face-to-face, the students are online researching, searching their enhanced e-text and using online tools to post questions and compile responses and to journalise their reflections while present in the university classroom.

Anderson talks about constructivist pedagogy as necessary but not sufficient. Connectivist pedagogy is built on a foundation of constructivist pedagogy, but takes it to the next level. The key differentiator between the two is that connectivist pedagogy adds production and sharing of artefacts. This pedagogy is germane to the being of universities, which are responsible not only for graduating

employable and productive citizens, but for fostering, building and leading knowledge and application and helping students build their social capital. Likewise, schools are beginning to see their students as social capital. The completed projects that previously were shoved under the bed and eventually thrown out are now compiled, digitised and registered in online repositories. The children's ideas are used to prime the pump of other children's and professionals' thinking. Connectivist pedagogy encourages learners to be writers as well as readers. The artefacts of their learning are posted and thereby leave a digital footprint. They challenge, develop and extend one another's thinking and writing.

When a group of children at a primary school decided to create a website about the human body based on their school project, they asked their teacher if she thought that others would use their website for information and resources, just as they were using websites to research the content of their own, the teacher nodded even though she wasn't sure if she believed it. The outcome far exceeded her expectations. Soon after posting the website, the children received requests from a renowned scientist to use the children's labelled diagrams at a scholarly conference because the children's drawings were refreshingly easy to understand. They also received a request from a singer to use a diagram of the heart as a CD cover for a collection of love songs.

In an online university class on technology and society, a group of students elected to focus on adaptive technology. The students became frustrated by the proliferation of resources on the topic and found themselves wanting a framework or map to help them get the most value out of the websites. They looked and could not find such a framework. They therefore created a portal that annotated the various websites. They complemented this with screen-casts wherein they described navigation of the portal and defined key terms.

Most readers are familiar with Bloom's (1956) taxonomy of learning. L.W. Anderson and Krathwohl (2001) have extended and adapted this framework. The six modified domains from the base of the pyramid

through to the top are: remembering, understanding, applying, analysing, evaluating and creating. The first two necessary accomplishments of school and university students (remembering and understanding) are largely facilitated through cognitivist pedagogy. The second two (applying and analysing) are largely enacted in a group through constructivist pedagogy. The top two (evaluating and creating) require connectivist pedagogy.

Interpretation of T. Anderson's three pedagogies can be supplemented by overlaying another framework he has published. There are three types of presence that are necessary in each of the pedagogies. In order to facilitate a quality educational experience there must be evidence of each presence.

Cognitive presence ensures that the students are intellectually challenged and supported such that they learn in substantive ways. In other words, bored students are not learning. First, students at all levels from prep through to postgraduate must feel stimulated, inspired and challenged by the content and process. Educational technology plays an important role in cognitive presence because it facilitates meeting individual needs and levels. In school programs such as Mathletics (URL provided above), skills tests establish the students' achievement level and the teacher sets individualised tasks accordingly. At both school and university, the internet provides a ubiquitous source of enhancement curricula. There is boundless information at incrementally challenging levels.

Second, there must be social presence. This means that there are ample opportunities for interaction between the educator and the student, as well as facilitated shared learning experiences between students. Educational technology features both information and communication tools. Communication tools provide diverse possibilities for same-time (synchronous) and anytime (asynchronous) communication. Students at all levels may work together online through text, voice, video and/or avatars.

Third, there must be teaching presence. A good teacher is an essential element

no matter what pedagogical framework is applied. When computers were first introduced to schools there was speculation about teaching machines and fears that the teachers were going to be replaced by computers. We now know that behind every effective school and university-based learning experience, whether face-to-face, online, or a blend, a good teacher is involved. The teacher in a school or university reads the students, moderates the pace, fosters the examples and application, and organises the information and process.

In summary, we now know that in order to learn, students at all levels must grapple with established knowledge, share in the learning experience with others, and create and publish their own unique expressions and interpretations. Schools and universities can use education technology to foster an environment of intellectual engagement and collaborative group work through inspired teaching. This column concludes with four recommendations from Terry Anderson regarding where and how school teachers and university educators can begin:

- Be as fearless as your students
- Seek out and create opportunities to collaborate with and learn from your peers
- Develop your own personal learning system
- Explore, experiment and have fun 

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