



## Flexibility and function: Universal design for technology enhanced active classrooms

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This paper discusses the evolution of pedagogies used in technology enhanced learning spaces and their intersection with the principles of Universal Design for Learning (UDL). It also argues that as the next generation of computer integrated classrooms are built we must not forget to design for inclusion. UDL provides a framework for developing course content that can be effective for all students including those from various equity students in a technology rich environment. This paper discusses these factors and outlines some elements of a pilot project at the University of South Australia as it completes construction of a new seven-storey learning centre – the Jeffrey Smart building. The paper in part explores the linkages between the flipped classroom model and UDL and argues for the principles of universal design as a solution to the current pressures within higher education to teach effectively in technology rich environments and the need to be inclusive.

Keywords: Universal Design for Learning, UDL, Flipped Classroom, Tech-Enhanced Learning Spaces.

### Introduction

During the last twenty years computers have become ubiquitous across university campuses in Australia. These computers have typically been in rows in computer labs or scattered about in informal spaces for student use around the campus, typically in libraries or near recreation areas. The last decade has seen an evolution in the design of these types of computer integrated spaces and instead of computer integrated classrooms being made up of rows of screens they are instead formed by large tables, or pods, that enable students to face each other. A core feature of the design of the computer spaces relates to the democratisation of participation. For instance, the lecturer's position in the room is deemphasised with the integration of the lectern in to one of the pods. This design moves away from a pedagogical model of command and control to a model where the teachers is an active and value added node in the learning network. In essence, these classroom designs are a rejection of didactic teaching and learning styles and an acknowledgement of the growing acceptance of blended learning and pedagogies influenced by social constructivism.

The 2008 Bradley Review of Australian Higher Education makes an overt link between participation in higher education and social and economic development. Based on this the Australian Government announced targets in 2009, that by 2020, 20% of University students are to come from low socioeconomic status (low SES) backgrounds and by 2025, 40% of 25 to 34 year olds are to hold bachelor degrees. Meeting these targets will require a comprehensive and nuanced approach. Growing student numbers in this way, particularly in the context of South Australia's ageing population, means that an increasingly diverse student cohort will be part of the Australian HE sector in the near future, meaning that issues of equity and inclusion will be increasingly prominent. Catering for the educational needs of these diverse groups means that teaching and learning must be more inclusive so that we do not just attract diverse students but that we also retain them and help them to succeed. As Burgstahler (2008 p. 213) states, 'depending on how it is implemented, IT can either level the playing field or further widen the gap in educational attainment between individuals of minority groups (e.g.

individuals with disabilities, people from poor communities) and those of the majority.’ In response to these intertwined requirements of inclusion and technology-rich classrooms and with the aim of levelling the playing field for our students the University of South Australia has begun designing and piloting courses using Universal Design for Learning (UDL) in our technology enhanced learning spaces. This paper discusses the context driving these developments and gives some examples of universally designed in-class tasks.

## **The Jeffrey Smart Building: UniSA’s City West Learning Centre**

The University of South Australia is currently completing the development of a new seven level learning centre at its City West campus. Four of these levels are dedicated to technology-enhanced classrooms for formal and informal use. There are no ‘traditional’ lecture theatres or tutorial rooms. The building has an innovative design, featuring integrated student services available on each floor of the building and an emphasis on tech-friendly informal student areas. The design and layout of the new building immediately indicate to both students and staff that a change is in the air with regards to the implemented model of teaching and learning. Learning is increasingly seen to be most effective when it is collaborative and social in nature and these ideas have influenced the design and implementation of the learning centre. Innovative spaces like this are a physical manifestation of this underlying philosophy, or what John Seely Brown has called the shift in education from ‘learning about’ to ‘learning to be’ (2006, p. 23) and in many ways spaces like these present an enormous challenge to many existing higher education pedagogies. This challenge to traditional ideas manifests further in the recent groundswell of attention for the concept of the ‘flipped classroom’.

The new classrooms provide a flexible learning space consisting of nine person tables or pods, each table having three desktop computers with large touch screen monitors, with the opportunity for up to three students to work collaboratively at each station. There is also room to cater for additional laptops and other mobile devices with retractable HDMI and USB cables. Each table has a corresponding large wall mounted touch screen monitor and each table contains a document camera, with whiteboards on adjacent walls. The lecturer controls the display system of all pods via a switching system, allowing students to see either the same view, or their own view. Other equipment includes lapel and handheld microphones and a touch pen that can be used as a mouse or annotation tool.

These classrooms offer a huge range of potential learning activities, allowing students to interact with the space through independent study, teacher-led sessions or through group-work with peers. Explicitly, the types of activities that are best suited to these spaces are collaborative in nature and are about pedagogies that encourage active learning and collaboration. This means collaboration and collaborative learning between lecturer-student & student-student. If as Gerry Stahl states in his 2004 work on collaboration theory, that ‘the extending of group knowing – is constructed in social interactions’, then facilitating highly effective interactions between students will be an important element of the classrooms design. This type of room is also an excellent venue for dissemination, research, improvement of digital literacy and many activities that fall within the spectrum of blended learning, including the implementation of the flipped classroom. Key drivers for this convergence of technology and innovative classroom design include:

- Student-centred and active learning pedagogies influenced by social constructivism.
- Recognition of the need to educate students for the world unfolding before them and the need to invest in and develop lifelong learning and collaborative skills.
- The availability of technology and infrastructure.
- Student preference - ‘Digital-age students want an active learning experience that is social participatory and supported by rich media’ (McLoughlin & Lee, 2010, p. 28).
- In the case of the University of South Australia, the development of a Personal Learning Environment including a fully integrated institution-wide LMS, ePortfolio & Virtual classroom system (Dinmore, Kehrwald, Bradford, 2011).

As well as being an acknowledgement that the lecture-tutorial model, or what Claxton (2012, p. 78) calls the ‘sedentary and disembodied approach’, is not effective for many students, the evolution towards using these kinds of learning spaces is also recognition of the changing role of the university in Australia. As McLoughlin & Lee (2010, p. 37) suggest, ‘The essential difference in the role of the institution is a move from delivery of content to a focus on designing experiences to facilitate personal learning, capability building and skills development, combined with a renewed emphasis on curriculum design that values the student’s voice and needs in shaping decision making.’ The design and intent of this learning centre is to be part of this new environment in Australian higher education.

## Inclusion and Equity

This context of valuing the student's voice and needs means it is important that our teaching practices exemplify an inclusive approach. As educators it is perhaps easy to forget that next generation learning spaces are potentially intimidating places for new students. This factor could apply to those from equity groups and 'traditional' students alike. It is also the case that some students will be coming to the university with a set of expectations that will be confounded when they are asked to attend classes in the new learning spaces. Therefore, an excellent course and task design, a well thought out communication strategy, a high level of competency from staff and an inclusive environment are all essential for success. In response to this need for effectively designed pedagogies for the new learning spaces and the need to be inclusive it was decided to pilot Universal Design for Learning (UDL) in rooms constructed as prototypes of the new learning centre. Universal Design for Learning was developed by the Centre for Applied Special Technology (CAST) in the US, and is about removing barriers to learning for students. It is a set of principles for curriculum development that offers all individuals equal opportunities to learn. The three central principles (CAST, 2011) are:

1. Provide multiple means of Representation
2. Provide multiple means of Action and Expression
3. Provide multiple means of Engagement

Through this multiple provision of course materials and activities students from a huge range of backgrounds and learning styles are operating on a more level playing field within the course. UDL is also about guiding students to become expert lifelong learners and outlines a process to teach effectively, not just equity groups but ALL students. The United States Government through its *Higher Education Opportunity Act of 2008*, stated: 'The term UNIVERSAL DESIGN FOR LEARNING means a scientifically valid framework for guiding educational practice that [...] provides flexibility in the ways information is presented, in the ways students respond or demonstrate knowledge and skills, and in the ways students are engaged' (Edyburn 2010, p. 34). So flexibility is at the heart of UDL and it is precisely this factor that makes it extremely well suited for the technology rich networked classroom.

## Universal Design in the Flipped Classroom

UDL pedagogies are most effective in a technology-rich environment, due to the relatively easy process of building in the accessibility and portability afforded by multimedia and the Internet. Edyburn (2010, p. 38) proposes that technology is essential for implementing UDL noting that 'paper-based instructional technologies (e.g., worksheets, textbooks) commit information to fixed formats and cannot match the array and flexibility of supports provided in a digital environment.' Burgstahler (2008 p. 29) describes some of the advantages of the digital environment to inclusive teaching;

Flexible components are built in to digital materials to benefit students with learning disabilities; with attention issues; with behavioural problems; or with physical or sensory disabilities. They also benefit those who are learning a new language; who have attention deficits; or who have other characteristics that make taking notes, reading, understanding auditory information, paying attention, handwriting, or spelling difficult.

For example, UDL pedagogies are well suited for use in something like a flipped classroom model. Indeed, there are many similarities. They both;

1. Have the concept of flexibility at their core.
2. Rely on a technology rich environment with groups of networked learners.
3. Encourage self-paced learning through the provision of Internet based materials.
4. Rely on a high level of explicit communication with students facilitated by ICT.

If, as Rose & Meyer state (2002), 'The central practical premise of UDL is that a curriculum should include alternatives to make it accessible and appropriate for individuals with different backgrounds, learning styles, abilities, and disabilities in widely varied learning contexts', then a technology enhanced environment would be almost the ideal venue for its successful implementation. Universal Design is about leveraging the available technology to create as wide a range of options as possible for students and to steadily build flexibility in to the course at every level. With this in mind and drawing on the three central principles of UDL, mentioned above, this section outlines some examples of universally designed in-class tasks for a technology rich classroom.

**Table 1: Examples of universally designed in-class tasks**

1. Providing multiple means of Representation - How do I present essential course content to my students?  
Lecture material – A technology-enhanced classroom has the advantage of being able to represent information to students in a variety of ways simultaneously. Effective use of multimedia allows various modes of presenting information e.g. a lecture/topic podcasts can be created with annotations or captions, and also be available as a written transcript. Course homepage – The LMS course page was redesigned as a graphic organiser - in the form of a grid. This type of graphic representation of the course material removes unnecessary complexity and removes the need for scrolling through deep pages. This grid is also available as a taggable PDF (available to download next to the main grid) so it can be scanned by OCR (Optical Character Recognition) software. MOODLE, for example, has many accessibility options built in, these include variable display of fonts for colour-blindness and dyslexia and translation through the use of language packs. Course materials, key concepts and processes can be communicated to students through the use of graphic organisers. Venn diagrams and flowcharts created in tandem with your other course material can be effectively displayed online and help to scaffold learning for a wider range of learners.
2. Providing multiple means of Action and Expression - How do I get my students to show what they know?  
Student's voices in-class - Many students find it hard to express themselves orally for a number of reasons. A web-based application like PADLET (a collaborative wall online on which text, pictures and videos can be added in boxes) is an excellent venue for in-class discussions or class debates and can be part of a strategy, including small group work, individual reflection and student presentations to allow multiple avenues for expression in the classroom.  
Multi-media – An assignment that is normally assessed as a report with a one-size-fits-all template has now been changed to allow students various means of expression. Students can illustrate their mastery of a key course topic through the means of a traditional report, a website, a PowerPoint presentation or as a video recorded interview.
3. Providing multiple means of Engagement - How do I involve my students in the learning process?  
ePortfolios – eP's encourage a wide range of student engagement modes. In this case students are working in small groups using GLOGSTER (an online tool for creating interactive posters) to create posters on course topics that will be displayed to the whole class in a 'conference' format. Time is allocated each week for a number of weeks to allow for structured group work supported by interaction with instructors. The various posters are displayed through each student's ePortfolio (in this case Mahara) to the rest of the class using the touchscreens next to each pod. Through the ePortfolio feedback mechanism the students review and mark each other's posters in a poster defense. Students then reflect on the process, and their grade. Online students can also participate in this process with the rest of the class as a means of opening up communication between internal and external students fostering community and collaboration.

## Conclusion

Ultimately, the current contexts, outlined above, signal a radical cultural shift in higher education. As Rose and Gravel (2012, p. 27) suggest, 'what will separate the new curricula from old is that they will reflect a new ecology for learning. That new ecology will put students at the centre of the learning environment.' The new Jeffrey Smart building gives us this opportunity to develop and deliver innovative, inclusive pedagogy and a new ecology for learning that centres on students. If our approach to using it is strategic and research driven and we support those wanting to teach in the space, to provide authentic learning experiences for students, then we will be realising our ambitions. The way that we, as a sector, rise to meet the challenge of inclusive teaching practice in technology-rich classrooms will help define the Australian higher education and our students in the years to come.

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