Changing landscapes, content, technologies: What is the optimal pathway ahead for Technology Education in professionally focused university programs?

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Technology has infiltrated every university program, which has created significant implications for educators, students and industry.

The role of a university is to provide a platform for thought and progressive direction for industry and design students, to ensure their needs are realised to meet today’s workplace challenges. The catch phrase at present is: Technology in education is what’s necessary for today’s careers.

Our graduates need to effectively communicate their ideas and concepts to clients or colleagues so that they are heard above the cacophony of images and messages out in the market place.

The use of leading-edge visualisation and special effects technology can significantly enhance communication capabilities.

Regardless of the technology used, the ultimate success of any effective teaching and learning environment is to provide a rich learning experience where content is delivered in an exciting way and students are fully engaged.

This paper will explore the scope of cutting-edge technology education. It will discuss the interactive technologies that give us rich sensory experiences, the recent developments in the creative industries, and their utilisation, affordability and effectiveness in the university environment.

Practical examples of flythrough animation, virtual reality scenes, 3D web interactivity and visualisation will be presented. The presentation will also highlight future trends in the development of these technologies and discuss the implications for universities.

[I have prepared my presentation differently. With similarities to the movie ‘Sliding Doors’, I will be presenting ‘sliding windows’; showing you how two world’s meet. On the right screen you will see my story, how I cooperate with the university to provide the best possible platform to bring out the best from my students, while on the left screen you will see the students journey.]

In the past few years we have seen dramatic growth of technology infiltrating all areas of university programs, and the explosive development of technology tools being part of our teaching arsenal. We have witnessed the growth of the internet, blackboard, email, video conferencing, virtual telecommunication, digitally interactive and enhanced teaching strategies, to add dynamic dimension’s to our teaching. Today’s students expect so much more . . . talking is not enough. The attention rate of our students is increasing, where interest, concentration, awareness, dynamic interaction is dependent on delivery and content. The ultimate success of any effective teaching and learning environment is to provide a rich learning experience where content is delivered in an exciting way and students are fully engaged. This being the case for technology based and non-technology based courses.

The extent in which the Federal Government has placed on technology research and development at universities is evident by its 2003 commitment of $12.4million over the next seven years to the new Cooperative Research Centre (CRC) for Interaction Design. A further few million will be invested by a consortium of universities and commercial partners, that include Queensland University of Technology, The University of Queensland, Griffith University, RMIT and New Zealand’s University of Canterbury; to develop creative technologies for improving access to the digital world. This centre will be a catalyst for growth of creative industries nationally. It takes account of local talent within industry and universities and puts a strong face to global communities and markets. The centre, based at QUT’s new Creative Industries precinct at the Kelvin Grove Urban Village, brings together some of the most technology focused universities and connects them with Australian major industry and core commercial partners with industry and universities in North America and Europe.
Creating industry quality output from university students

Given this background and my work as a Design lecturer at Griffith University, this paper will look at and address the issues of creating industry quality output from students in the university environment. This output at times, being in career fields that use cutting edge technologies and digital effects.

This is my teaching story, a point in time showing how I achieve industry quality work from my students, how the university assists this to happen, and the future direction that state-of-the-art technology is heading. Much of this may be obvious, but I hope all of you will leave with at least one new idea, an approach, or are reinforced what you are currently doing.

Talented students and excellent facilities are not enough on their own to guarantee excellent output; one also needs the right student motivation, journey, environment, and teaching factors. With these respects, one has a strong base to be a competitive educator for industries elite. We are here to build gateways to the future, not be gatekeepers to the past; of anecdotal and superceded knowledge.

Lecturing in the Bachelor of Design, and Masters of Digital Design programs, I teach students how to design using leading industrial technologies. These courses examine strategic technologies that give the competitive advantage to the processes of three-dimensional design, visual effects, virtual reality scenes, fly through animations, 3D Web design, and thereby develop student’s creative personalities as design professionals. Students use these technologies as a gateway to developing critical thinking and ideation used in industry today. I do not prepare my students to fit in with industry, but to lead in facets of it.

Incorporating motion with three dimensional modelling has revolutionised design, just as desktop publishing transformed the printing industry in the 1980's. It has given designers the control to design, compose, direct and produce dazzling compelling presentations and displays, and technical visualisations on the personal computer. The applications of 3D modelling with multimedia are as endless as the user's creativity. It has placed the adeptness of a drafting table with a multimedia production department on a desktop. One can articulate and communicate ideas in ways not possible with other communication media. Movement and sound give you a much deeper understanding of how a project appears and functions as a whole. Today's designers can design and stage a building, or cityscape by animating light and colour, introduce structural detail, and show construction processes over time. At its best, animation can do more than merely sell a design idea. It recreates the processes of construction and engineering before the clients' eyes, present shadow analyses, previews a landscape, shows architects where their designs fail, and provides a new way of integrating ideas between clients and designers, in real time. These interactive designs can ultimately shave weeks, even months from the traditional design, documentation, and approval cycle.

Although the students’ final outcomes look visually compelling and contain the ‘wow’ factor, they could not have been achieved without finding the triggers that catalyse the teaching environment, that take the students far beyond what they thought they could of achieved, or hoped to have accomplished. Key teaching strategies and processes must be in place to get students to this level, in conjunction with the university environment and policies, allowing these procedures to happen.

Teaching strategy

There are many combinations of teaching practices; many of these being as a result of, and dictated by financial restraints, the number of tenured staff per program, university procedures and protocol, lecturers workloads, convenor directives, and the teaching and content knowledge of the lecturer.

I have listed nine principles that drive the cultivation of technology education in my lectures. These principles are underpinned by my current PhD research on ‘The Design Ideation Process and its Effect on Student Design Outcomes: a case study of teaching 3 dimensional design in classrooms’. My research being an action research study investigating the effects, in outcomes, of using different teaching approaches to teaching design in a 3D product design scenario. This research case study involves specialist industrial technology and design teacher’s, teaching classes of equal ability, having little prior design experience. The study involves the measuring of variance between these classes when different design-teaching approaches are used.

These principles are:

1. Be passionate
‘All things in life must be done with passion’. Teaching is no exception. Students are bright, they can see through a teacher who does not want to be their, and they respond accordingly. Without passion, you cannot be dynamic, or write a unique and inspiring course. Nothing more self satisfying than walking away at the end of your lecture thinking, ‘you nailed it’.

2. Be innovative

Within the coursework, formally develop and reward risk taking. Risk taking enables students to achieve extreme innovation and creativity.

Not only mix the use of teaching resources which you have available to you, which stops monotony, but use innovative teaching approaches. These include being diverse and flexible. Look at having guest lecturer/s and/or excursions. ‘I would go off’ if I saw one of my sessional staff ‘verbally and gesturely’ teach a class on digital design effects in a computer lab, when there is a roof mounted digital projector available. I have seen this happen with 25 students shaking their heads; scared to state the obvious – show us, not tell us.

We must establish strategic, professional and dynamic partnerships between industry, government and universities. We should work with industry partners to develop programs which reflect their needs and undertake projects where interests intersect. All coursework, tasks, projects, exams must have industry relevance, and industry participation or input. Thus making the coursework realistic, effective and relevant.

Make the course attractive to overseas students, thus adding an extra dimension to your class, where cross-cultural learning will flourish. This also helps the financial burden of running technology driven programs. 1 in 6 of our students is from overseas; with Scandinavian and Asian students being the majority. It is cheaper for these countries to send their students to Australia, than to expand their infrastructure of technology programs within their own country. Most countries pay their students to study here.

3. Set the standard

Excellence encourages excellence. Show past students work; both the exceptional and not so exceptional; at the beginning, middle and the end of the course. Critique these works with the students, having these students add their input. Have these samples available to the students all the time, such as on a student public computer network, saved as a digital slide show, or even better, on a website, so students can access these at home.

Address the shifts in social values, ethical considerations, Australian Standards, legal issues, environmental awareness and responsibility. Combine high-technology expertise with human values; strive towards insight and new things; and have an optimistic persistence; as dealing with technology, anything that can go wrong will go wrong.

4. Continually critique the students work

Be honest with your comments, nothing worse than giving praise for a students work, then giving them a low mark with a list of faults after it has been handed in; be upfront at the start and call a spade a spade; but always remark on the positives of their work, as well as the negatives. After formal assessment, return the student’s work as soon as possible with feedback; which assists them with their next assessment item. The faster the return, the more reflective and beneficial the comments.

5. Build dynamic interaction

Built on respect and mentoring, a rich and dynamic relationship of interaction and collaboration between students and lecturers is the key.

Because students evolve toward their potential, rather than define it up front, developing them involves imagining possibilities they have not yet considered, and guiding them to it.

Allow students at all levels to feel empowered. Build benches for those on the sidelines, to assist them to come to the forefront.

6. Be transparent and consistent

Do not change the assessable content without a great deal of prior warning. Do not give extra marks for what was not required in the assessment requirements; or else students are penalized for completing only the required content. Examples of this entail giving extra marks for submitting images not required or handing in elaborate
assignment folders; before long students will be spending hundreds of dollars on leather A3 folders or spending hours decorating and designing ornate binders. Only mark what was asked . . . be transparent so students know exactly what is required. I assess each assessment item at the same time; keeping my marking consistent across the class.

7. Set one’s policies and practices
(These must be consistent with those of the University)

Policies can be the sand that makes the pearl.

I tell my students at the beginning of every semester that this course is costing them approximately $650; so get your value from it.

‘Every lecture you will be taught a handful of important, new techniques and design principals, if you miss a lecture, you will miss out’.

I also tell my students that although the course is digitally focused they will not be taught how to use the software, but how to design using the software; strengthening the links between theory and technology. They will be taught through integrated theory, practice, and self-paced learning which will occur in a practical computer studio environment through completing ‘real’ design briefs. From these practices, I have a 90-95% attendance rate.

I believe you should teach industry standard software; similar software is not good enough for university level. If you are going to the trouble and expense of teaching it, then the onuses is on you and the university to get the software correct. Students should not be forced to make the software transition when they enter the workforce. It defeats the purpose of higher education.

I believe you cannot teach a technology course effectively, with less than 3 hours of computer lab lecture time a week, anything less is a compromise.

There should be no doubling up, with one student per computer in a class. This being a must.

Make it a policy to review each course on an annual basis.

You cannot teach practical technology courses externally online; students need the face to face with hands-on approach, with the lecturer.

The “re-treading” of ones skills is critical as one moves from season to season of one’s working life. Re-skilling is your duty to your students.

8. Be contactable

I include my mobile and office phone numbers on all my course outlines. As we all know, when working with technology, something very simple can take hours to figure out. By a quick phone call from a student, I usually can remedy a student’s dilemma in minutes, and shave hours off their time; giving them more time for the important issues.

Students also require access to educators and industry leaders with the highest level of ability. In many circumstances, these educators are lecturers undertaking fulltime research or administrative duties and no longer lecture. These lecturers, adjunct professors and gifted industry leaders should be encouraged to donate student access time, be guest speakers, present workshops, and/or give ‘lunchbox’ lectures. Why is it, that many of our best lecturers do not lecture?

9. Be prepared and organised

For a unique and inspirational curriculum, you need to be prepared and organized.

This relates to course outlines to course content. Give all assignment, exam, course outlines to students in Week 1 of lectures, having it on-line is even better. This also gives you transparency. Ensure your suggested texts and supporting material is complete; include the latest journals articles, journal publications, and a substantial web site listing (I list approximately 50 websites that I expect my students to visit; all of them listed, being very relevant).
How the university creates technology excellence

The role of a university is to provide a platform for thought and progressive direction for its students and programs, to ensure their needs are realised to meet today’s workplace challenges. In order to enable students to reach this knowledge base, the university is required to assist this to happen. Through its policies, procedures, committees and resources the university can assimilate this knowledge transfer.

Because of the technology environment within my university, my lecturing is greatly assisted by having:

- Flexible and knowledgeable Information Technology Services
- 24 hour computer access to computer labs and common access labs
- Control over ones Websites
- Students have their own folder on a network drive, used to back-up their work
- A ‘drop box’ on a network drive for students to submit their assignments and exams
- Have all computer labs, common access labs and network drives all being networked together
- Staff computers have access to their student’s network folders and ‘drop box’ from within one’s office
- Replacement of technology at least every 3 years
- Policy of one student per computer in a class; no doubling up

Directions

What is the future for technology courses at universities?

With the cost of maintaining, running, updating and expanding technology facilities, new smarter solutions will evolve through necessity. Simple solutions are having less duplication of courses across campuses; to the stage where universities will become so specialised and streamlined in what they offer, duplication amongst universities will be to a minimum. It will become standard procedure for students to complete electives at other universities; in an effort to cross fertilise resources.

Technology course fees will increase; as did the medical and dental fees have in the past. Departments will be asked to pay a quota to their university on their technology use. Computer labs will host the names of their hardware or software suppliers, like sporting teams, with sponsorship endorsements. The labs will be fully used over the three semesters of the year, with private organizations leasing the labs at the quieter times. It will be common for lectures to be held on weekends and late at night. The longevity of the computers will be doubled as the older computers will be turned into ‘rendering farms’, where multiple computers will be stockpiled in racks in storerooms and networked to become ‘super’ computers with a single monitor and keyboard.

Students will purchase cheap software licenses that automatically expire when their program of study finishes. Universities will be made to take responsibility and action, for students handing in coursework completed using illegal software.

As educators we must re-evaluate and develop our pedagogic practices to suite our university, student and personal needs. The dilemma is trying to look at the best practices and also be innovative. Looking at the best practices consists of looking backwards, while being innovative involves looking forward. This is where the paradox lies. I feel the best way to predict the future is to create it.

Conclusion

In conclusion, I would like to tell you a story. A good friend of mine, Martin Albrecht; who is the retired managing director of Thiess Proprietary Limited, and currently the Board Chairman, took his wife Fran, son Stephen (whom I once taught) and myself to The Queensland Club in the city, to celebrate Stephen’s 2nd degree graduation. Martin only months earlier, being awarded a Companion of the Order of Australia, for his outstanding achievement for guiding and building Thiess to be one of the best and biggest civil engineering companies in South East Asia. Just after Bob Borbridge, and 3 Deputy Ministers came over to our table to wish Martin and Fran a wonderful night; Martin said to me how privileged it must be to be a teacher. He then continued to say how gratifying and rewarding it must be to shape human lives. I was stunned and speechless, to hear this from such a remarkable individual who has, and still is achieving so much in his life.

In retrospect, and thinking afterwards, we do have a wonderful career. We may not be building 10 lane freeways, 1 km span bridges, or be listed as one of the best quality driven companies in Australia. But we do something very special; we shape people, and with this comes responsibility.