

Premier’s TAFE Scholarship

Applied Research as a teaching and learning strategy in vocational education and training

Todd Packer

TAFE NSW Sydney Institute

# Introduction

I was first introduced to the term applied research in 2016 when it appeared in the TAFE NSW Higher Education Learning and Teaching Plan 2016 to 2019. In this document, applied research appeared alongside applied teaching and applied learning as the three pillars that underpin TAFE higher education delivery. While the two latter terms were well understood and aligned to my teaching practice, applied research was new - and very unfamiliar.

As a TAFE teacher, I was daunted by the prospect of undertaking research; I had always seen “research” as what universities do! As I investigated this further I found there were few examples of applied research in TAFE NSW or in other TAFEs in Australia, particularly in the creative industries, my teaching field. The study tour was conceived as an opportunity for me to explore the topic in a thorough way and understand what it could mean for my teaching practice.

Through planning, researching and undertaking the tour, I have developed a clearer understanding of applied research and confirmed the incredible possibilities and opportunities of engaging in applied research. Far from being a fringe activity, applied research is exactly what TAFE NSW needs to be engaged with in the future!

Applied research is a type of research program that sets out to solve a specific practical problem. An applied research project has a specific purpose for a client, with the aim of producing a clear result, such as a new design or product. Applied research can be part of a teaching and learning strategy in vocational education and training providing opportunities for practical learning through ‘hands-on’ project work. A key feature of applied research is the opportunity for collaboration between students, teachers and an industry partner (government or private sector).

The aim of the study tour was to investigate applied research as a teaching and learning strategy in vocational educational, and to examine best practice examples and case-studies applicable to the creative industries.

Technological advances have created unprecedented change and new possibilities in work linked to the knowledge economy such as design, media, advanced manufacturing, 3D printing, advanced materials, fashion technology, and the broader technical services sectors. How can we, as VET providers, ensure our students are prepared for this new world of work?

Applied research embedded into VET delivery offers the potential for innovation. It can develop competencies for dealing with the complexity of the workforce graduates will be entering. The use of applied research as a teaching and learning strategy in vocational education is relatively common and well established in European and Canadian technical colleges, polytechnics and applied universities.

However, applied research has gained currency in the Australian context only recently, demonstrated by the TAFE NSW Higher Education Learning and Teaching Plan (LTP) 2016 to 2019, which identifies applied research as one of its three guiding key principles. There are few examples of applied in TAFE NSW or in the Australian VET sector generally. Is applied research something TAFE should be doing?

# Focus of Study

The scholarship also enabled me attend two international conferences - Design March 17, a major Scandinavian design conference, and Munich Creative Business Week. In between institutional visits, conferences and a couple of design museums, I also had the chance to meet with international colleagues from both the education and design sectors. These opportunities to share ideas from around the globe, increase awareness of the Australian VET sector, and spread the word about the Australian design industry were among the highlights of the four weeks.

An initial literature review and other investigations into applied research in vocational education globally, revealed good models in both Canada and Europe. I focused my study tour on institutions in Scandinavia and the Netherlands because of a range of factors. Firstly, these countries are well known for the strength of their education and training in the design and creative industries sectors (my teaching area). Secondly, Scandinavia and the Netherlands are leaders in vocational education, with many colleges engaged with integrated, practice-oriented research. Other identified strengths of these systems included:

* strong links between vocational education, industry and the innovation sector
* a clearly articulated role for vocational education to serve business and the economy
* an education and training system that fosters life-long learning.

Five institutions were visited and over 70 interviews were conducted with teaching staff, educational managers, students and industry partners. I had the opportunity to examine best practice examples of applied research and was exposed to a showcase of current and meaningful case-studies.

Within this framework, investigation into each case-study involved:

* understanding the context of the institution
* reviewing the project scope
* discussion and interviewing students and staff
* reviewing outcomes
* meeting with industry partners.

The topic of applied research is very broad and covers a range of interrelated issues such as dealing with intellectual property, commercial funding sources, staff capability, research ethics and income streams. Therefore, to ensure my program was manageable I developed six key questions which focused my line of enquiry on applied research as part of the teaching and learning experience. The six key question were:

* How does applied research contribute to innovation in teaching and learning?
* How applied research assists students to develop real world skills?
* How does applied research contribute to the reputation of the institution/ courses?
* How do institutions create and exploit links with industry partners in applied research projects?
* How can applied research improve employability and job outcomes of graduates?
* How can applied research enhance student-centred, practical learning?

# Significant Learning

## Case study: KEA – Copenhagen school of art and design

KEA is polytechnic college in Copenhagen, Denmark. Programs offered are mainly diplomas and applied degrees in design, technology and IT. They have multiple campuses and I visited the design campus in the north of Copenhagen – a purpose-built design facility that opened in 2004. KEA programs are oriented towards the business sector and attach equal weight to theory and practice.

Cooperation with business enterprises particularly small or medium enterprises (SMEs) in Europe is a key and important aspect of their delivery. Businesses play a role in all aspects of delivery and particularly through joint ventures and partnerships. Applied research and innovation is a central feature of these partnerships. Applied research also supports teachers in developing their teaching methods and currency.

## Case study: KEA Materials lab

The KEA Material Design Lab is an interdisciplinary space where research and design converge in the exploration and understanding of new materials. KEA’s strength in materials research lies in the cross-disciplinary collaborations which occur in the lab – between students from different design areas and with industry partners. This breeds a culture for collaborative applied research. The Material Design Lab is the centre of KEA’s research framework and consists of two main facilities:

* a state-of –the-art workshop where materials can be tested, manipulated, and refined
* the materials library - Material ConneXion. This industry facility contains over 1500 material samples, as well as access to the online database. Danish and European SMEs subscribe to the library – creating a clear link between KEA and the innovation sector.

## Case study: Reykjavik city model

Final year Bachelor of Architecture students at the Academy of Arts Reykjavik, worked on a practical problem for the Reykjavik city council. Applying data from a multitude of different topographical surveys students checked the data and applied cutting edge 3D modelling software, 3D scanning and laser cutting to create a 3D model of the city. The model is now a resource for the architecture students, the council and local architectural and urban planning businesses.

## Case study Product labelling for H & M Fashion

Working to a problem set by industry partner H & M, first year textile students devised a new and sustainable product line. The students’ applied research on materials and environmental sustainability along with consumer research, led them in a very different direction. Rather than a new product the students created a concept for an integrated labelling system for H& M’s sub brand COS that would assist the consumer make more informed environmental decisions about how to protect and extend the life of clothing through care and maintenance, so that it may have a longer life.

## Case Study: Fashion up-cycling

The end product for this project was a high-end fashion show using recycled garments and textiles from the Red Cross. Behind the finished garments, this project involved final year fashion students applying research on the economic theories behind up-cycling and specifically how to value “waste” materials as a resource. Students explored economic theories of resources distribution and created a methodology for valuing the vast mountain of ‘waste’ material held in Red Cross warehouses which they then adhered to in “costing” the production of the garments.

## Case Study: The search for Icelandic Porcelain

Presented at Design March 17, a multi-disciplinary research team consisting of a geologist, an industrial designer and a fine artist (ceramists), applied research from their varied fields on a collaborative search to answer the question “can porcelain be produced in Iceland?” The project involved taking samples of suitable minerals, experimenting, researching and testing.

## Case Study: Design Academy Eindhoven

The Design Academy Eindhoven is multi-disciplinary college of art, architecture and design in the technology city of Eindhoven, Netherlands. The bachelor's program is split into eight interdisciplinary departments and students are free to move between faculties throughout their study – a very different model from Australian education and training models. Students engage in a major applied practical project in their final year along with a six month internship – the combination of research and internship makes it an interesting model for understanding the role of applied research in education and training. The institution has longstanding links to the Dutch Tech sector and industry partners including Canon, Swarovski and flooring company Forbo.

## Case Study: Student Incubator Program

The VIA student incubator program provides the framework that allows graduates and students to develop and implement real ideas and projects. They offer counselling, mentoring, business coaching and networking opportunities to assist students and graduates establishing their own enterprise or through innovation projects in existing organisations.

## Case study: Advanced materials research

This applied research project involved final year industrial design students from the Academy of Arts, Reykjavik taking a single local resource and researching every possible material or product that could be derived. Firmly based in theories of environmental sustainability, and advanced materials research the project also involved the ethical considerations of the resource use. Students worked with a range of local manufactures to produce and test the viability of the end products.

## Case study: The Design Museum, London

The Design Museum, London is a museum in Kensington,, which covers product, industrial, graphic, fashion and architectural design. The Designers in Residence program is a core part of the museum's activity and gives recent graduates/ emerging designers the opportunities to engage in practice-based research projects

## Report on conferences

During the study tour I attended two design conferences - Design March 17, a major Scandinavian design conference and Munich Creative Business Week. Together, these events cover the variety and complexity of the contemporary design industry, with a focus on technology, design, materials, current industry developments and the important role that creative industries play in driving innovation in the manufacturing and building industries.

### Munich Creative Business Week (MCBW) Germany 2017

Munich Creative Business Week (MCBW), is the largest design event held in Germany for designers and has evolved into a major event on the design calendar for international designers, creative workers and the businesses they serve. MCBW champions design and its relevance to society, culture and the German economy. The theme of MCBW 2017 was Design Connects: the Smart Revolution. “Smart” referred to the integration of technology into design, and the corresponding innovation that could be achieved in the following three fields:

#### Smart homes and cities

The theme here was the integration of technology into design for living - including virtual reality, and new media technologies, smart mobility and smart homes. An overriding message was that shaping the future lies in the hands of designers.

#### Smart workplaces

Workplace furniture design company Steelcase presented innovations in workplace design products and furniture. Co-working, collaborative design and connecting people was a major theme as was integrated digitalisation technologies.

#### Smart materials

Advances in material technologies is at the cutting edge of design innovation. This can be through new materials (material memory, hybrid materials, and networked materials) or new manufacturing technology such as 3D and 4D printing. Examples on show included wearables for the entire body, eHealth materials, smart grids that supply and save energy, and materials that communicate with remote software. Branding was a key driver here, with brands no longer developed top-to-bottom but jointly with users through feedback and customisation features.

### Design March 2017

Design March is one of Scandinavia's most important annual design industry events. In 2017 over 100 activities were held under the Design March banner, related to furniture design, product design fashion and architecture. The program showcased the best of the local design scene alongside international developments. A central part of the event was Design Talks, which encompassed lectures by internationally acclaimed designers and design thinkers including product designer Alexander Taylor, Visual Artist Han Ersin, and the key note speaker, creative director Paul Bennett. Design March 17 was organised by Iceland Design Centre, the promotion agency of Icelandic design and architecture. Industrial designer Alexander Taylor presented the extraordinary design story behind the development of the Parley Shoe for Adidas, a shoe designed from recycled fishing nets. “Parley for the Oceans”, is an Adidas-supported non-profit for fighting ocean waste.

# Conclusion

Digital disruption and new technology are rapidly changing the way we work. The rate of change in recent years has been extraordinary. Creativity, innovation and entrepreneurial skills are key attributes needed for the future workforce.

Embedding these traits in our students is therefore an increasingly important aspect of education and training. From my investigations, applied research projects are a perfect way to develop these in a training and educational context.

I was particularly impressed by the motivation and maturity of students. In my teaching experience most students are wary of undertaking group work; they see problems for assessment, managing personalities and equal distribution of work. Yet collaboration is such an important skill needed by graduates in the modern work force. In the various case studies, I witnessed many examples of students working in teams on applied research projects. The inherent characteristics of applied research allows students to leapfrog beyond a focus on “assessment” and “grades” to revel in the real outcomes and the objectives of the project. This is a shift in mindset that allows students to be immersed in the learning experience and focus on the meaningful outcomes.

Another observation was the entrepreneurial attitudes of students. The graduates at Eindhoven are in many ways creating their own jobs with projects often going into production. This is supported through initiatives such as the student incubators and is particularly relevant to the creative sector where employment patterns are changing away from traditional full-time job outcomes.

An important attribute of all the colleges I visited is that they are seen by the employers/ industry I interviewed, as having something to offer in the research space. From my investigations this capability is often focused in a particular area of expertise, such as the KEA materials lab or the long-established links between Eindhoven and the technology sector.

Finally, another key feature I observed is the integrated way that research competencies are scaffolded from lower course levels. This was particularly evident in the programs at KEA and the Technical College Reykjavík. This approach is student centred because it views education and training as a life-long journey.

In summary, applied research is inherently student entered, practical learning and could provide benefits in the following areas:

## Teaching and learning

* creates flexible, supportive delivery to meet different student styles and needs
* innovative application of a traditional work integrated learning model
* allows for varied and authentic assessments
* builds knowledge and skills through experiences, collaboration and practical application

## Student and graduates

* encourages students to become flexible and resilient
* equips students with skills to excel in the real world
* produces leaders and business-oriented graduates, enhancing employability skills
* promotes the development of student talent for the creative industries
* develops competencies in project management, leadership and entrepreneurialism
* builds confidence and entrepreneurship

## TAFE/ Industry relationships

* frames deeper / useful collaborations between students, teachers and our industry partners
* provides clear workforce relevance of the training
* facilitates participation of joint-ventures and collaborations with industry

## Benefits for TAFE

* more sophisticated engagement with industry
* better employment outcomes for our graduates
* TAFE could excel in training graduates for the knowledge economy - areas such as design, media and advanced manufacturing
* creates a link for TAFE with the innovation sector

## Three Key Attributes for Success

### Be forward thinking

Applied research needs to be part of the strategic direction of the organisation

### Be informed

Applied research can leverage an existing strength which may be technological, unique facilitates (VR labs, materials labs, 3D printing) or established industry relationships

### Be embedded

Research competencies should be scaffolded throughout course levels introducing students early on to the key concepts and skills

## Three Key Issues for TAFE NSW

### Capability

Do we have the staff skills and experience in research literacy/ does TAFE NSW as an organisation have capability?

### Reputation

TAFE/ VET sector is not perceived as a player in the research space.

### Autonomy

Applied research projects require a level of freedom to manage industry partnerships, joint ventures, IP, budgets, funding, and risk taking which may not align to TAFE’s model.