

# **INQUIRY INTO TEACHER SHORTAGES IN NEW SOUTH WALES**

**Organisation:** Institute of Technology Education

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# Institute of Technology Education

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## **Inquiry into teacher shortages in New South Wales**

### **Institute of Technology Education Response**

Dear Portfolio Committee No. 3 – Education,

Thank you for the opportunity to provide feedback on the 'Inquiry into teacher shortages in New South Wales'.

The Institute of Technology Education (iTE) is one of the largest teacher professional associations in NSW, with over 2000 members. This response focuses on the Technologies learning area, including teachers of Agriculture, Design & Technology, Engineering Studies, Food Technology, Graphics Technology, Industrial Technology (Automotive, Building & Construction, Electronics, Engineering, Farm Maintenance, Graphics, Metal, Multimedia, Timber), Information & Software Technology, Information Processes & Technology, Marine & Aquaculture Technology/Marine Studies, Science & Technology K-6, Software Design & Development, Textiles Technology/Textiles & Design. All of these subjects are true STEM courses.

These are not new issues for the Technologies area (also known as Industrial Arts, Home Economics or Technological and Applied Studies). [Appendix A](#) to this response is the summary of the 2005 "Submission by industrial arts teacher associations to the social issues committee of inquiry into the recruitment and training of teachers".

If any of the content of this response requires clarification, please do not hesitate to contact me.

Yours sincerely,

Grant Byrne  
Institute of Technology Education President

(a) ***current teacher shortages in NSW schools***

During 2021, the iTE tracked permanent and temporary advertised positions for Technologies teachers across government and non-government sectors. There were almost 1300 positions advertised. The combinations of teaching codes asked for in some advertisements would have been almost impossible to fill, unless a specific person was already available. These advertisements were copied and pasted directly into Word documents and can be made available if requested.

Across the state there are approximately 100 new graduates each year from all NSW based universities combined. These numbers obviously do not add up.

(b) ***future teacher supply and demand***

Technologies subjects are now in a position where they are spiralling down to nothing. There are not enough teachers, so Principals don't offer the subjects. If subjects aren't offered, there doesn't appear to be a need for Technologies teachers. If students don't access the learning experiences provided by the Technologies learning area, they don't enter STEM professions and we have an increasing skills shortage. This is evident with the decline of manufacturing in Australia; the wait time, quality of work, and cost of tradespeople; and our STEM entrepreneurs selling their ideas overseas due to a lack of support in Australia. If we want to be a powerful knowledge economy, it starts in schools with high quality Technologies teachers.

[Appendix B](#) is the Design & Technology Teacher Association of Australia Technologies Teacher Shortage Survey National Overview 2019. This shows that by 2025 it was anticipated the Technologies teacher shortage would be so dire it could not be recovered from. We believe the impact of Covid has accelerated this timeline and we have now reached 2025 position.

(c) ***out-of-area teaching, merged classes and minimal supervision in NSW schools***

Out-of-area teaching is definitely occurring in the Technologies area. Where Technologies teachers are not teaching in their own subject area, this is a waste of a valuable human resource.

The more concerning issue is the lack of Technologies trained teachers available and untrained teachers delivering Technologies subjects. This causes issues for the integrity of the subjects, the workload on the trained Technologies staff in the school to train and support these people, potential WHS issues with the use of equipment. The iTE has seen a list of 'TAS solutions' to address the Technologies teacher shortage, circulated by another association, that absolutely terrifies Technologies trained teachers.

Merged classes and minimal supervision affect Technologies classes significantly. Most of our syllabuses state:

*"To satisfy the requirements of the [insert syllabus name] Syllabus students must undertake a range of practical experiences that occupy the majority of course time".*

This cannot be achieved if the merged classes are different subjects, in different locations or rooms, the teacher is not approved to teach the different subjects, or the class size of the merged classes exceeds that deemed safe to continue with practical work. Merged classes mean syllabus outcomes cannot be addressed satisfactorily.

The same is true with classes being minimally supervised. They cannot be permitted to continue their practical activities; therefore, they miss out on valuable learning experiences.

#### (d) ***the NSW Teacher Supply Strategy***

The iTE is discussing strategies with the NSW Department of Education, and universities to improve the supply of high-quality Technologies teacher graduates.

For the Technologies area, while it does have some Technologies/TAS specific points, the NSW Teacher Supply Strategy does not appear to offer realistic solutions to immediate issues. Taking some key points from the Strategy:

- There is at least a national, perhaps global shortage of Technologies teachers. Trying to poach teachers from other jurisdictions will not provide enough high-quality teachers.
- Improving the perception of teaching is difficult when teachers are actively battling their employer for pay and conditions that recognise the quality and quantity of work done.
- The reality of the nature of work done by Technologies teachers means they complete the same tasks as every other teacher regarding programming, marking, report writing, dealing with student wellbeing issues and more. However, most Technologies teachers do not have an assistant like science teachers for example. All of the workshop, tool, equipment maintenance that other teachers do not have to do, must be done by a Technologies teacher. Materials preparation is more involved, WHS issues are significantly larger. Technologies teachers generally spend a lot of time helping students outside of class time that others don't. This is not to disparage other learning areas; simply to highlight the difference in workload. Students see this and most do not want to work that hard, meaning fewer enrolments in pre-service Technologies teacher education courses.
- Scholarships do not provide enough incentive for students directly out of school, or for potential career changers from workforces that are paying them more than teaching.
- The STEM label does not help. The type of teachers needed must be explicitly stated.
- Trying to get the universities on side is an admirable goal. The University of Sydney, Newcastle University and the University of NSW have all had strong Technologies teacher undergraduate programs in the past. Newcastle University, Southern Cross University and the Australian Catholic University are developing strong programs. If universities do not see the financial

incentive in offering a course, they don't offer it. If they cannot attract enough students into their course, the cost to run it is too high and it doesn't run. Teaching needs to be made a more attractive profession if universities are to see the incentive to offer Technologies pre-service teacher programs.

#### **(e) teaching workforce conditions**

In general, teaching workforce conditions are poor. In the Technologies area, these conditions may vary depending on the drive of the school leadership, faculty leadership or individual teacher.

Some schools may not have emergency isolation switches in workshops; dust extraction and collection may be poor, leading to longer term health issues for Technologies teachers. Buildings or resources are not regularly maintained or updated if not done by the teacher themselves. The quality of working conditions in the Technologies area is generally a credit to the hard work of the teachers at that particular school who take pride in what they do and want to provide the best, and safest possible learning opportunities for students.

#### **(f) *Initial Teacher Education***

Initial Teacher Education courses are based on meeting the Graduate Teacher Standards. This usually comes at the expense of [Subject Content Knowledge](#). As stated earlier, the iTE believes the courses being developed at Newcastle University, Southern Cross University and the Australian Catholic University are continually improving.

A full list of Technologies teacher education courses can be found at <https://www.itensw.com.au/Learn-to-Teach-Technologies/>

#### **(g) *impacts related to COVID-19, including the impact of government responses such as remote teaching and safety restrictions***

Trying to deliver subjects where the majority of course time should be devoted to practical learning experiences was made exceptionally difficult during Covid-19 learning from home periods. This was especially difficult for Higher School

Certificate courses where the production of a Major Project makes up more than half of the HSC external examination mark. Most teachers went above and beyond the requirements to provide their students with extra time before or after school, weekends and 'school holidays' so their projects could still be completed to a high standard and make up for lost face-to-face time. The intensity of these experiences led to some teachers burning out. Some left the profession or took leave to pursue other ventures. That is not the fault of the dedicated teachers, but the negative impact on a teacher's wellbeing is obvious.

(h) ***the impact of workplace mandates***

The impact of workplace mandates such as vaccinations will have been the same across all learning areas.

(i) ***the status of the teaching profession***

The status of the teaching profession is driven by the media. Nicole Mockler has been doing research into this, with a summary available, titled [No wonder no one wants to be a teacher: Australian media must change conversation about the profession](#)

It is not uncommon for engineers, tradespeople or those from other professions or occupations to retrain into Technologies teaching. Most don't do it for the status, or the lower pay, or the poorer working conditions. Some do it under the illusion of 'holidays', quickly realising they 'holidays' don't exist.

Helping young people and the job satisfaction that brings are common reasons for teachers staying longer than 3-5 years. The status, pay and conditions of the profession are often what cause great teachers to leave. The knowledge and skills that Technologies teachers have means it is easy to find a preferred job outside of teaching, or return to their previous workforce if they have retrained to become a teacher.

(j) ***the impacts of the Staffing Agreement on the ability of principals to effectively staff schools and manage performance***

Section 22 of the Staffing Agreement is of concern for Technologies teachers:

*“Years 7-10*

*The principal, in consultation with staff, is responsible for determining actual class sizes on the basis of the curriculum needs of the school, student needs, community expectations, and the expertise of the teachers. In the case of vocational education, principals also take account of work health and safety issues when forming classes.*

*No class need exceed 30 students.*

*Practical classes Years 7-10*

*the organisation of industrial technology in Years 7-10, and Year 7 visual arts on the basis of no class need exceed 20 students;*

*the organisation of food technology and textiles technology in Years 7-10 on the basis of no class need exceed 24 students; and*

*the organisation of technology (mandatory) classes in Years 7-8 and design and technology (elective) classes in Years 7-10 on the basis of no class need exceed 22 students.*

*When forming classes, principals of secondary schools also take into account the following advice.*

*Years 11-12*

*No class need exceed 24 students”.*

It makes no sense to have any Technologies class size above 20 students. Industrial Technology Years 7-10 is 20. From Year 7, students get larger and access a wider range of equipment requiring greater teacher supervision. All Technologies class sizes should be capped at 20 students.

The wording of “no class need exceed...” allows Principals to run classes greater than the numbers prescribed if they deem it fit to do so. This affects the



performance of the teacher who now has greater WHS and supervision responsibilities.

(k) ***the administrative burden for principals associated with recruiting for and appointing roles***

The process of creating an advertisement, convening the panel and applying the appointment process is often delegated to another staff member where a position is being filled by local choice.

(l) ***the impact of central appointments prioritisation for teaching and principal roles***

Given the scarcity of them, most Principals would be overjoyed to be told they are having any Technologies teacher appointed.

(m) ***support for principals to effectively staff schools above base allocation***

This is often dependent on school funding and the management of funding.

(n) ***the impacts of incentives and the transfer point system on regional shortages***

Regional shortages are often the result of a (perceived) lack of other services in the area. The financial incentives offered are very good, but not enough to entice people away from major cities or coastal areas. The lack of collegial or mentoring support is a major drawback for Technologies teachers who may wish to move to regional or remote areas. Being unable to immediately access someone with appropriate expertise to help a teacher new to the area is a negative aspect of moving to these areas, especially if they are the only Technologies teacher in a school.

(o) ***the approval to teach process in New South Wales***

The approval to teach process is governed by NESA policy and procedures, combined with NSW DoE specific requirements. Universities should be structuring their courses so all graduates are aware of and supported to meet these requirements.

Where a teacher is seeking approval to teach a specific subject following their graduation the process becomes more complicated. The NSW DoE does not give a teacher a 'code', that is approval to teach a subject, unless they have completed a course at Australian Qualifications Framework Level 7 – Bachelors Degree. This prohibits a large number of those teaching Technologies subjects out of their normal teaching area because of the limited opportunities to study the required subjects, especially while teaching full time.

There are opportunities for Principals to recommend teachers receive 'approval to teach' codes if a teacher has taught a subject for two years, usually through the Preliminary and HSC course. The application of this appears inconsistent. It also means that an unqualified teacher has taught an HSC class. This often places an unfair workload on the Head Teacher, who needs to train and supervise an unqualified teacher. This extra work is almost exclusive to the Technologies area.

(p) ***the impact of casualisation, temporary contracts and job insecurity***

This is a significant issue for those teachers who want a permanent position. Repeatedly applying for the same position year after year, or sometimes term after term, drives some teachers away from the profession. Referring back to point (m), if the budget allowed, more casual and temporary staff would possibly be appointed to full time positions.

The other side to this is the casual teachers who do not want to become permanent due to the increased work load they would have with report writing, programming, resource development and all of the other activities that permanent teachers need to complete. Being able to turn up, have the work given to you, and often supervise, rather than explicitly teaching, can be attractive to those who see teaching as an occupation and not a profession. In some schools, casual teachers

are being looked after better than permanent teachers because they are in high demand with the current teacher shortage. Some casuals have decided the extra tax they pay if working more than 3 days a week isn't worth the extra work, thus reducing access to casual teachers even further.

(q) ***the measurement of staff turnover particularly in regard to temporary staff, and (r) any other related matter.***

Any Technologies teacher that is temporary and wants a permanent position can almost pick and choose where they want to work. Most temporary Technologies teachers are so by choice. They might have a specific school they want to work at and are holding out for a position there. They could be testing the waters, deciding how or if they want to continue as a Technologies teacher.

# Appendix A

## **SUBMISSION BY INDUSTRIAL ARTS TEACHER ASSOCIATIONS TO THE SOCIAL ISSUES COMMITTEE OF INQUIRY INTO THE RECRUITMENT AND TRAINING OF TEACHERS**

### ***Introduction.***

Industrial Arts teachers congratulate the former Minister for Education and Training in commissioning The Social Issues Committee (SIC) to inquire into the recruitment and training of teachers. This is a very important inquiry as it is those recruited into teaching that carry the responsibility of delivering the learning programs to students in NSW schools as well as a number of associated professional tasks.

Allied to this inquiry is the issue of the drift of students and teachers away from Public Education. This may be a symptom of the overall perceptions about schools and teachers. It also points to and suggests the possibility of faults in the Administration of some aspects of Public Education.

This inquiry has the potential to draw together aspects of a number of recent educational reports. This submission attempts to provide the inquiry with the considered opinions of Industrial Arts teachers, as represented by the Institute of Industrial Arts Technology Education (IIATE) and the NSW Industrial Arts State Equipment Committee (NSWIASEC).

### **TERM OF REFERENCE 1: The best means of attracting quality teachers to NSW Public Schools and meeting the needs of school communities**

The educational bureaucracy and the wider political community have key roles in relation to this term of reference. These include the need to develop and apply an administrative structure that delivers the curriculum in the best possible way, the support of teachers teaching and students learning and responding to the government policies. There is sometimes a tension between these two requirements, but the balance seems to have been disrupted since the late 1980's and the relationship between NSW Department of Education and Training (DET) officials and its teachers has been dysfunctional

In Industrial Arts, a major problem emanating from the educational bureaucracy has been the manner in which the Technological and Applied Studies (TAS) Key Learning Area (KLA) has been adopted. This has had a detrimental effect on the delivery of Industrial Arts subjects and a reduction in the opportunities to undertake Industrial Arts teacher education programs; (see Appendix A). The actions of some universities have adversely impacted on issues relating to this Term of Reference.

These factors have lowered teacher morale and presents teaching as an unattractive career choice.

Teaching competes with many other categories of employment and there are many factors that influence people taking up teaching as an occupation. Often these factors are based on feelings, perceptions, and comparisons with other occupations. The attraction to teaching and retention of teachers involves more than just offering someone an opportunity to practice his or her vocation, the payment of a salary. Earlier approaches to recruitment, induction, development and support did include a high level of nurturing and commitment by DET, and some predictability in regard to appointments, promotion and transfers. These seem to have dissipated in recent years. A range of factors have created some disincentive to recruitment.

A list of more general issues needed to be addressed in relation to this term of reference is provided in the main submission.

## **TERMS OF REFERENCE 2: the effectiveness and efficiency of current means of recruiting teachers to NSW Public Schools, including**

**(a) recent graduates**

**(b) career change teachers**

Current methods of recruiting teachers to the profession often not effectively publicised to the target audiences. Students straight from school at the completion of the HSC are a key target group. There is also a lack of a current clear pathway to follow to become an Industrial Arts teacher. Both 'Teach NSW' and the current UAC Guide fail to delineate a clear pathway to those wishing to become Industrial Arts teachers.

Are the people selected for retraining the best possible for the teaching profession; or are they the best of a selection used merely to fill vacancies quickly? In addition, many professional people undertaking retraining as teachers have not been in a school classroom for a great number of years and have trouble adjusting to the management of today's classrooms.

The impact of the HECS debt is considerable and pay rates make repaying this debt difficult compared to other professions.

Student teachers in Industrial Arts, Home Economics and Computing Studies are required by DET to complete a generic TAS program, with an over-emphasis on Design and Technology.

The appointment of beginning and retrained teachers appears to be ad hoc.

Retraining for career change teachers is expensive unless fully funded and represents an upheaval in living standard and family life. The need to be willing to teach anywhere in the state is prohibitive to some retrainees and even recent graduates. Because of this some teachers are lost to the private school system, which allows prospective teachers more flexibility in finding a suitable school.

## **TERM OF REFERENCE 3: Differences and similarities between primary and secondary school recruitment needs.**

The restructuring of the administration within DET since the late 1980's has seen fundamental changes in how the curriculum is supported, and how standards are achieved. The natural divisions that exist between subject areas in secondary education have continued in the curriculum. These divisions reflect the seriousness of treatment required in the specialty of particular disciplines and the notion of subject integrity which is important particularly within Industrial Arts subjects.

Previously the systems of curriculum and administrative support, professional development and teacher accreditation recognised and aligned with this idea of teaching disciplines and subject integrity. Unfortunately, structures since the late 1980's, are seen as less than adequate by comparison, and not offering improvements to that which previously existed. We suspect that this is not an issue in primary education. Prior to the 1990's, Industrial Arts teachers had access to a range of support personnel within

their specific areas of the curriculum whom also had a close relationship with those in tertiary institutions. These relationships, formal and informal infrastructures and networks, and the culture they developed provided the means by which standards were established, communicated, monitored and further developed, and in which schools delivered quality of education. These support mechanisms no longer exist.

The SIC could look at the application of the current structure for the delivery of the curriculum in secondary education; KLA's and the application of this categorisation to teacher training requirements. There are anomalies between KLA's which work to the disadvantage of the Industrial Arts discipline within the TAS KLA. The categorisation factors within the TAS KLA have long been opposed and resented by Industrial Arts teachers along with the application of this categorisation to teacher training and accreditation. *(Please see Appendix A for an expansion of these matters)*

Further, beginning teachers in secondary schools need to be supported by people who have expertise both in generic skills and in the skills and content of their discipline. Perhaps beginning teachers should not have the same teaching load as other teachers and a suitable within school mentor having both discipline and generic skills should be given a period allocation and allowance to mentor each beginning teacher. Also that beginning teachers be placed in schools which can provide such support and development opportunities.

There is a need for ongoing and meaningful dialogue between the DET and its teachers through their professional associations and at the school level. These processes need to be inclusive and not limited to those who are aligned with the thinking of DET officials. This has been a particular problem for Industrial Arts teachers in secondary education.

#### **TERM OF REFERENCE 4: existing initiatives and programs of the Department of Education and Training, including**

##### **(a) Teach NSW**

##### **(b) scholarships for undergraduates.**

Material contained in the Teach NSW package and on the DET's website under Teach NSW<sup>1</sup> contain considerable information that may be of use to someone already committed to entering teaching. It does not do much to motivate the just interested or curious. The material also reflects the pattern we have criticised in our discussion of the TAS KLA under Term of Reference 3 and in Appendix A. TAS is mentioned frequently in this material with no reference to Industrial Arts other than in retraining courses; yet the discrete disciplines in the CA KLA are mentioned.<sup>2</sup>

#### **Scholarships for undergraduates**

We support the provision of scholarships that cover fees and pay some form of living allowance. We understand HECS fees and a yearly allowance of \$1500 is paid to undergraduate scholarship holders in particular disciplines. We support this initiative, but are not aware of how many potential Industrial Art

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<sup>1</sup> <https://www.det.nsw.edu.au/employment/teachnsw/index.htm> viewed 30 January 2005

<sup>2</sup> <https://www.det.nsw.edu.au/employment/teachnsw/teacherqual.htm> Viewed 3 February 03.

teachers have been awarded such scholarships. Perhaps DET should attempt to gain the support of professional associations in supporting this program and to encourage school leavers to apply. We note that a living allowance and fees are paid to those undertaking retraining programs. However the accelerated teaching programs attract the payment of HECS fees but do not provide a living allowance.

An additional incentive to recruitment and retention might be an offer to pay teachers the annual HECS debt repayment whilst they remain employed with the DET. A further incentive to aid retention and promote further development would be to offer to pay HECS fees for existing teachers who undertake appropriate postgraduate study.

#### **TERM OF REFERENCE 5: the role of the NSW Institute of Teachers and its accreditation and endorsement requirements**

The need for ongoing and meaningful dialogue between teachers through their professional associations and at a local level with the aim of developing a functional relationship between teachers and the bureaucracy teacher training personal and institutions and systems be put in place to ensure this. The NSW Institute of Teachers should:

- work in close liaison with the relevant professional associations,
- provide explicit details of what it means to be an Industrial Arts teacher,
- specify minimum standard for teaching Industrial Arts and specifying minimum amount of workshop practice/competency to be attained,
- specify minimum time for OHS training. Safety Certificates,
- challenge current accreditation practices in NSW DET (teach one woodwork class for two years, be endorsed by the Principal – need have no IA skills or knowledge- accreditation to teach certain IA subjects).

#### **TERM OF REFERENCE 6: the role, distribution and effectiveness of university pre-service teacher education**

The fundamental outcome of a teacher education program should be confident, knowledgeable and competent beginning teachers. In secondary education this confidence, knowledge and competence must include a significant emphasis on and mastery of a subject discipline. The concept of Subject Integrity need not conflict with basic and generic skills (eg literacy, numeracy problem solving, planning) or the notion of integration and transfer of knowledge and skills across disciplines and contexts.

We assert that the specialist discipline based components of secondary teacher education programs must clearly reflect the subject integrity of the particular discipline and subjects within them. We believe that there has been pressure to dilute the strength of subject integrity in teacher education programs for potential Industrial Arts teachers since the implementation of “*Excellence and Equity*”. More recently we have become concerned about the less than transparent processes of teacher education program accreditation, with criteria developed within DET, then implemented by the NSW Teacher Qualifications Advisory Panel (TQAP) without reference to relevant professional teacher associations. We suggest that the present accreditation criteria be reviewed in conjunction with professional teacher associations, DET and representatives of other system employers. In particular, there needs to be recognition that the traditional disciplines present within the TAS KLA also comprise discrete areas that are a part of the

subjects Design and Technology, and Technology (Mandatory). This means that a person qualified to teach Design and Technology, and Technology (Mandatory) may not necessarily be competent to teach some of the other TAS KLA subjects, such as Engineering Studies, Food Technology and/or Computing Studies.

There also needs to be a provision for teachers who have completed the Industrial Arts teacher re-training program to obtain an Industrial Arts major, or equivalent, by part-time study.

We have long sought the provision of Industrial Arts teaching degree programs at both Sydney and non-Sydney based universities. Industrial Arts discipline subjects at universities should be conducted by mainly fulltime academics with Industrial Arts qualifications and recognisable expertise. The specialist Industrial Arts facilities should be of a high standard and available to students for non-timetabled access.

We have also sought the establishment of flexible delivery teacher education programs, which can be completed through part-time study or via distance education (with some practical workshop components).

Industrial Arts teachers regret the abandonment of the undergraduate Industrial Arts teacher education programs at the universities of Sydney, NSW and Newcastle. The replacement program at Newcastle, in our view, does not meet the same standards that were achieved by the previous program in our opinion. Unfortunately the replacement program at the University of Sydney is less satisfactory. Programs have been established at Charles Sturt University and at Southern Cross University. In our opinion, these programs have potential but unfortunately have not met the quality of the earlier programs. We have been unable to obtain any information on the program running at the University of Western Sydney other than that available in the UAC handbook.

The Australian Catholic University is the only Sydney based university providing a teacher education program that has some of the Industrial Arts features that we would endorse, but it runs on a small scale. Lecturers from the Australian Catholic University program have regularly engaged in dialogue with Industrial Arts teachers. However most of the Australian Catholic University graduates do not seek employment with the government sector.

Industrial Arts professional associations look towards formal and informal dialogue with universities with a view to improving the program structure and content to meet the needs of curriculum delivery that actually exists in schools.

There is a need to appoint additional full-time, tenured academics qualified in the Industrial Arts discipline in universities to deliver Industrial Arts programs. We are opposed to the contract system of employment of lecturers adopted by the University of Sydney to deliver DET funded Industrial Arts teacher re-training programs. There is not a critical mass of Industrial Arts academics to provide the research, development and promote information exchange, dialogue and professional leadership

One of the significant problems universities have to manage within teacher education programs in general is the quality and quantity of the teaching practicum with insufficient financial resources to adequately fund supervised practicums. The practicum is a significant experience for student teachers. An alternative approach could also include the mentoring concept where experienced classroom teachers guide and support beginning teachers during the formative phase of their teaching career.

The majority of Industrial Arts teachers view the DET's focus on retraining teachers from other disciplines as a 'quick fix' solution. To a lesser extent the accelerated training of people from professional



and trade backgrounds is similarly viewed. Engineering Studies is neglected in these programs. Should these short-term approaches to Industrial Arts teacher education continue, opportunities must be provided for these teachers to gain access to professional learning, which will enable them to develop broader skills and knowledge, including the ability to confidently teach Engineering Studies to students.

**TERM OF REFERENCE 7: Any other matter arising from these terms of reference**

**Occupational Health and Safety (OHS).**

There are a number of concerns about the adequacy of skills and knowledge related to Occupational Health and Safety (OHS) in teachers emerging from some teacher education/retraining programs. There are anecdotal accounts that school students are discouraged from taking up Industrial Arts teaching when they become aware of the personal responsibilities, including the possibilities of heavy personal fines that Industrial Arts teachers have to accept in relation to OHS. Primary teaching and other secondary disciplines become far more attractive in contrast.

**Displays of student works**

The Board of Studies (BOS) and DET conducts a number of exhibitions/displays, which promote the achievements of students. All of the disciplines in the CA KLA have separate displays. There is no display for any Industrial Arts subject. Industrial Arts teachers, without any support from DET or BOS. Industrial Arts teachers conduct a display of outstanding Industrial Technology students' projects InTECH in conjunction with the very well attended Working With Wood Show in June each year at Fox Studios. This display is possible only due to the generous donation of space by the Wood Show promoter and is fully funded otherwise by the IATE. Student work is submitted from across the State and the display attracts many very highly favourable comments.

DET and BOS should accept responsibility for and fund the InTECH and use it as a means of promoting Industrial Arts teaching as a career choice in a very favourable setting.

## APPENDIX A

### KEY LEARNING AREAS (KLA's)

Secondary teachers, unlike primary teachers, study particular disciplines. Secondary schools are also expected to provide learning experiences and “content rigour” that will enable students to move from school into further discipline based education, training and work. However, secondary schools are still expected to build on basic skills and develop a range of knowledge and skills that will enable young people to function in and adapt to an increasingly complex world that they will enter as citizens, students and workers. In the last two years of secondary school a number of students are already engaged in employment and learning in TAFE colleges. Some students, however, are clearly focused on particular professional options and University programs and have selected subjects in Stage 6 accordingly.

The Qualification Requirements for Classification as a Primary School Teacher and the Qualification Requirements for the Senior Years of Schooling in the NSW Department of Education and Training<sup>3</sup> reflect these differences, but there is a need to examine some aspects of these requirements as they impact on Industrial Arts teachers and Industrial Arts teacher education.

Within the secondary sector in NSW, Industrial Arts as a discipline was adversely affected by the implementation of the “*Schools Renewal*” and “*Excellence and Equity*” initiatives of the late 1980’s and early 1990’s. As a consequence of these initiatives there were inappropriate changes to Industrial Arts teacher education programs.

The processes and outcomes of the McGaw Report “*Shaping Their Future*” and the Government’s White Paper on reforms for the HSC “*Securing Their Future*” were widely supported by Industrial Arts teachers. In particular, the abolition of the curriculum Key Learning Area (KLA) categorisation of subjects in Stages 5 and 6. In discussing aspects of Professor McGaw’s process Dr Jim McMorro claimed.

*“The reform process has produced a strong information base for under pinning decisions. It has been an open process; informed but not captured by interest groups. It has been characterised by consultation, investigation, reflection and where necessary, further investigation”.*<sup>4</sup>

We endorse McMorro’s comments but would add they could not be made about the processes that led to the establishment of KLA’s in “*Excellence and Equity*” mentioned above. But the McGaw initiatives applied only to the final two years of secondary education. KLA’s remain in other years and the

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<sup>3</sup> <https://www.det.nsw.edu.au/employment/recruit/index.htm> viewed on 9 January 2005

<sup>4</sup> Dr Jim McMorro. WHO’S DRIVING THE SCHOOL BUS? Address to the Australian College of Education NSW Chapter Conference convened by the North Harbour Regional Group 1 May 1998  
<http://www.austcolled.com.au/state.php?id=305> viewed 9 January 2005

Technological and Applied Studies (TAS) KLA nomenclature has been, and continues to be, applied in sometimes inappropriate and damaging ways elsewhere; particularly in relation to Industrial Arts.

It is interesting to examine the way in which the TAS KLA nomenclature has been applied when contrasted with other KLA's.

- Many KLA's; English, Mathematics, and Science (for example) contain subjects that are seen to be from the same discipline or very closely related disciplines.
- Within some other KLA's there are subjects from separate disciplines. A good example of this is the Creative Arts (CA), which contains Visual Arts, Music and Drama. We are unable to locate any attempt to see teachers from these separate disciplines as CA teachers or teacher education programs as CA degrees. This is further reinforced in the "Undergraduate Degree Requirements For Teaching In NSW Public Schools"<sup>5</sup> of the Teach NSW website. No mention of the CA KLA is made: the separate disciplines of Visual Arts, Drama, Music, and Dance are listed as discrete areas.
- In the Human Society and its Environment (HSIE) KLA, the various disciplines within it are seen as separate; e.g. History, Economics/Commerce and Geography.
- Within the TAS KLA there has been pressure to deconstruct natural disciplines within the KLA (e.g. Industrial Arts and Home Economics) and replace them with the more generic TAS designation.

The damaging misapplication of the TAS KLA nomenclature for Industrial Arts exists in DET Policy regarding teacher education given expression in Teach NSW<sup>6</sup> and more strongly in DET's Qualification Requirements for the Senior Years of Schooling in the NSW Department of Education and Training.<sup>7</sup> To illustrate this we provide the following contrast between the requirements for the TAS KLA<sup>8</sup> with that of the HSIE KLA.<sup>9</sup>

Method 1 for teacher accreditation of this policy provides for the

*"Completion of appropriate university studies endorsed by the Department of Education and Training for employment purposes."*<sup>10</sup>

Within the HSIE KLA the history example states:

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<sup>5</sup> <https://www.det.nsw.edu.au/employment/teachnsw/teacherqual.htm> viewed 3 February 2005

<sup>6</sup> <https://www.det.nsw.edu.au/employment/teachnsw/index.htm> viewed 30 January 2005

<sup>7</sup> <https://www.det.nsw.edu.au/employment/recruit/index.htm> viewed 9 January 2003

<sup>8</sup> <https://www.det.nsw.edu.au/employment/recruit/index.htm> Page 3 Method 1 Example 1. Viewed on 9 January 2005

<sup>9</sup> <https://www.det.nsw.edu.au/employment/recruit/index.htm> Page 8 Method 1 Example 1. Viewed on 9 January 2005

<sup>10</sup> <https://www.det.nsw.edu.au/employment/recruit/index.htm> Page 2 Method 1 Example 1. Viewed on 9 January 2005

*“Completion of a Bachelor of Education (history) through a higher education institution will qualify a teacher to teach history.”<sup>11</sup>*

A further example for the HSIE KLA is given which recognises subject integrity.

Yet within Method 1 for the TAS KLA, central importance is given to TAS and Design and Technology. There is no reference to Industrial Arts or other disciplines that in fact were assigned to the TAS KLA. This requirement, as it relates to Design and Technology, is now out of date given the introduction of the revised Stage 4 - 5 syllabuses in 2005.

Further, the issue of an *“underlying philosophy”* is raised within the TAS KLA in section 2.

*“The TAS KLA contains a diversity of subjects which are united by an underlying philosophy.”<sup>12</sup>*

There is no claim of an underlying philosophy in the sections dealing with other KLA's, but the claimed *“underlying philosophy”* within the TAS KLA remains unstated and does not cite any authoritative source for such a claim.

Industrial Arts teachers reject that a consensus position exists on the nature or acceptance of any *“underlying philosophy”* amongst practitioners within the so-called TAS KLA. We agree that there is a diversity of subjects, and some common methodology but a number of them fit neatly within the Industrial Arts discipline; others do not and have little similarity in terms of knowledge, skills, materials, and processes, etc. to Industrial Arts subjects.

We believe this is an indicator of an attempt to undermine subject integrity and eliminate, by a process of deconstruction and reconstruction, the traditional disciplines that were lodged within the TAS KLA. This process was not carried out in other KLA's, but has been very damaging to:

- Industrial Arts teacher self concept and morale,
- the content and availability of Industrial Arts Teacher education programs,
- the number of full-time university staff employed to deliver Industrial Arts related programs in teacher education institutes and the consequent diminution of research, development and professional dialogue emanating from universities in Industrial Arts education,

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<sup>11</sup> <https://www.det.nsw.edu.au/employment/recruit/index.htm> Page 8 Method 1 Example 1. Viewed on 9 January 2005

<sup>12</sup> <sup>12</sup> <https://www.det.nsw.edu.au/employment/recruit/index.htm> Section 2.1 Page 3 viewed January 9 2006

- the number of school leavers who may have considered becoming Industrial Arts teachers through information supplied by DET in teacher recruitment, e.g. TeachNSW<sup>13</sup> and to university personnel conducting undergraduate teacher training programs in Industrial Arts; and
- meeting the valid demand for subject integrity and rigour in subject content in secondary education within the Industrial Arts discipline.

We believe pressure to misapply the TAS KLA nomenclature still emanates from the Curriculum Support directorate of DET (under various names over the years) and in the advice that DET provides to teacher education institutions originating from this DET directorate. Industrial Arts teachers have resisted this and, where we have been able to have direct input, we have been able to argue the case for Industrial Arts discipline type programs e.g. in the DET funded retraining programs.

Further the once close and symbiotic relationship between classroom Industrial Arts teachers and tertiary lecturers engaged in Industrial Arts teacher training now only exists in isolated pockets. A similar breakdown is also apparent with universities and elsewhere in relation to ongoing professional development for existing teachers in the area of Industrial Arts.

Our experience and anecdotal sources reflect the findings of Ramsey's that

*“schools, employers and universities were disconnected from each other in the provision of initial teacher education and ongoing professional development.”<sup>14</sup>*

We believe the inappropriate application of the TAS KLA nomenclature and disconnection, mentioned above identified by Ramsey, are adversely impacting on the morale and functioning of IA teachers, the promotion and selection of IA teaching as a career choice and the quality of teacher training program within the secondary education sector. We see no evidence of DET officials recognising this let alone addressing these issues.

## **APPENDIX B**

### ***A PHILOSOPHY OF INDUSTRIAL ARTS***

In the very broadest terms Industrial Arts Technology Education embodies the totality of the interrelationship between people and their material environment in a technological sense. In this respect it is clearly defined as being separate and different to but not divorced from interrelationships between people and their material environment in a scientific, cultural or commercial sense.

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<sup>13</sup> <https://www.det.nsw.edu.au/employment/teachnsw/index.htm> viewed 30 January 2005

<sup>14</sup> Dr Gregor Ramsey's report, *Quality Matters* <https://www.det.nsw.edu.au/teachrev/welcome.htm> viewed on January 9 2005

Whilst industrial arts technology education has its own body of knowledge it also seeks to draw from the sciences and social sciences, to provide a basis of understanding of the nature of materials, the ways in which they may be modified, the skills and techniques used in applying them. Industrial Arts Technology Education also seeks to place technology within a social context by examining the ways in which peoples' lifestyles have been modified by the application of various technologies.

Within education, at the tertiary level, Industrial Arts Technology Education is reflected in the faculties of architecture, engineering and the applied sciences. Within TAFE it is reflected in the multitude of trade programs. Within primary and secondary education it finds expression in programs variously titled craft, science and technology, design and technology, technical studies, and industrial arts.

As well as developing the cognitive domain through a knowledge and understanding of materials and processes, a study within Industrial Arts Technology Education benefits a person through,

- a) helping them to understand and interpret the technological and industrial world in which we live,
- b) providing a basis for fine motor skill development through the manipulation of tools and equipment under a design, make, evaluate paradigm,
- c) developing beneficial attitudes towards safety, design, creativity, quality organisation, and co-operation, the environment; and
- d) developing a conceptual framework and an appreciation of spatial interrelationships.

# Appendix B



[www.dattaaustralia.com](http://www.dattaaustralia.com)

## Technologies Teacher Shortage Survey

### National Overview 2019

Survey conducted and compiled by

**Design and Technology Teachers' Association of  
Australia**

Published during **Design and Technologies**

14<sup>th</sup> – 20<sup>th</sup> Oct 2019      [www.dattaaustralia.com](http://www.dattaaustralia.com)

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Contents	Page
Introduction and Intent	2
Executive Summary	3
Survey Results	4
Comparisons	4
Additional 2019 Data	5
Recommendations	6
Appendices	7
1. A Letter “In Desperation”: An All Too Familiar Story	7
2. 2019 Respondent Comments	9
3. The Australian Curriculum: Technologies	11
4. Impacts of Technologies Education on Industry and Society	12

## DATTA Australia

The Design and Technology Teachers' Association of Australia (DATTA Australia) is the peak organisation representing **Design and Technologies** learning area educators.

Our Association is comprised of individual state and territory associations that exist to promote and improve the quality of Design and Technologies education in Australia.

Our members are also often involved in delivery of **Digital Technologies** and **Food Technology**, so these have been included in this survey to offer a national perspective on all areas of Technologies education in Australia.



# Introduction and Intent

This survey was intended to gain more accurate data on the perceived shortage of Technologies teachers across Australia.

This survey follows a similar process undertaken in 2013 which has given us accurate and credible longitudinal data and thus allowed us to make informed predications about the future condition of Technologies Education in Australia in 2025.

Along with a range of quantitative and qualitative data, we have also sought feedback from our members on the most appropriate steps to deal with this growing crisis.

The survey was conducted online in August 2019. It was completed by **404 schools** across Australia, representing **2,941 Technology teachers**.

## Assumptions of the Survey

In order to ensure that the responses covered all areas of Technologies Education, including Design and Technologies and Digital Technologies, it was requested that this survey only be completed by the Head of Technologies in each school.

Where multiple submissions were received from any school, only one set of data (the most complete) was included in the national totals.

## Results Overview

The Technologies Teacher Survey 2019 was fully completed by **404 schools** across Australia, representing **2,941 Technologies teachers**. The 2019 results are compared with results from a similar national survey conducted by DATTA Australia in 2013 which had 460 schools submit responses.

Predications for **2025** are based on continuing data trends should no significant interventions take place.

## Technologies Curriculum Area

Each state and territory in Australia has traditionally used different terminology and structures to deliver Technologies education. Those approaches still have an impact on how the learning area is delivered today. However, the Australian Curriculum has now provided a common language and framework that has a direct relationship to Technologies education across the country.

The Australian Curriculum: Technologies describes two distinct but related subjects:

- **Design and Technologies**, in which students use design thinking and technologies to generate and produce designed solutions for authentic needs and opportunities
- **Digital Technologies**, in which students use computational thinking and information systems to define, design and implement digital solutions

For more information, see Appendix 3: **The Australian Curriculum: Technologies**, Page 11

# Executive Summary

The data contained in the 2019 Technologies Teacher Shortage Survey raises significant concern for the future of relevant and rigorous Technologies education in Australia.

Technologies education prepares our students to be tomorrow's creative problem solvers and innovators. They will work in growth areas such as engineering, robotics, transport, construction, infrastructure and communications. They will be the innovators behind emerging fields like medical technology, generative design and renewable energies. Young people with these skills and knowledge will be essential to a successful Australian economy in the future.

The survey gathered data reflecting the experience of nearly 3,000 Technologies teachers. 96% of the schools surveyed have experienced difficulty in finding qualified Technologies teachers. This is at a time when we also see large numbers of teachers leaving the profession due to retirement or stress.

84% of schools are currently using teachers from a variety of other learning areas to make up the shortfall and to deliver the expected level of Technologies education required by National and State curriculum authorities. This puts increasing pressure on qualified Technologies teachers to upskill and support teachers from Visual Arts, Health and Physical Education, Mathematics and Science, who are placed in subjects which they are not qualified to teach. This also represents a significant and growing Work Health and Safety risk to those teachers and their students.

39% of schools surveyed have reduced the amount of Technologies education they offer, and 68% of these schools have indicated that the quality of the remaining programs has also been affected by the shortage of qualified teachers.

There is also a serious concern that Technologies education is being neglected in the context of STEM, with 71% of Technologies faculties in the schools surveyed indicating that they have received no direct STEM funding, resources or support.

If we as educators, leaders and parents believe that technology and innovation are a part of a successful and prosperous 21<sup>st</sup> Century Australia, then the results of this survey represent a significant risk, not just to that preferred future but also to the safety of our students and teachers.

[In our professional and informed opinion, if significant action is not taken as outlined in this report, the Technologies learning area in Australia will be unsustainable by 2025.](#)

DATTA Australia would like to thank the remaining qualified Technologies teachers, and those stepping up from other learning areas, for their ongoing efforts to deliver quality Technologies education wherever and however possible as they face this crisis in Australian education. We trust that those who are in a position to influence and take action are listening and that help is on the way.

Peter Murphy  
**President DATTA  
Australia**

## Comparative Survey Results

Results of the 2013 and 2019 surveys are compared below, with extrapolation of the data to 2025 following its current trend.

“Qualified” was defined in the survey as those being teachers who had received Technologies teacher training as one of their methods within their tertiary teaching qualification.

	2013	2019	2025
Schools having difficulty finding qualified Technologies teachers	<b>92%</b>	<b>96%</b>	<b>100%</b>
By 2025 100% of schools will have difficulty finding qualified Technologies Teachers			

	2013	2019	2025
Schools using unqualified teachers from other learning areas due to shortage of qualified Technologies teachers	<b>60%</b>	<b>84%</b>	<b>100%</b>
By 2025 100% of schools will be using unqualified teachers from other learning areas to deliver Technologies Education			

	2013	2019	2025
Schools that have reduced their Technologies Education programs due to shortage of qualified teachers	<b>28%</b>	<b>39%</b>	<b>50%</b>
By 2025 over 50% of schools will have reduced their Technologies education due to lack of qualified teachers			

	2013	2019	2025
Schools that believe the quality of their Technologies Education programs have been compromised by the shortage of qualified teachers	<b>51%</b>	<b>68%</b>	<b>85%</b>
By 2025 approximately over 80% of schools will have the quality of their Technologies education programs compromised by lack of untrained teachers			

## Additional 2019 Survey Data

To further investigate the effects of Technologies Teacher shortages, additional data was collected in the 2019 survey.

Percentage of Technologies Teachers predicted to leave the teaching profession over the next five years.

2019

**26%**

**By 2025 over a quarter of our current Technologies Teachers will have retired or resigned due to stress relating to the shortage of qualified Technology Teachers.**

Schools that believe Work Health and Safety for students and teachers is being compromised in the Technologies learning area due to widespread use of unqualified teachers from other learning areas

2019

**70%**

**By 2025 Work Health and Safety for students and teachers in the Technologies learning areas will be a serious concern in most Australian schools.**

Number of qualified Technologies teachers in surveyed schools that come from an industry or professional background

2019

**42%**

**Financial barriers to retraining as a qualified Technologies teacher are a significant threat to the future of the Technologies learning area.**

Number of schools that have indicated they have received no direct STEM funding, resources or support

2019

**71%**

**As a neglected area of STEM education in terms of funding, resources or support, students will lose vital opportunities to integrate creative problem-solving skills and new technologies into their learning experience.**

# Recommendations

The following strategies have been suggested and supported by DATTA Australia's committee and its members who responded to the 2019 survey. These strategies have been developed following extensive consultation with Technologies Education leaders, academics and both qualified and unqualified Technologies teachers in each state.

## **1. Upskilling of existing teachers through Professional Development courses**

Funding state-based upskilling courses for existing teachers, supported by DATTA Australia and RTOs, is essential. We must focus on Work Health and Safety in the Technologies learning area, effective pedagogies for teaching design and specialist skills, and safe operation of tools and machinery. Schools in most states have no incentive to pay for this type of upskilling as they can currently appoint any available teacher to teach in the Technologies learning area without Technologies education qualifications.

## **2. Industry supported National Technologies teacher recruitment campaign**

Potential candidates must be made aware of the fantastic opportunities in contemporary Technologies Education, which has evolved greatly over past 10 - 20 years. Poor perception of the learning area has been identified as a major cause of potential candidates not pursuing a career in Technologies Education. This perception has been compounded by the shortage of qualified Technologies teachers in schools, resulting often in the poor delivery of Technologies Education in many schools.

**3. Removing financial barriers through subsidisation of initial Technologies Teacher education and increased starting salaries for candidates who retrain from industry or professional backgrounds** Technologies Education relies heavily on suitable candidates leaving industry or professional positions to retrain as educators. Cost has been identified as a significant barrier for those considering retraining. A financial recognition of prior experience would be a significant motivator in people choosing to undertake a lengthy and demanding period of study.

## **4. Improved and consistent initial Technologies Teacher education**

A National Standard for all Technologies Education courses to ensure consistent and rigorous Technologies Education training throughout all universities should be developed, in consultation with DATTA Australia. This will ensure all states have contemporary and consistent Technologies Teacher registration standards and processes.

## **5. Mandate that all schools employ a Technologies technician**

It has been identified through our consultation that one way to greatly improve the safety of the Technologies Learning area for teachers and students is to employ a technician who is qualified and capable of using machines and supporting students and teachers during school hours. Many schools expect teachers, whether qualified or not, to supervise students, handle heavy materials and operate dangerous machinery at the same time.

# Appendix 1

## **“In Desperation”: An All Too Familiar Story**

A letter received from one of our 2019 survey respondents - 13 August 2019

“I completed the survey and hopefully included enough factual feedback to support our quest!!!

Just thought I would share my experience from the last two weeks, as it is good supportive evidence for a massive recruitment drive.

My woodwork teacher took ill at the end of Semester 1 and was unable to return until Monday this week. This left us covering classes with a retired (but VIT registered) Tech teacher. My other woodwork teacher has had to shuffle her timetable around to cater for his senior classes and I have had to find time to teach our CRT how to teach the design process. See, even when we can scrounge up a trained teacher they don't even know how to teach the design process. I have monitored my time spent these last few weeks just making sure classes are organised, planning each class for the juniors (CRT does not do this even though there is a comprehensive unit, week by week breakdown) and the time spent is phenomenal.

In addition to my current load of 29, yes 29 which is 4 over (I agreed to this so our senior D&T classes would run knowing we would never get any applicants to replace the teacher who was ill) I spent 4 hours getting stuff ready, checking materials, ordering surplus and undertaking a tool stocktake to ensure nothing goes missing. All this on top of putting out spot fires in my domain and developing new curriculum for our new school and ensuring that students are actually getting taught stuff!

This is an example of what the teacher shortage looks like on a day to day basis. Further to this my other teacher has given 2 weeks' notice and will finish in a fortnight. If you read the top half again and then double it, this will be my workload until I get a replacement teacher. The CRT can only do so much due to pension constraints so what we do in this situation is drag in anyone who can hold a hand tool from our immediate staff.

This means that I have to teach not only one teacher how to teach our process (safety doesn't get a look in at this stage) but most likely 4 teachers. Student outcomes are continually compromised due to the lack of competent staff. This leads to a skills/problem solvers shortage which affects the economy etc.

It's beyond dire. My take on it now is that the lack of available staff coupled with a ridiculous teaching load as the Domain Leader has led me to contemplate becoming an apprentice butcher, seriously. The stress and anxiety this situation is causing me would not be any different to other domain leaders in regional areas.

We need the option to get willing professionals from all areas into the system on an equitable pay structure and flexible university hours.

In the meantime, I will be having the discussion with my wife about doing another apprenticeship! In desperation

NB from Shepparton, Victoria”

## **Appendix 2**

### **Comments from 2019 Survey Respondents**

#### **On the Value of Technologies Education**

“Technologies is a critical area in a student's education, particularly given the emphasis placed on creative and critical thinking abilities by industry. Technologies teachers have to bring a range of skills, knowledge and ability to schools to be able to effectively teach across specialties, which involves targeted education, placement and preferably industry experience.”

#### **On the Effects of Teacher Shortages**

“If no significant action is taken many schools in NSW will struggle to adequately implement our mandatory and elective courses. It is already extremely difficult to find suitably qualified staff and a large percentage of those staff are looking at retiring in the next 5 years. If a staffing solution is not found many schools will have no option but to staff mandatory and elective courses with untrained and unqualified staff. This may lead to a reduction in the learning opportunities provided to students, a drop in their academic success, exposing students to potential hazards in the work environment and students graduating high school without the skills necessary for an evolving workforce. Technologies subjects are at the forefront of equipping students with the knowledge and skills necessary to be creative, innovative and critical thinkers. Skills that are now pre-requisites for many future career paths.”

“Urgent action is needed to supply secondary colleges with well-educated Technologies Teachers, from an improved tertiary education, that reflects the current and emerging industry technologies, to provide quality education for future students to equip them with the needs of the economy.”

“We have implemented a new and challenging syllabus here in NSW with little to no fully qualified teachers to implement it. We need action.”

“Staff find it difficult to take leave or relieve in higher positions due to trained casuals' availability. This affects health and wellbeing as well as stymies professional advancement.”

“I'm looking to leave within 5 years, as I have no support as a teacher and coordinator.”

#### **On the Reduction of Technologies Education**

“Subject areas will not continue if they are not able to be staffed. We have significant student interest and uptake of these subjects, but these students will not have access if staffing is not addressed. We are doing our best to provide a holistic education for our students. In a world where technology knowledge is essential, Australia's education system is letting students down.”

“Schools across the state are closing facilities due to lack of staff available or lack of skills and knowledge.”

“There will be a lot of schools that are unable to deliver Technologies subjects into the future.”

“As there are going to be insufficient teachers to deliver subject options, I feel in the next few years that subject offerings to students will decline as there will be insufficient teachers to deliver appropriate courses.”

## **On Teacher Recruitment**

“The question is “Why would anybody want to be a Technologies Teacher?”, and it is important that there is a clear incentive that is beyond the normal rhetoric, and the pathways to becoming a Technologies Teacher are easy, cost effective (scholarships?) and achievable, especially for people who are currently employed in industry and have fixed financial commitments which may normally prevent swapping employment for further education.”

“It is getting to crisis stage - we don't have enough well-trained, highly engaged new teachers coming through the system. The pathways through from undergraduate to Technologies teacher training are unclear and unknown by most in the discipline area and universities and Federal and State Education departments are taking no responsibility for ensuring the supply of teachers in the Technologies area. This cannot be a 'market-led' training situation - direct action is desperately needed to increase the number of new Technologies teaching graduates. The learning area is vitally important for innovation in the design and manufacturing industry, and to develop a Technology-aware community, but it is dying out due to lack of new teaching staff, and limited energy and currency in existing staff.”

## **On Student Employment and Industry**

“Technologies learning area delivers what employees are looking for – problem-solving, teamwork, project-based learning – reading literacy texts in a practical context, performing maths in real situations. How is the current shortfall in the workforce going to be overcome if our students don't have the teachers to teach them the skills?”

“Nothing will be designed or made in Australia. There will be no innovation in the country.”

“Australia will be left behind globally as it will not be equipped to deal with industry 4.0.”

“I would like them to know that the largest emerging field for jobs and development of Australia's future is being neglected because of a lack of proper training and funding for teachers and schools.”

## **On Digital Technologies**

“Subsidised external PD for teachers so that schools can afford to use it to help develop stronger skills and confidence in Technologies, particularly the Digital Technologies.”

“We have such a shortage of Engineering and Digital Technologies teachers that our students will not receive adequate training in years to come as our ageing teaching population retires.”

“The shortages in Digital Technologies and Design and Technologies teachers is hampering the ability to advance new employment opportunities in the areas of data sciences and advanced manufacturing vocations.”

“Certain subjects will disappear from some schools such as the Computing / Digital subjects.”



## **On STEM**

"STEM is being pushed in the media but we do not have enough adequately trained staff to deliver these courses. There are large numbers of staff who are currently teaching the new Digital Technologies syllabus who have not had adequate training in this area and are struggling to cope with this as well."

"This area is crucial to Australia's future - STEM. Yet there are no teachers. More status is needed with regards to this teaching area."

## **On Regional Issues**

"The regions suffer this issue the most. Without attention the regions will fare far worse in any achievement data analysis and suffer the subsequent loss of status. It will contribute further to a decline in the quality of education in the regions particularly in publicly funded schools. It seems as though the leaders / influencers of the entire educational sector nationally DONT CARE!"

## **On Safety**

"Schools will stop delivering Tech subjects and the problem-solving skills will be lost. More accidents in classrooms due to untrained teachers."

"Student and equipment safety at extreme risk due to lack of training and knowledge. Unfair workload on qualified teachers to cover / train unskilled teachers in our area. We need university specific courses."

## **On the Need for Technicians**

"I have wanted to quit without a Tech assistant. I can't be expected to do the level of job I know would do me proud whilst doing the job of two. For years it was only me in the Technologies department and I found it really hard. I see Technician Assistant support the most vital part to keeping Technologies teachers."

# Appendix 3

## The Australian Curriculum: Technologies

The Australian Curriculum: Technologies describes two distinct but related subjects:

- **Design and Technologies**, in which students use design thinking and technologies to generate and produce designed solutions for authentic needs and opportunities
- **Digital Technologies**, in which students use computational thinking and information systems to define, design and implement digital solutions.

### Rationale

Technologies enrich and impact on the lives of people and societies globally. Australia needs enterprising individuals who can make discerning decisions about the development and use of technologies and who can independently and collaboratively develop solutions to complex challenges and contribute to sustainable patterns of living. Technologies can play an important role in transforming, restoring and sustaining societies and natural, managed and constructed environments.

The Australian Curriculum: Technologies ensures that all students benefit from learning about and working with traditional, contemporary and emerging technologies that shape the world in which we live. By applying their knowledge and practical skills and processes when using technologies and other resources to create innovative solutions, independently and collaboratively, they develop knowledge, understanding and skills to respond creatively to current and future needs.

The practical nature of the Technologies learning area engages students in critical and creative thinking, including understanding interrelationships in systems when solving complex problems. A systematic approach to experimentation, problem-solving, prototyping and evaluation instils in students the value of planning and reviewing processes to realise ideas.

All young Australians should develop capacity for action and a critical appreciation of the processes through which technologies are developed and how technologies can contribute to societies. Students need opportunities to consider the use and impact of technological solutions on equity, ethics, and personal and social values. In creating solutions, as well as responding to the designed world, students consider desirable sustainable patterns of living, and contribute to preferred futures for themselves and others.

### Aims

The Australian Curriculum: Technologies aims to develop the knowledge, understanding and skills to ensure that, individually and collaboratively, students:

- investigate, design, plan, manage, create and evaluate solutions
- are creative, innovative and enterprising when using traditional, contemporary and emerging technologies, and understand how technologies have developed over time
- make informed and ethical decisions about the role, impact and use of technologies in the economy, environment and society for a sustainable future
- engage confidently with and responsibly select and manipulate appropriate technologies – materials, data, systems, components, tools and equipment – when designing and creating solutions
- critique, analyse and evaluate problems, needs or opportunities to identify and create solutions.

<https://www.australiancurriculum.edu.au/f-10-curriculum/technologies>

# Impacts of Technologies Education on Industry and Society

## Creating Preferred Futures

The Technologies curriculum provides students with opportunities to consider how solutions that are created now will be used in the future. Students will identify the possible benefits and risks of creating solutions. They will use critical and creative thinking to weigh up possible short- and long-term impacts.

This is critical to all areas of industry and society as students will learn to identify possible and probable futures, and their own preferences for the future. They develop solutions to meet needs, considering impacts on liveability, economic prosperity and environmental sustainability.

## Project Management

Key to all industries, students will develop skills to manage projects to successful completion through planning, organising and monitoring timelines, activities and the use of resources. This includes considering resources and constraints to develop resource, finance, work and time plans; assessing and managing risks; making decisions; controlling quality; evaluating processes and collaborating and communicating with others at different stages of the process.

Crucial for our future society, all Technologies students are taught to plan for a sustainable use of resources when managing projects and take into account ethical, health and safety considerations and personal and social beliefs and values.

# Transferable Thinking Skills in Technologies

Careers relating to Design and Technologies are often thought to be concerned only with designing and making / engineering. Digital Technologies is viewed as linking directly to a range of ICT professions. While this has been the case for many students, it is also true that through Technologies education, a range of transferable 21<sup>st</sup> Century thinking skills are taught that are central to all of these areas and beyond.

## Systems Thinking

Systems Thinking is a holistic approach to the identification and solving of problems where the focal points are treated as components of a system, and their interactions and interrelationships are analysed individually to see how they influence the functioning of the entire system.

## Design Thinking

Design Thinking involves the use of strategies for understanding design needs and opportunities, visualising and generating creative and innovative ideas, planning, and analysing and evaluating those ideas that best meet the criteria for success.

## Computational Thinking

Computational Thinking is a problem-solving method that is applied to create solutions that can be implemented using Digital Technologies. It involves integrating strategies, such as organising data logically, breaking down problems into parts, interpreting patterns and models and designing and implementing algorithms.