The Shop is Open but the Customers are Staying Away: Student Perceptions towards Design and Technology in a Western Australian Context

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Abstract

The number of students studying Design and Technology (D&T) education at Edith Cowan University (ECU) in Western Australia (WA) has fallen over the past few years. This is despite an increasing shortfall in the workplace leading to many graduate job opportunities. In addition to this the demographics of the student population in D&T varied greatly from that of education students more generally with a very high male proportion.

In the context of this the researchers set out to examine the perceptions of existing school of education students towards D&T to determine if preconceived views relating to the area of D&T were discouraging study in the area. An online survey was developed and delivered in 2014 via a Qualtrics (Qualtrics, Provo, UT) commercial survey engine, with questions influenced by a paper survey used at the University of Waikato in New Zealand. The voluntary participation survey was administered to School of Education students via the universities learning management system. A total of 173 student responded 72% of whom were female giving a sample that roughly parallels the schools male/female population.

Amongst the findings is a clear indication that before entering university many students' views towards design and technology are biased and stereotyped based upon school experiences. In particular the perception is that, while seen as creative, design and technology is about men making things. This paper discusses these findings and their implications for the School of Education.

Key Words: *Teacher education, student perceptions, online surveys, design and technology (D&T).*

Introduction

This paper reports upon a small research project carried out in the School of Education at Edith Cowan University (ECU) in Perth Western Australia (WA), that sought to determine the perceptions of our students towards the subject of Design and Technology (D&T). In the paper the authors will describe the setting and method for gathering the data, followed by a discussion of selected findings. The paper will conclude with the implications for D&T at ECU

Edith Cowan University (ECU), situated in the metropolitan area of Perth Western Australia, is a large university with approximately 23,000 students, 14,105 of whom are female. These students are spread over three campuses and about 20% of all students are international. Historically, ECU has its foundations in teacher education and training and its Faculty of Education and the Arts is the largest in Western Australia, with 7529 students (6096 equivalent full-time student load) and 263 academic staff (ECU, 2014).

The research was driven by the need to address falling D&T student numbers within the four-year degree program. In this program students graduate with a Bachelor of Education (B.ED) specialising in D&T. Numbers had been steadily declining, while at the same time demand for graduates was at an all time high.

Currently in Australia we are at a point of change as a new National Curriculum is being rolled out across the nation. The implications of this are great for D&T in Western Australia, as it becomes an area less focused upon the final product and more focused on the process of design and production (Australian Curriculum and Assessment Reporting Authority, 2014). It is now about the problem solving process of design applied across a wider range of years and subjects.

Upon taking over as coordinator of the programme in late 2014 one of the authors set out to address this decline, by first examining existing enrolment data and conducting the research project described here.

Internal (unpublished) enrolment data showed that while around 10 male students enrolled each year there were only one or two females and often none. This is despite the four thousand plus enrolment of the School of Education (the biggest school in the Faculty of Education and Arts) being approximately 75% female. This led the researchers to pose the question: Is D&T perceived as being a male oriented subject? Given the lack of female students enrolling as D&T majors in the B.Ed. programme, we wondered whether this perception was more widely held. To investigate this issue, it was decided to conduct a survey of our current students to determine their perceptions of D&T.

Design and technology education in Western Australia is on the verge of a time of flux, with the introduction of the first Australian National Curriculum that is currently being implemented. Figure 1 shows the change of emphasis from technologies (product and processes) to design and this tension between practical and theoretical has been an ongoing tension over the history of D & T curricula (Williams, 1996). This is combined with the positioning of the subjects of computing, home economics and design and technology under the one area of design and technologies. This change will lead to a number of existing teachers being uncomfortable as they have never received training in design and also make the teaching of the subject attractive to a different range of potential students. Changes implemented to encompass design over the past year in the ECU course have led to resistance from the more practical of our students, showing how great a paradigm shift this emphasis is for some teachers and potential teachers. Traditionally there has been perhaps a change the name but not what we teach approach to new curricula in the area. It is in this context that the current research is being undertaken.

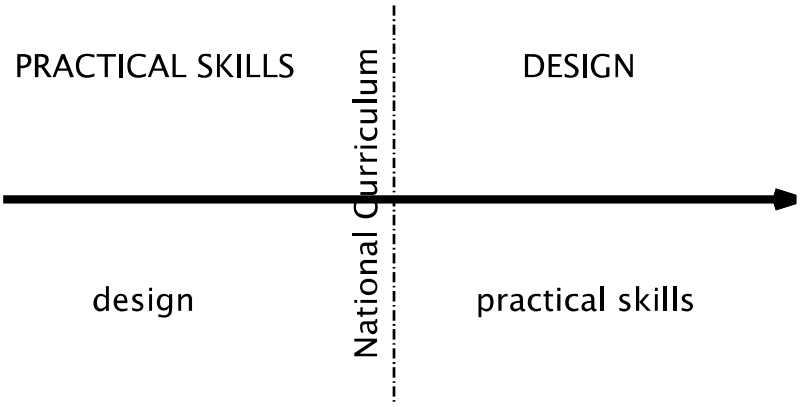

Figure 1 Representation of the recent change in emphasis in D & T education in Western Australia

Method and participants

The investigation was undertaken via an online survey developed and delivered via the Qualtrics survey engine. A paper based Science, Technology, Engineering and Mathematics (STEM) survey developed by, and used at, the University of Waikato (Forret et al, 2013,pp.166-172) was used as a starting point for the questions and these were added to and adapted for local conditions. Education students were informed of the survey via a link placed on the ECU Blackboard Learning management system. Figure 1 shows two screens captured from the survey and illustrates how it was designed with an uncluttered layout and utilised radio buttons to facilitate accurate data entry. A progress bar indicated how far participants were through the survey to encourage them to continue through to the end.

The survey contained the following sections.

- Demographics
- Perceptions of Design and Technology

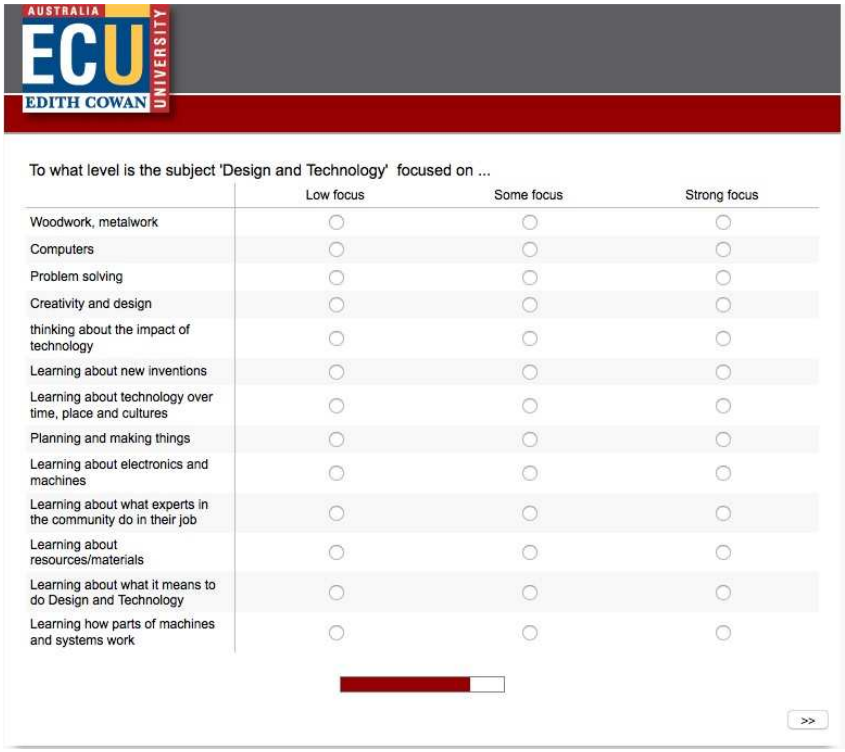

Figure 2 Screen capture from the online survey

In all 173 students from the School of Education at ECU completed the survey. Twenty eight percent of the respondents were male meaning the ratio of male to female students was a fair reflection of the actual ratio among Education students at ECU. Seventy four percnet of respondents were under thirty years old.

Overall the samples were a reasonable representation of the student population under examination.

Additionally of interest to the authors was how many of the sample had studied D&T at school. Overall 71% of students reported having studied D&T at school, 80% of males and 68% of females. This represents the two main areas of interest pursued throughout the paper – gender and whether or not the respondents had studied D&T at school. These two areas were chosen because the majority of the B.Ed. intake is directly from the school system and so any preconceptions regarding the subject are likely to have been developed though past study. Also the perception of females was of particular interest due to the small numbers of students studying the subject at university.

Findings

Results presented here pertain to the results of interest that emerged from analysing the survey data. For the purposes of this paper only those results with particular relevance to the topic of this paper are presented. Most come from the statistical analysis of data from the closed questions within the survey but some pertain to the results from the interpretation of open-ended questions.

Impact of Studying D&T at School

The researchers were interested to know how many of the sample had studied D&T at school, as this was likely to affect their perception of the subject and allowed some separation of this group from the general population of those that have not studied D&T. Also of interest were how many of those that studied at school pursued studying D&T in the School of Education at ECU (Table 1).

Table 1 *Studied D&T at School vs Studying D&T at ECU*

		Studying D&T at ECU	
		Yes	No
Studied D&T at School	Yes	22 (17.9%)	101 (82.1%)
	No	3 (6.0%)	47 (94.0%)
Total		25 (14.5%)	148 (85.5%)

The cross tabulation in Table 1 shows a significant difference ($X2=4.06$, $N=173$, $p=0.04$) was found with those who had studied the subject at school being more likely to study the subject at university 18% vs. 6% of respondents. That is studying D&T at ECU is not independent of whether or not the student studied D&T at school and conversely it is more likely that those who not study D&T at school will also not study the subject at university.

Perceptions of D&T

The respondents were asked a number of questions relating to their perceptions of the D&T Subject area and these are summarised in Figure 2.

The first of these was: *How important you think Design and Technology is to Australia as a country?* D&T is perceived by respondents to be of great importance to Australia. Given the age of the respondents this perception is likely to have come from their experiences in secondary school. However, despite this perception the vast majority of them have chosen not to study D&T at tertiary level.

The respondents had the opportunity to give a reason for their response and the most common reasons given were that

- D&T teaches useful skills that are transferable to other areas of life
- D&T gives students a chance to see if they would like to pursue the subject as a career, particularly for non-academic students

That respondents perceived the subject to be more practical than creative was expected. However, it is surprising given the nature of students' school experiences that the results did not tend even further toward the practical side of the scale, as the current curriculum in WA schools is very practical in nature.

- D&T is perceived as mostly a masculine subject with only a few respondents choosing the feminine or mostly feminine options.
- Respondents believe that D&T is more *Industry* than *Hobby* focused. This perception could deter those who do not plan to be tradespeople from studying the subject at school.

- Feeling comfortable within the workshop environment was encouraging with the trend towards the comfortable end of the scale, however there are over 20% who are uncomfortable.

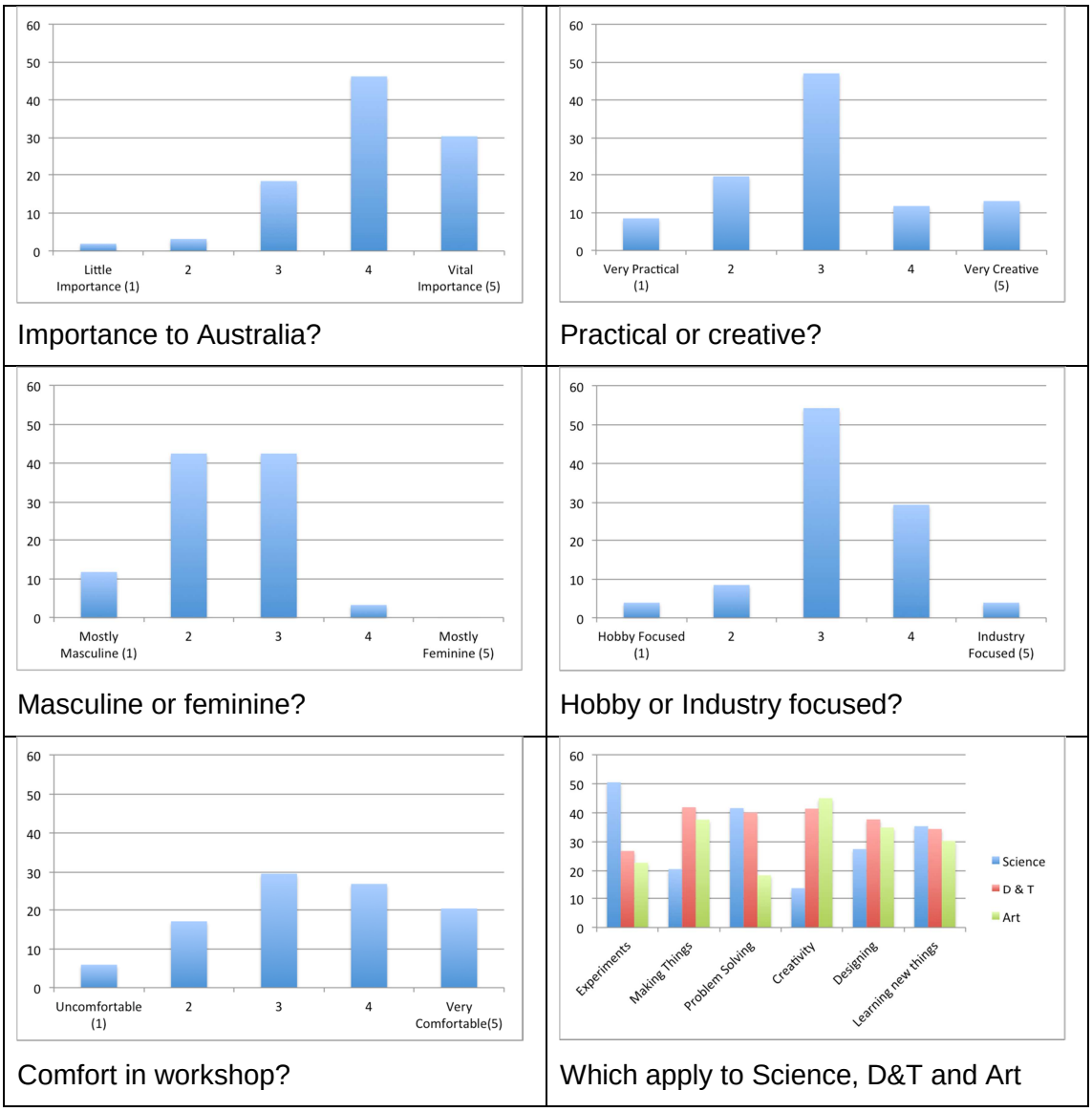

Figure 3 Respondent perceptions of the D&T subject area.

The final graph in Figure 1 looks at the three subjects, science, art and D&T and asked respondents to rate them in terms of various criteria such as creativity, problem solving etc. D&T is perceived by many respondents on a parallel with art as a creative and practical subject and with science as a problem-solving subject.

Overall the closed question survey data shows a positive attitude towards D&T, with the subject being perceived as vital to Australia's future and balanced between the creative and the practical. While there is a tendency towards the masculine it is not overwhelming.

The open question, which asked, *what type of person would you find in a D & T workshop?* Was more revealing with the over whelming response being *mostly men*, which in fact reflects the reality of the subject area currently. When asked why they did not study D&T at University,

the top responses where *not interested/other subject preferred*, followed by *lack of prior background/lack of natural ability*. Given the majority of respondents had reported having studied wood, metal and tech drawing at school, this last statement shows for some students at least their school experiences made them aware of this.

Focus of D&T

A number of questions asked the respondents to give their perceptions regarding the focus of D&T. These questions are shown in Figure 3.

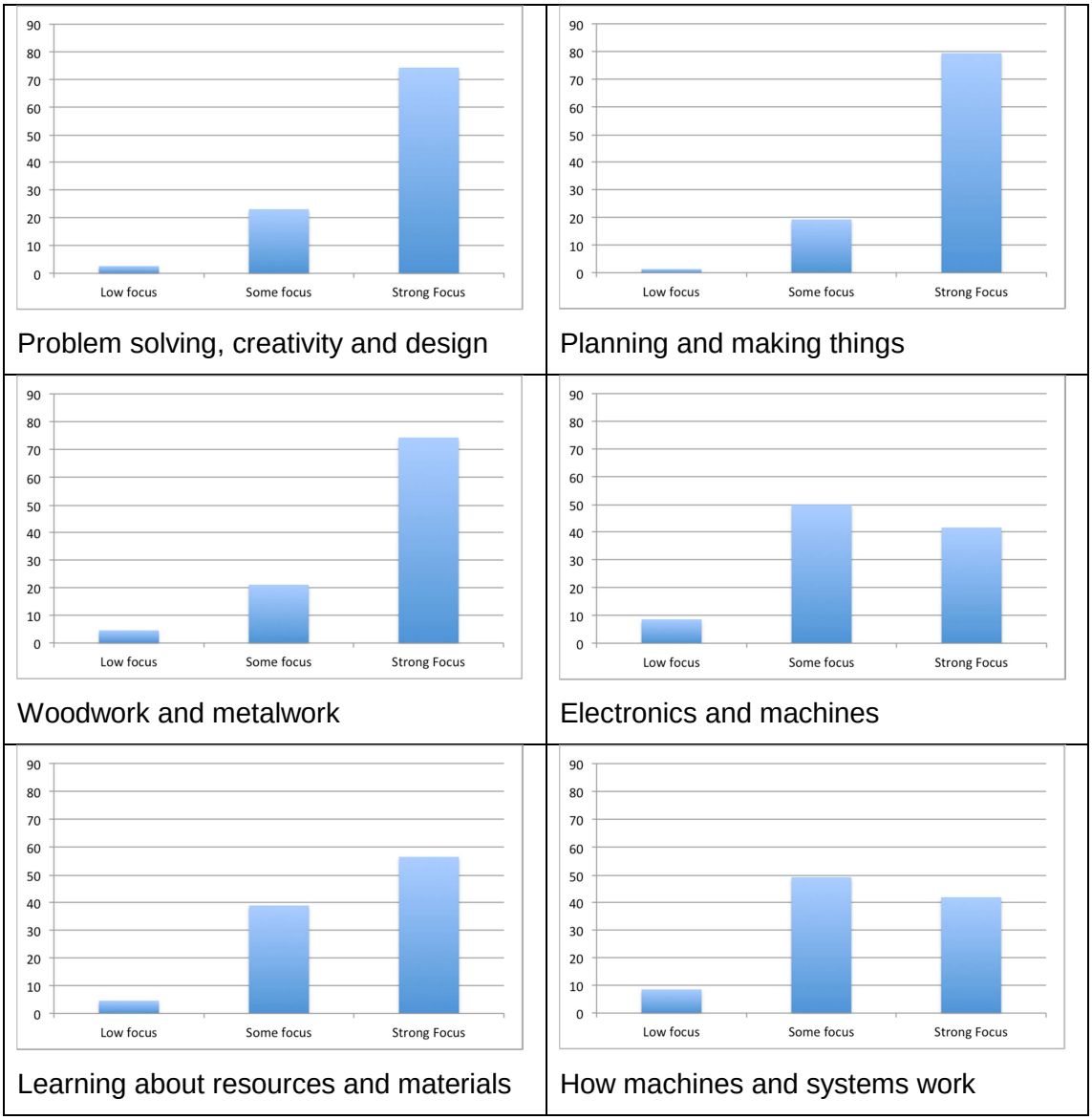

Figure 4 Respondents perceptions of the focus of D&T

The results from these questions reinforced the message that respondents see D&T as problem solving, creative and design focused, but also very practical and largely relating to the working of the materials of wood and metal.

Breakdown by whether respondents studied D&T at school

Given that the researchers suspected that these perceptions of D&T and the focus of D&T might have come from school experiences, the data was further interrogated by creating a crosstabulations of data regarding the respondent's perceptions of D&T versus whether or not the respondents studied D&T at school. This is shown in Table 2.

Table 2 *Crosstabulation of Questions by Studied in School (SiS*)

	Little Importance to Australia (1) to Vital Importance to Australia (5)				
SiS	1	2	3	4	5
Yes	0 (0.0%)	4 (3.4%)	18 (15.1%)	59 (49.6%)	38 (31.9%)
No	3 (7.7%)	1 (2.6%)	11 (28.2%)	14 (35.9%)	10 (25.6%)
Total	3 (1.9%)	5 (3.2%)	29 (18.4%)	73 (46.2%)	48 (30.4%)
Very Practical (1) to Very Creative (5)					
	1	2	3	4	5
Yes	6 (5.2%)	25 (21.7%)	59 (51.3%)	12 (10.4%)	13 (11.3%)
No	7 (18.4%)	5 (13.2%)	13 (34.2%)	6 (15.8%)	7 (18.4%)
Total	13 (8.5%)	30 (19.6%)	72 (47.1%)	18 (11.8%)	20 (13.1%)

Table 2 shows a statistically significant difference between the perceptions of those that studied D&T at school and those that didn't (X2=13.52, df=4, N=173, p=0.01) with those that had studied the subject more likely to value D&T highly.

Additionally in Table 2, those students who studied D&T at school were less likely to have divergent views on whether the subject is practical or creative (X2=10.51, df=4, N=153, p=0.03). There were 51% who believed it was in the middle between the two with 5% at the practical extreme and 11% at the creative end. While for those who had not studied the subject there were equal numbers 18% insisting it was one or the other and 34% in the middle. This would indicate that for those who had not studied the subject had more divergent views as to what the subject entails.

Table 3 *Focus on Materials by Studied at School*

		D&T focused on Woodwork & Metalwork		
		Low focus	Some Focus	Strong focus
Studied D&T at School	Yes	4 (3.5%)	19 (16.4%)	93 (80.2%)
	No	3 (8.3%)	13 (36.1%)	20 (55.6%)
	Total	7 (4.6%)	32 (21.1%)	113 (74.3%)

Equally interesting is that those who studied the subject at school also have a narrower view as to what is the focus of the subject (see Table 3) is with over 80% believing that D&T is strongly focused Woodwork and Metalwork while only 51% those who have not studied the subject believing that was the case (X2=8.74, df=2, N=152, p=0.01). This would come from both the

structure of most Western Australian secondary schools where rooms 9and thus the subject taught) are of the woodwork or metalwork variety.

Overall studying Design and technology at school has an important influence on both attitudes towards the subject and also the likelihood of studying it at university level.

Breakdown by Gender

Given that the researchers suspected that respondent perceptions of D&T and the focus of D&T might be related to gender the data was further interrogated by creating a crosstabulations of data regarding the respondent's perceptions of D&T versus gender. This data can be seen in Table 4.

Table 4 *Crosstabulation of Questions by Gender*

	Uncomfortable in workshop (1) – Comfortable in workshop (5)				
Gender	1	2	3	4	5
Male	1 (2.2%)	9 (20.0%)	6 (13.3%)	12 (26.7%)	17 (37.8%)
Female	8 (7.5%)	17 (15.0%)	39 (36.4%)	29 (27.1%)	14 (13.1%)
Total	9 (5.9%)	26 (17.1%)	45 (29.6%)	41 (27.0%)	31 (20.4%)
	Hobby Focused (1) – Industry focused (5)				
	1	2	3	4	5
Male	4 (8.9%)	3 (6.7%)	24 (53.3%)	13 (28.9%)	1 (2.2%)
Female	2 (1.9%)	10 (9.3%)	59 (54.6%)	32 (29.6%)	5 (4.6%)
Total	6 (3.9%)	13 (8.5%)	83 (54.3%)	45 (29.4%)	6 (3.9%)
	Mostly Masculine (1) – Mostly Feminine (5)				
	1	2	3	4	5
Male	6 (13.3%)	17 (37.8%)	21 (46.7%)	1 (2.2%)	0 (0.0%)
Female	12 (11.1%)	48 (44.4%)	44 (40.7%)	4 (3.7%)	0 (0.0%)
Total	18 (11.8%)	65 (42.5%)	65 (42.5%)	5 (3.3%)	0 (0.0%)
	Very Practical (1) – Very Creative (5)				
	1	2	3	4	5
Male	5 (11.1%)	11 (24.4%)	23 (51.1%)	4 (8.9%)	2 (4.4%)
Female	8 (7.4%)	19 (17.6%)	49 (45.4%)	14 (13.0%)	18 (16.7%)
Total	13 (8.5%)	30 (19.6%)	72 (47.1%)	18 (11.8%)	20 (13.1%)

Males overall report being more confortable in a workshop setting with 38% reporting being very comfortable vs. only 13% of females ($X2=16.98$, $df=4$, $N=152$, $p<0.01$). However the somewhat comfortable category (4) was equal at 27%.

There is a tendency for males to see D&T as more industry focused 9% vs.2% females who see it as hobby focused 5% vs. 2%. However, this result was not statistically significant.

Both genders see D&T as a masculine subject 54% with only 3% seeing it as feminine and 42% who see it as neither. There was no statistically significant difference between the perceptions of males and females for this question.

Generally speaking, females see D&T as more creative than males 30% vs. 13% who see as a more practical subject 35% vs. 25%. However, this result was not statistically significant.

Table 5 *D&T Focus: Woodwork & Metalwork versus Gender*

		D&T focused on Woodwork & Metalwork		
		Low focus	Some Focus	Strong focus
Gender	Male	2 (4.6%)	2 (4.6%)	40 (90.9%)
	Female	5 (4.6%)	30 (27.8%)	73 (67.6%)
	Total	7 (4.6%)	32 (21.1%)	113 (74.3%)

Males are also more likely than females to think of D&T as having a strong woodwork/metalwork focus 91% vs. 66% ($X^2=10.30$, df=2, N=152) (see Table 5).

Overall males and females do have very different perceptions of the subject area with the female view being more in line with the future direction of the subject through the new curriculum and the male perception being more traditional.

Conclusions

It appears from the survey that while all participants had a view as to what D&T is and how important it is in education, these views were greatly influenced by their experiences at school. Indeed for those who studied D&T at school their views of the subject tended to be very narrow, and they perceived D&T as restricted to woodwork, metalwork and technical drawing subjects.

The survey has also shown that while D&T is seen as male dominated it is not perceived as too masculine. D&T is seen by many as on a parallel with art as a creative and practical subject and with science as a problem solving subject.

While this finding fits well with the intent of the new curriculum, other findings showed that many participants still see the area as focused upon the process of making, constrained within years 8-12, and boxed into areas defined by material.

What is currently happening in many schools has perpetuated a men in sheds attitude that must change through both application of the new Australian Curriculum and a new breed of graduate with enhanced creative and design skills. The implications of this for D&T at ECU are great. ECU cannot rely on the out-dated perceptions of potential students to sell the subject. D&T needs to be marketed in a new light, one that reflects the needs of the new Australian Curriculum and attracts a more creative type of person. While ECU needs to, and is, changing the structure and content of our course to reflect a greater emphasis on design, we also need to market the course to overcome any preconceptions the potential students may have both about the subject itself and the type and gender of the person who teaches it.

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Appendix: Design and Technology Survey

Design and Technology Survey

Thankyou for your willingness to answer this survey which focuses on your experiences and opinions concerning Design and Technology. The results from this research may be aggregated and reported in a journal article or conference presentation. The primary goal of the study is to better understand student perceptions of Design and Technology. Your answers are confidential and neither the researchers nor the university will be able to identify you. Furthermore, participation is voluntary. Your decision to participate or not will not affect your current or future relations with Edith Cowan University. If you decide to participate you are free not to answer any question or withdraw at any time.

Age

- ❍ 18 or less
- ❍ 19 to 24
- ❍ 25 to 30
- ❍ 31 to 36
- ❍ 37 or older

Gender

- ❍ Male
- ❍ Female

Did you study any Design and Technology subjects at school? If so please list them (e.g. Woodwork, Metalwork, Technical Drawing, etc)

- ❍ Yes _____
- ❍ No

What course in Education are you studying?

- ❍ Bachelor Degree - secondary
- ❍ Bachelor Degree - primary or early childhood
- ❍ Graduate Diploma - secondary
- ❍ Graduate Diploma - primary or early childhood
- ❍ Post graduate
- ❍ Other _____

What is your major teaching area?

What is your minor teaching area?

Are you currently studying Design and Technology at ECU?

- ❍ Yes
- ❍ No

What aspects of Design and Technology discouraged you from studying this subject?

If **5 is 'Extremely Important' and 0 is 'Not at all important' indicate how important you think Design and Technology is to Australia as a country? Drag slider to indicate your response.**

	1	2	3	4	5
Little importance:Vital importance	❍	❍	❍	❍	❍

Give a reason for your rating in the previous question.

When someone says 'Design and Technology' what do you think of?

Design and Technology is:

	1	2	3	4	5
Very Practical:Very Creative	❍	❍	❍	❍	❍
Mostly masculine:Mostly feminine	❍	❍	❍	❍	❍
Hobby focused:Industry focused	❍	❍	❍	❍	❍

How comfortable would/do you feel in a Design and Technology workshop?

	1	2	3	4	5
Uncomfortable:Very comfortable	❍	❍	❍	❍	❍

What type of people would you find in a Design and Technology workshop?

To what level is the subject 'Design and Technology' focused on ...

	Low focus	Some focus	Strong focus
Woodwork, metalwork	❍	❍	❍
Computers	❍	❍	❍
Problem solving	❍	❍	❍
Creativity and design	❍	❍	❍
thinking about the impact of technology	❍	❍	❍
Learning about new inventions	❍	❍	❍
Learning about technology over time, place and cultures	❍	❍	❍
Planning and making things	❍	❍	❍
Learning about electronics and machines	❍	❍	❍
Learning about what experts in the community do in their job	❍	❍	❍
Learning about resources/materials	❍	❍	❍
Learning about what it means to do Design and Technology	❍	❍	❍
Learning how parts of machines and systems work	❍	❍	❍

Indicate by clicking the boxes which items apply to Science, Design and Technology, and Art (you can make multiple selections).

	Science	Design and Technology	Art
Experiments	❑	❑	❑
Making things	❑	❑	❑
Problem solving	❑	❑	❑
Creativity	❑	❑	❑
Considering the impact of our actions on others	❑	❑	❑
Learning about new inventions	❑	❑	❑
Risk taking	❑	❑	❑
Planning and designing	❑	❑	❑
Learning new things	❑	❑	❑
Investigating Aboriginal and Torres Strait Islander ways	❑	❑	❑

This is the end of the survey. Click on the 'next arrow' to finish.Thank you for your responses