



Cape Peninsula  
University of Technology

# An industry-responsive model of professional practice for Industrial Design: a Work-Integrated Learning case study at a local University of Technology

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by

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## DECLARATION

I, Johan van Niekerk, declare that the contents of this thesis represent my own unaided work, and that the thesis has not previously been submitted for academic examination towards any qualification. Furthermore, it represents my own opinions and not necessarily those of the Cape Peninsula University of Technology.

Signed: \_\_\_\_\_

A handwritten signature in black ink, appearing to be 'J. van Niekerk', written over a horizontal line.

Date: 14 March 2016

## ABSTRACT

Economic recession and job scarcity has led to a decline in the demand for design services. Graduates in all fields are faced with the risk of unemployment beyond graduation, with youth unemployment rates in South Africa and globally at alarming levels. The evolving social and economic challenges of our times place increasing pressure on the responsibility of higher education institutions to design learning experiences that adequately prepare graduates for the world of work, whether in employment or in entrepreneurial self-employment. However, there is a significant gap between universities' supply and industry's demand for graduates with the desired attributes, which research shows include not only subject-specific knowledge and skills, but particularly 'soft skills' that make an employee effective at work. The paradox of students graduating without professional experience can be overcome through approaches such as work-integrated learning, which embed the lessons of professional practice into design education curricula.

This research project examines a case study of work-integrated learning at a South African university of technology in order to develop an industry-responsive model of professional practice in Industrial Design education. The case examined is the "R5K project", a year-long group project in BTech Industrial Design in which students are challenged – simulating the world of work - to design, develop, manufacture, market and sell a product, and earn at least ZAR 5 000. This research set out to assess the extent to which the project effectively prepared students for work.

A multi-method qualitative research methodology was followed, employing a longitudinal and cross-sectional case study strategy to examine the experience of R5K alumni and industry experts in the context of their learning and working experiences. Data collection methods included document analysis, a survey all R5K participants from 2010 to 2015, interviews with R5K alumni, and interviews with industry experts who have employed R5K alumni. A participatory thematic analysis workshop was conducted with representatives of the active R5K project in 2015, which informed the researcher's analysis of the data and themes therein. The findings are interpreted in dialogue with the literature on employability, work-

integrated learning, situated learning and graduate attributes, drawn from academic and government sources.

The findings demonstrate that the R5K project as a model for professional practice aids in the alignment between graduate attributes and industry expectations for Industrial Design by working with the industry and therefore facilitating the move from the educational field to the professional field through Work Integrated Learning and situated learning. The findings also show that the project can be improved upon through an adoption of an updated model that is proposed in chapter 6.

The limitations of this study are the danger of personal involvement and thus the influence of subjectivity. In addition, the study is also limited in its scope to Industrial Design at the Cape Peninsula University of Technology, currently the only institution that offers the R5K project.

Notwithstanding these limitations, the contribution of this research has enhanced curriculum development of the subject Professional Practice within Industrial Design as well as offered deeper insight into Work Integrated Learning and the role it plays in aiding student employability. Through this research there is a better understanding of the needs of the student, the needs of industry and the needs of academia, such that the gaps between these can be bridged.

## **Keywords**

Graduates attributes, Industrial Design, industry preparedness, R5K project, Situated Learning, Work-Integrated Learning, World Design Capital 2014.

## **Acknowledgements**

I wish to thank:

- My wife, friend and muse, Jenni
- My first born, Finley, who is one week old today
- Mom, whose soft voice is a beacon that we follow
- Alettia and Vikki (Vix) who have (seemingly effortlessly) aided in reducing complexity.

## **Dedication**

To my Dad who continues to inspire me to fill his shoes; they are very big shoes.

## Table of Contents

<b>DECLARATION</b> .....	<b>II</b>
<b>ABSTRACT</b> .....	<b>III</b>
KEYWORDS .....	IV
<b>ACKNOWLEDGEMENTS</b> .....	<b>V</b>
<b>DEDICATION</b> .....	<b>V</b>
<b>LIST OF FIGURES</b> .....	<b>X</b>
<b>LIST OF TABLES</b> .....	<b>XI</b>
<b>LIST OF ABBREVIATIONS</b> .....	<b>XII</b>
<b>CHAPTER 1: INTRODUCTION</b> .....	<b>1</b>
1.1 INTRODUCTION .....	1
1.2 RESEARCH STUDY .....	3
1.3 ROLE OF THE RESEARCHER.....	3
1.4 STATEMENT OF THE RESEARCH PROBLEM .....	3
1.5 DESCRIPTION AND BACKGROUND TO THE RESEARCH PROBLEM .....	4
1.6 RESEARCH QUESTIONS .....	5
1.7 CURRENT STATUS OF RESEARCH AREA. IS THERE A PROBLEM?.....	6
1.7.1 <i>Graduate unemployment</i> .....	6
1.7.2 <i>Graduate attributes in context</i> .....	8
1.7.3 <i>New developments in graduate attributes</i> .....	10
1.7.4 <i>Work-integrated learning</i> .....	14
1.7.5 <i>Situated learning</i> .....	15
1.8 OBJECTIVES OF THE RESEARCH.....	15
1.9 RESEARCH DESIGN AND METHODOLOGY.....	16
1.10 DATA COLLECTION TECHNIQUES .....	18
1.10.1 <i>The Case Study strategy</i> .....	19
1.10.2 <i>Participant observation</i> .....	19
1.10.3 <i>Interviews</i> .....	19
1.10.4 <i>Statistics</i> .....	20
1.11 EPISTEMOLOGICAL CONSIDERATIONS.....	20
1.12 DELINEATION OF RESEARCH.....	20
1.13 SIGNIFICANCE AND CONTRIBUTION OF RESEARCH .....	21
1.14 OUTLINE OF CHAPTERS.....	21
1.15 ETHICAL CONSIDERATIONS.....	22
1.16 EXPECTED OUTCOMES.....	23
1.17 CHAPTER SUMMARY .....	23
<b>CHAPTER 2: LITERATURE REVIEW</b> .....	<b>24</b>

2.1	INTRODUCTION .....	24
2.2	ACADEMIC CONTEXT .....	24
2.2.1	<i>Introduction to the Industrial Design course at CPUT</i> .....	24
2.2.2	<i>Employability</i> .....	27
2.2.2.1	<i>Graduate Attributes</i> .....	27
2.2.3	<i>Situated learning</i> .....	35
2.2.4	<i>Work Integrated learning (WIL)</i> .....	38
2.2.5	<i>Design Education</i> .....	44
2.3	INDUSTRY AND GOVERNMENT CONTEXT.....	50
2.3.1	<i>Western Cape Design Strategy</i> .....	50
2.4	CHAPTER SUMMARY .....	54
<b>CHAPTER 3: RESEARCH DESIGN AND METHODOLOGY .....</b>		<b>55</b>
3.1	INTRODUCTION .....	55
3.2	RESEARCH DESIGN AS LAYERS OF AN ONION .....	55
3.2.1	<i>Research philosophy: epistemology and ontology</i> .....	56
3.2.3	<i>Methodological choice</i> .....	59
3.2.4	<i>Research Strategy</i> .....	60
3.2.5	<i>Time horizons</i> .....	66
3.2.6	<i>Data collection and data analysis</i> .....	66
3.2.6.1	<i>Population and sampling</i> .....	67
3.2.6.1.2	<i>Sampling technique</i> .....	67
3.3	EXECUTING THE RESEARCH DESIGN.....	71
3.4	ETHICAL CONSIDERATIONS .....	75
3.5	CHAPTER SUMMARY .....	76
<b>CHAPTER 4: DATA COLLECTION AND PRESENTATION OF FINDINGS .....</b>		<b>77</b>
4.1	INTRODUCTION .....	77
4.2.1	<i>Past R5K projects</i> .....	79
4.3	SURVEY RESULTS.....	86
4.3.1	<i>Survey question 1: Which year did you complete the R5K project?</i> .....	86
4.3.2	<i>Survey Question 2: Are your R5K groups still active?</i> .....	87
4.3.3	<i>Survey Question 3: How much did your group make after expenses?</i> .....	87
4.3.4	<i>Survey question 4: Would you recommend the R5K project to the 3<sup>rd</sup> years that will do the project next year?</i> .....	88
4.3.5	<i>Survey question 5: Did the R5K project give you enough experience to start a company?</i> 88	
3.3.6	<i>Survey question 6: How much did the R5K project develop you in the following areas? (a rating of 1 didn't develop much and 5 indicates significant development)</i> .....	89
4.3.7	<i>Survey question 7: How much did 3<sup>rd</sup> year develop you for industry? (a rating of 1 didn't develop much and 10 indicates significant development)</i> .....	89
4.3.8	<i>Survey question 8: How much did 4<sup>th</sup> year develop you for industry?</i> .....	90
4.3.9	<i>Survey question 9: Which company type do you work for?</i> .....	90

4.3.10 Survey question 10: How many personnel in the company? .....	91
4.3.11 Survey question 11: How long did it take to get design work after graduation?.....	91
4.3.12 Survey question 12: Which of these dimensions of employability do you think Industrial Design employers find most important?.....	92
Figure 30 - Survey results .....	92
4.4 INTERVIEWS.....	94
4.4.1 Overview of alumni interviews.....	94
Alumni interview questions.....	96
4.4.3 Overview of industry expert interviews.....	98
4.5 PARTICIPATORY THEMATIC ANALYSIS WORKSHOP .....	101
4.8 CHAPTER SUMMARY .....	104
<b>CHAPTER 5: DISCUSSION OF FINDINGS.....</b>	<b>105</b>
5.1 INTRODUCTION .....	105
Sub-question 1: What is the degree of alignment currently between graduate attributes and industry expectations for Industrial Design? .....	105
Sub-question 2: What impact has the R5K project had in the preparation of Industrial Design students for industry?.....	112
Sub-question 3: How can the R5K project, as a Work-Integrated Learning experience, effectively contribute to an industry responsive learning model?.....	113
5.3 CHAPTER SUMMARY .....	116
<b>CHAPTER 6: CONCLUSION .....</b>	<b>117</b>
6.1 PROPOSED MODEL OF GRADUATE EMPLOYABILITY DEVELOPMENT.....	117
6.2 DISCUSSION OF LIMITATIONS .....	119
6.3 SUGGESTIONS FOR FUTURE RESEARCH .....	119
6.4 STUDY'S CONTRIBUTIONS .....	120
6.5 CLOSING .....	122
<b>BIBLIOGRAPHY .....</b>	<b>123</b>
APPENDIX A: TIMELINE .....	130
APPENDIX B: EXAMPLES OF COMPLETED INDIVIDUAL ETHICS CONSENT FORM. ....	131
COVER PAGE.....	131
APPENDIX B: EXAMPLES OF COMPLETED INDIVIDUAL ETHICS CONSENT FORM. ....	132
APPENDIX B: EXAMPLES OF COMPLETED INDIVIDUAL ETHICS CONSENT FORM .....	133
APPENDIX B: EXAMPLES OF COMPLETED INDIVIDUAL ETHICS CONSENT FORM .....	134
APPENDIX B: EXAMPLES OF COMPLETED INDIVIDUAL ETHICS CONSENT FORM .....	135
APPENDIX C: PUBLISHED R5K PROJECTS .....	136
APPENDIX D: INDUSTRIAL DESIGN AS A SCARCE SKILL .....	137
APPENDIX E: R5K BRIEF .....	138
APPENDIX F: THEMATIC ANALYSIS WORKSHOP GUIDE .....	140
APPENDIX G: LISTS OF ALL R5K PROJECTS AND THEIR PROJECTS AND PARTICIPANTS.....	141



APPENDIX H: GAPS IN THE DESIGN SYSTEM (WESTERN CAPE GOVERNMENT, 2013, P.13) ..... 141

APPENDIX I: DID THE R5K PROJECT GIVE YOU ENOUGH EXPERIENCE TO START A COMPANY? (COMMENTS)  
..... 143

APPENDIX J: CAN YOU GIVE ADVICE TO IMPROVE OR CHANGE THE R5K PROJECT. (COMMENTS)..... 144

## List of Figures

Figure 1	R5K WDC2014 Geotag	Pg.4
Figure 2	Harvey's model of graduate employability development	Pg.12
Figure 3	The research 'onion'	Pg.16,55
Figure 4	Aspects of employability	Pg.32
Figure 5	A traditional professional knowledge system	Pg.39
Figure 6	A professional knowledge system in a WIL approach	Pg.40
Figure 7	Barrows Problem Based Learning model	Pg.47
Figure 8	Makeup of Western Cape design industry	Pg.53
Figure 9	Case study tactics for four design tests	Pg.65
Figure 10	Basic types of designs for case studies	Pg.65
Figure 11	Yins Case study method	Pg.72
Figure 12	R5K 2010 project	Pg.79
Figure 13	R5K 2011 project	Pg.81
Figure 14	R5K 2012 project	Pg.82
Figure 15	R5K 2013 project	Pg.83
Figure 16	R5K 2014 project	Pg.85
Figure 17	R5K 2015 project	Pg.86
Figure 18	Survey results	Pg.86
Figure 19	Survey results	Pg.86
Figure 20	Survey results	Pg.87
Figure 21	Survey results	Pg.88
Figure 22	Survey results	Pg.88
Figure 23	Survey results	Pg.89
Figure 24	Survey results	Pg.89
Figure 25	Survey results	Pg.90
Figure 26	Survey results	Pg.90
Figure 27	Survey results	Pg.91
Figure 28	Survey results	Pg.91
Figure 29	Survey results	Pg.92
Figure 30	Survey results	Pg.92
Figure 32	Thematic analysis workshop	Pg.102

Figure 31	Graduate Attribute Bubble	Pg.103
Figure 32	Proposed model of graduate employability development	Pg.118

### **List of Tables**

Table 1	Subject and assessment for Product at CPUT	Pg.25
Table 2	Dimensions of employability	Pg.30
Table 3	A Work-Integrated Learning typology	Pg.42
Table 4	Gaps in the design system	Pg.52
Table 5	Case Study method	Pg.73
Table 6	Summery of R5K brief	Pg.77
Table 7	Alumni interview questions	Pg.96
Table 8	Industry expert interview questions	Pg.99
Table 9	Summary of graduate attributes question	Pg.101

## List of Abbreviations

ASGISA	Accelerated and Shared Growth Initiative of South Africa	(Griesel & Parker, 2009, p.22)
CCDI	Cape Craft and Design Institute	(Western Cape Government, 2013, p.5)
CHE	Council on Higher Education	(Griesel & Parker, 2009, p.22)
CHEC	Cape Higher Education Consortium	(Department of Education, 1997, p.56)
CPUT	Cape Peninsula University of Technology	(CPUT, 2014, p.7)
DST	Department of Science and Technology	(Griesel & Parker, 2009, p.22)
DTI	Department of Trade and Industry	(Griesel & Parker, 2009, p.22)
HEI	Higher education institutions	(Western Cape Government, 2013, p.9)
HEQF	Higher Education Qualifications Framework	(Griesel & Parker, 2009, p.22)
HESA	Higher Education South Africa	(Griesel & Parker, 2009, p.22)
JIPSA	Joint Initiative for Priority Skills Acquisition	(Griesel & Parker, 2009, p.22)
NBA	National Business Association	(Griesel & Parker, 2009, p.22)
PBOL	Problem Based Oriented Learning	(Savery & Duffy, 2001, p.14)
PJBL	Project Based Learning	(Savery & Duffy, 2001, p.3)
PBL	Problem Based Learning	(Council on Higher Education, 2011, p.71)
R5K	Five Thousand Rand, an Industrial Design Bachelor of Technology project	(World Design Capital, 2014)
SAGRA	South African Graduate Recruitment Association	(Griesel & Parker, 2009, p.22)
SAQA	South African Qualifications Authority	(Griesel & Parker, 2009, p.22)
SASCE	South African Society for Co-operative Education	(Griesel & Parker, 2009, p.22)
SET	Science, Engineering and Technology	(Griesel & Parker, 2009, p.22)
SMEs	Small and medium enterprises	(Brown, 2012, p.17)
TUT	Tshwane University of Technology	(TUT, 2015)
UJ	University of Johannesburg	(UJ, 2015)
WDTL	Work-Directed Theoretical Learning	(Forbes, 2006, p.13)
WIL	Work-Integrated Learning	(Griesel & Parker, 2009, p.22)
WCG	Western Cape Government	(Council on Higher Education, 2011)
WPL	Workplace Learning	(CPUT, 2014)

# CHAPTER 1: Introduction

## 1.1 Introduction

As the Industrial Design industry in South Africa has no active national association or professional body establishing industry standards, it is difficult to gauge the success of a project that is specifically designed to ease the transition from university into the working world. The intention of this research study is to determine the effectiveness of the R5K project as a bridging project from academia to industry.

The R5K brief has been a fourth<sup>1</sup> year Industrial Design project since 2009. The project was started to increase students' awareness and involvement with industry. The brief requires students to earn a minimum profit of R5000 (hence the name R5K) using the skills gained from previous undergraduate years. As part of the project students have to start a company and set up all structures to allow for idea generation, concept development, prototype testing, manufacturing, marketing and selling of an industrially designed product (See Brief – Appendix E).

This thesis aims to investigate and analyse the relationships between the design industry, a University of Technology and the students in order to propose a developmental model within the subject Professional Practice 4. Alongside the investigation into the perceived experience 'gap' between industry and academia, this study will also assess the effort, motivation, involvement and learning that the R5K project fosters and how Work-Integrated Learning (WIL) methods and methodologies can increase the quality and relevance of teaching and learning at Universities of Technology.

To gain a relevant understanding from the students and practicing Industrial Designers this study will use the case study research method. This quasi-

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<sup>1</sup> Product Design is offered in a three-year course with an optional fourth year being Industrial Design.

experimental research will make use of constructivist methods in a cross sectional and longitudinal study.<sup>2</sup>

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<sup>2</sup> Unpacked in the Methodology chapter.

## 1.2 Research study

An industry-responsive model of Professional Practice for Industrial Design: a Work-Integrated Learning case study at a local University of Technology, Western Cape.

## 1.3 Role of the researcher

The researcher has been working in the Industrial Design field for the last seventeen years. In that time he has been self-employed, opened his own design agency, has been an employee, and for the last ten years has taught Industrial Design at every level up to BTech and is, at the time of writing, the programme leader for Industrial Design. As an Industrial Design graduate he was fortunate enough to find employment directly after graduation, which was the exception at the time. Based on an informal survey<sup>3</sup> his classmates and those from earlier years struggled to find design-relevant employment. With this knowledge gained, and from continuing industry experience and ten years of lecturing in Industrial Design, the researcher and two other lecturers<sup>4</sup> started the R5K project in the 4<sup>th</sup> year in 2010. The researcher is aware of the potentially subjective role as both researcher and the co-founder of the project, this has been explicitly catered for in both the ethics chapter as well as the research methodology chapters.

## 1.4 Statement of the research problem

The apparent schism between what academic institutions offer and what industry expects from academia is in question by academia, industry and governmental bodies (Griesel & Parker, 2009, p.3). This research study investigates how the inculcation of an entrepreneurial culture in the Industrial Design programme at the Cape Peninsula University of Technology (CPUT) measures up with industry expectations, using a lens of/an assessment of graduate attributes to investigate the

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<sup>3</sup> Which will be substantiated in the primary research phase of this report.

<sup>4</sup> Along with lecturers Bart Verweckken and Prof. Mugendi M'Rithaa.

trifecta of industry, academia and the work-readiness of graduate students and, in addition, the expectations from government bodies. The current global recession and job scarcity in the field of design has led to the decline of the demand for design services (Elliott, 2014). This study will investigate if Industrial Design graduates are being sufficiently professionally prepared for this reality.

## 1.5 Description and background to the research problem

This project investigates the preparedness of graduates for the Industrial Design industry, using the R5K project as a Work Integrated Learning (WIL) case study.

The R5K is a group project, which is a start-up simulator designed to give the students experience with a live project<sup>5</sup>. During their first three years of undergraduate studies students are taught the theory of business and sales. Within the R5K project the students invest their own money and resources into a registered business under their own names. They then produce a run of products that answers the brief by raising a minimum of R5000 profit through product sales. The project has been featured in numerous articles (see sample Appendix C) and was officially recognised as a World Design Capital Cape Town 2014 project (see Figure 1).

Using input from current students, alumni and industry experts, the thesis will investigate the expectations of the job market that graduates enter into as well as evaluate the effectiveness of the undergraduate course at CPUT in preparing graduates to meet these expectations.



**Figure 1 - R5K WDC Geotag** (ICSID and City of Cape Town, 2014)

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<sup>5</sup> A live project implies that the project is done within industry and that the outcomes are tangible.



This study aims to evaluate if the R5K project is helping make the transition from university to industry more streamlined, and if it contributes to the employability of graduates.

## 1.6 Research Questions

The research problem will be answered by addressing the following research question, which is divided into three component sub-questions:

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<b>Main research question</b>	<b>How can Industrial Design graduates better gain employment in the context of a Work Integrated Learning project at a local University of Technology?</b>
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<b>Sub-question 1</b>	What is the degree of alignment <sup>6</sup> currently between graduate attributes and industry expectations for Industrial Design?
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<b>Sub-question 2</b>	What impact has the R5K project had in the preparation of Industrial Design students for industry?
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<b>Sub-question 3</b>	How can the R5K project, as a Work-Integrated Learning experience, effectually contribute to an industry responsive learning model <sup>7</sup> ?
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<sup>6</sup> 'degree of alignment' it is known that these qualities are measurable based on the literature review in which existing quantifiable variables of graduate attributes have been developed.

<sup>7</sup> In sub-question 3, an industry responsive learning model is based on empirical understanding of university-industry linkages which will be investigated through primary and secondary research.

## 1.7 Current status of research area. Is there a problem?

The following sections provide an overview of existing knowledge about youth unemployment, graduate attributes in context, new developments in graduate attributes, Work-Integrated Learning and Situated Learning. The findings demonstrate the call for pedagogic methods that better prepare graduates for the workplace.

### 1.7.1 Graduate unemployment

The factors that contribute to unemployment of design graduates are numerous and varied including the global recession resulting in jobs scarcity (Elliott, 2014), the lack of design awareness, resistance of small and medium enterprises (SMEs) to change and the evolution of clients' needs.

South Africa (2014) has a population of 52.98 million; a quarter of that number, 13.23 million, cannot find a job at all; 71% of that quarter are youth aged 15-34 years. In total that is 9 403 950 youth aged 15-34 in South Africa that are unemployed. In their paper '*The World of Work*', (CCDI & Western Cape Government, 2013, p.3) iterates:

*Education continued to play an important role in labour market outcomes. The problem here is clearly the lack of employment opportunities, although it may also reflect a mismatch of skills in the labour market.*

This local trend is mirrored around the world. According to the International Labour Organization there are 202 million jobless people around the world, 75 million (37%) of whom are global youth. The unemployment trend is expected to increase to 215 million by 2019 (Viegelahn, 2014). According to Viegelahn (2014) South Africa had the highest global unemployment rate in 2014 of 25.2%, followed by North Africa and Italy, which stood at 12.2%.

Based on the latest Cape Higher Education Consortium graduate survey (CHEC, 2013), 17% of CPUT graduates are unemployed<sup>8</sup>. Of that number 1.2% are unemployed but not looking for work, leaving 15.8% work-seeking graduates unemployed. Based on the researcher's own findings as the lecturer in charge of the R5K project<sup>9</sup>, since the inception of the R5K project Industrial Design graduates have enjoyed a 100% employment<sup>10</sup> rate.

To put this in context, in 2013 South Africa's design industry as a whole was reported to contribute 2.82% to South Africa's GDP, of which the Western Cape's portion equates to roughly R13.4 billion (CCDI & Western Cape Government, 2013:8). As South Africa had a GDP of R4.2 trillion in 2013 we can deduce that the Western Cape design industry contributed approximately 0.3% of South Africa's GDP.

According to a collaborative study done by the CCDI and the Western Cape Government in 2011 the Western Cape graduated 738 designers and an additional 1045 graduates that had design subjects in their qualifications (CCDI & Western Cape Government, 2013). We can therefore speculate that out of the approximate total of 1783 design and design-related graduates per year there is sufficient room for them all in the multibillion rand design industry.<sup>11</sup>

The Western Cape might even take more of a share of this industry based on the following statement that the province is '... a recognised leader in providing design-led products, services and solutions to the global market place' (CCDI & Western Cape Government, 2013, p.9).

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<sup>8</sup> Data gathered from the 2013 CHEC graduate survey pg17, Table 32.

<sup>9</sup> This statement is justified in Chapter 4.

<sup>10</sup> In design relevant fields; primary data supporting this statement included in survey question 6, Chapter 4.

<sup>11</sup> This deduction will be further investigated and corroborated in chapter 5.

### 1.7.2 Graduate attributes in context

Industrial Design as a professional discipline is offered at three South African tertiary institutions: CPUT, Tshwane University of Technology (TUT) and the University of Johannesburg (UJ). There is no official Industrial Design body that governs skills and competencies needed from graduates in South Africa. The result is that the three Industrial Design departments at CPUT, TUT and UJ adapt the curriculum based on moderator, alumni and employer input. Although the outcomes are clearly stated, the assessment, teaching and learning practices are fluid and less formal in their response to industry feedback.

The R5K project is designed as a start-up simulator to give students a safe space within an academic context to learn the lessons and competencies that will serve them in an industry context after graduation. According to the Western Cape Government and CCDI (2013, p.9):

*Design is the bridge between creativity and innovation. It is the bridge between technology and the user. It is the bridge between scientific and commercial disciplines and economic benefit. As such, design is a tool for the realization of innovation. Innovation drives competitiveness and competitiveness is what we need for growth.*

This statement makes a strong case for the contribution of design to business and to the economy. This requires, however, for design graduates to enter industry with the necessary attributes to make this contribution real; and for universities to produce such graduates. However, this may not be the case.

In a survey completed by the Western Cape Government (2013), the question was put to employers: “*In general, are the qualifications and experience you look for easy to find when recruiting?*” Seventy five percent of employers in the Western Cape responded negatively (ibid).

Graduate attributes ought to be industry-specific thereby leading to employability. This study will investigate perceived and actual graduate attributes for the field of Industrial Design. A study of South African graduates, from the perspective of

employers, stated that desired graduate attributes are represented firstly by knowledge followed by skills, competencies and values (Griesel & Parker, 2009).

Predicting graduate attributes in an ever-changing world is seen as one of the stabilising factors for the economy as well as the skills revolution that we are currently undergoing. In her address delivered at the Third Annual Julius Nyerere Memorial Lecture, at the University of the Western Cape, Deputy President at the time Ms Phumzile Mlambo-Ngcuka (Mlambo-Ngcuka, 2006) noted:

*The phenomenon of unemployed graduates, who are without abilities to self-employ and self-determine, after spending three to four years of post-secondary education is an indication to all of us of the challenge in our education at a tertiary level...the curriculum developers are not paying enough attention to issues of relevance and ensuring that we all pay attention to the skills and the competencies learners require when they come out of higher education...we need a skills revolution in the curriculum of tertiary education.*

The Australian Minister of Education, Science and Training, Julie Bishop MP seems to concur when she says 'if universities are to engage more effectively with businesses and communities they will need to align their "structures, processes and operations" with the needs of businesses and communities' (Bishop cited in Franz, 2007, p.1).

An adaptable graduate is one who will be able to navigate this developing world during global economic crises and a shrinking workforce or other hurdles that may hinder employability.

Based on the above statistics and rhetoric, one might deduce that a country would need to be producing more universities but the opposite is the reality. In the last few years South Africa has reduced the number of universities from 36 to 23<sup>12</sup> and thus losing niche areas that differentiated those universities (Griesel & Parker, 2009,

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<sup>12</sup> That these numbers are partially due to mergers will be discussed in Chapter 4

p.2). This places even more responsibility on the remaining universities to ensure that their graduate attributes answer to the needs of the industry as well as our evolving society.

### **1.7.3 New developments in graduate attributes**

According to a Cape Higher Education Consortium (CHEC) Study (2013) on South African higher education institutions (HEI's), 'critical cross-field outcomes' are essential skills needed for employability. For the subjects of Design and Professional Practice within Industrial Design at CPUT these skills relate to CHEC's 'critical cross-field outcomes':

- Identify and solve problems in which responses display that responsible decisions using critical and creative thinking have been made;
- Work effectively with others as a member of a team, group, organisation, community;
- Organise and manage oneself and one's activities responsibly and effectively;
- Collect, analyse, organise and critically evaluate information;
- Communicate effectively using visual, mathematical and/or language skills in the modes of oral and/or written presentation;
- Use science and technology effectively and critically, showing responsibility towards the environment and the health of others;
- Demonstrate an understanding of the world as a set of related systems by recognising that problem-solving contexts do not exist in isolation;
- Contribute to the full personal development of each learner and the social and economic development of society at large;
- It must be the intention underlying any programme of learning to make an individual aware of the importance of:
  - Reflecting on and explore a variety of strategies to learn more effectively
  - Participate as responsible citizens in the life of local, national and global communities;

- Encourage cultural and aesthetical sensitivity across a range of social contexts;
- Explore education and career opportunities, and
- Develop entrepreneurial opportunities.

(CHEC, 2013)

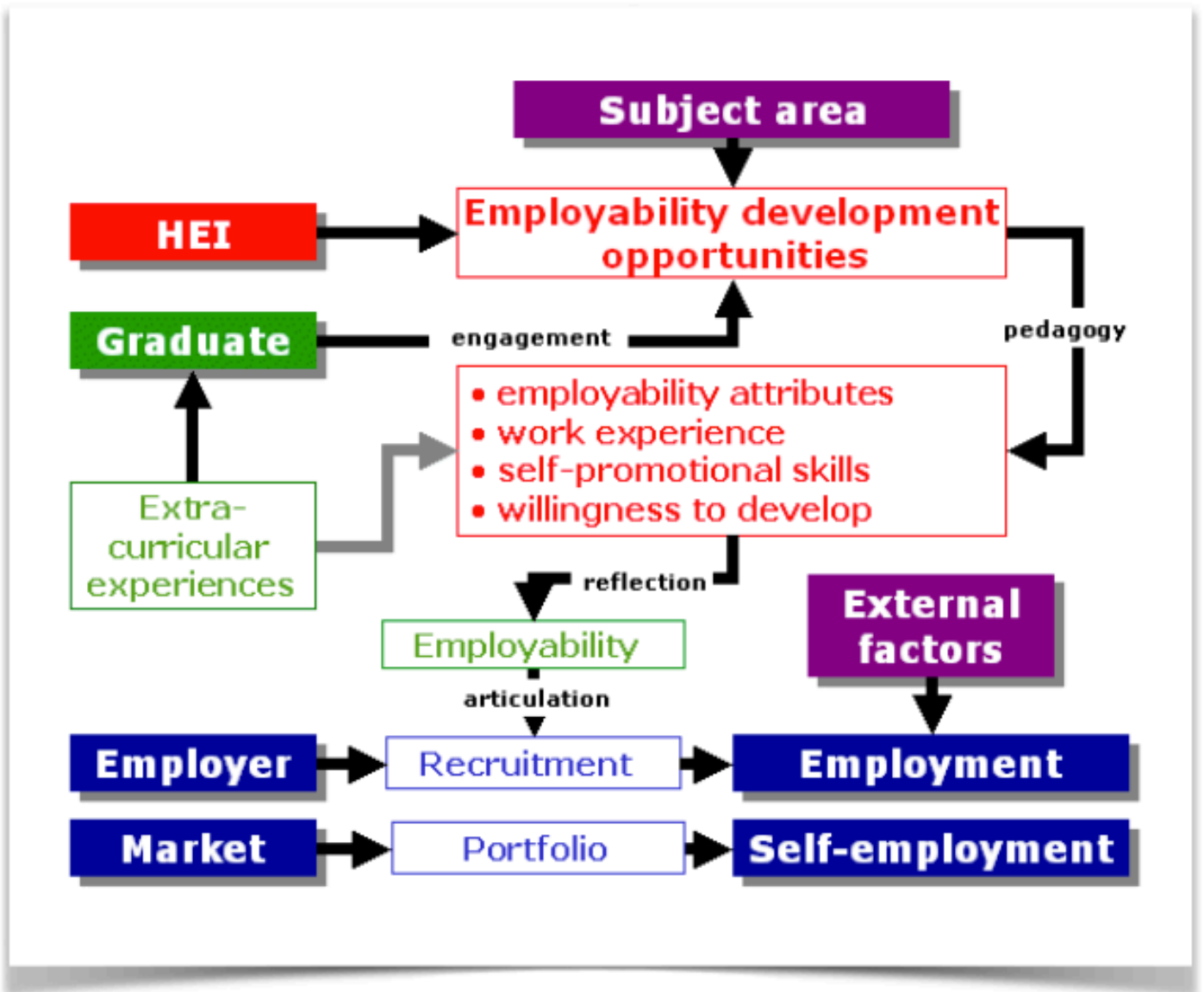
These attributes, with reference to industry, academia and employability, will be analysed to determine the cause of the so-called gap between industry and academia.

Research done by Griesel and Parker (2009) concurs with Harvey (2002; 2004) that there is now a shift in higher education away from developing specific skills, towards a more holistic, more adaptable approach. HEI's are moving away from skills development to employability development. Harvey's model of graduate employability development (Figure 2) describes three main processes that impact on employability:

- 1 Pedagogic processes that encourage development
- 2 Self-reflection of attributes, skills and experience gained by the student
- 3 Articulation of those attributes, skills and experience within an industry context

(Harvey, 2002, p.8)

Harvey's model differs from the critical cross-field outcomes above in that subjects are geared directly towards employability development opportunities through a central support structure. Work experience is an integral component within the system giving the student context within which to concentrate learning. This is followed by a stage of reflection within the context of the possible employment areas followed by a reflection of the process within an academic report.



**Figure 2** - A model of graduate employability development (Harvey, 2002, p.4)

Embedding employability as an outcome within the curriculum does not necessarily require drastic changes but rather a constant evolution of the curriculum. According to Yorke and Knight (2006, p.21):

*...employability goes well beyond the simplistic notion of key skills, and is evidenced in the application of a mix of personal qualities and beliefs, understandings, skilful practices and the ability to reflect productively on experience...in situations of complexity and ambiguity.*



Griesel and Parker (2009) argue that positions of the South African Qualifications Authority (SAQA) and the Higher Education South Africa (HESA) concur with Yorke and Knight (2006, p.22) and with Harvey (2004, p.6) based on their factors that influence student employability:

- Higher education and the work place have a misunderstanding about the qualities and skills of graduates.
- The role of higher education is to produce graduates that have the attributes, capabilities and dispositions needed for industry
- The move away from 'key generic skills' to more intangible attributes like understandings and metacognition
- That the world is changing and what is defined as graduate attributes of the past needs constant revision
- How far is higher education expected to bridge the gap and how much are companies expected to induct hired graduates.

The points above speak to the same flexible system that Harvey shows in his model of graduate employability development (see Figure 2), a model that is context and content dependant. This model finds meaning within the structures and limitations imposed on them.

It is against this backdrop that this study, with the participation of current students, alumni and industry experts, aims to explore ways in which to narrow the gap between employer needs and academic outputs. The impact of the R5K project and whether the project can be developed to better align the needs of industry and the student skill and knowledge profiles, is a key focus area within the research. By exploring this, it is hoped that a contribution may be made to ultimately produce students who are better prepared to enter the local or global job market.

#### 1.7.4 Work-integrated learning

Work-Integrated Learning (WIL) is an experiential learning activity whereby academic learning is integrated in a structured way with or within industry that has a mutual benefit for students and the workplaces (Martin & Hughes , 2009). This is a practice that has been followed within the R5K project since 2010 This pedagogic method will be analysed for effectiveness and validity within the context of the R5K project.

Work experience is fundamental in integrating learning into contextual practice as well as enhancing employability (Yorke & Knight, 2006). Work-based learning is a method for students to manage their own direction of learning.

WIL is significant in disciplines that foster hands-on skills and practical knowledge as it increases professional development and employability (Council on Higher Education, 2011). The Council on Higher Education (2011, p.6) state the advantages of WIL as:

- Academic benefits, such as improved general academic performance, enhancement of interdisciplinary thinking, increased motivation to learn
- Personal benefits, such as increased communication skills, team work, leadership and co-operation
- Career benefits, for example, career clarification, professional identity
- Increased employment opportunities and salaries, development of positive work values and ethics
- Skills development, including increased competence and increased technical knowledge and skills.

These advantages will be investigated along with Situated Learning, both of which make up the conceptual model for this study.

### **1.7.5 Situated learning**

Situated learning describes learning as a function of the activity, context and culture in which it occurs. Lave (1991) comments that social interaction is critical when it comes to situated learning where students are involved in a community of practice where they can embody the activity within the local, social context. There are three characteristics that are essential within a community of practice; each will be interrogated in the following chapters. Firstly the domain is the organisation within which the participants belong, the place where they can collectively learn from each other. Secondly the community fosters a spirit of learning and sharing information together. The final characteristic that makes up a community of practice is the practice, the act of doing within the domain and within the community (Wenger, 2007).

As this study is limited to a local university and its students, the concept of situated learning is well suited to this study. Communities of practice will be investigated, as well as how students embed the knowledge of the design industry and how that influences their graduate attributes.

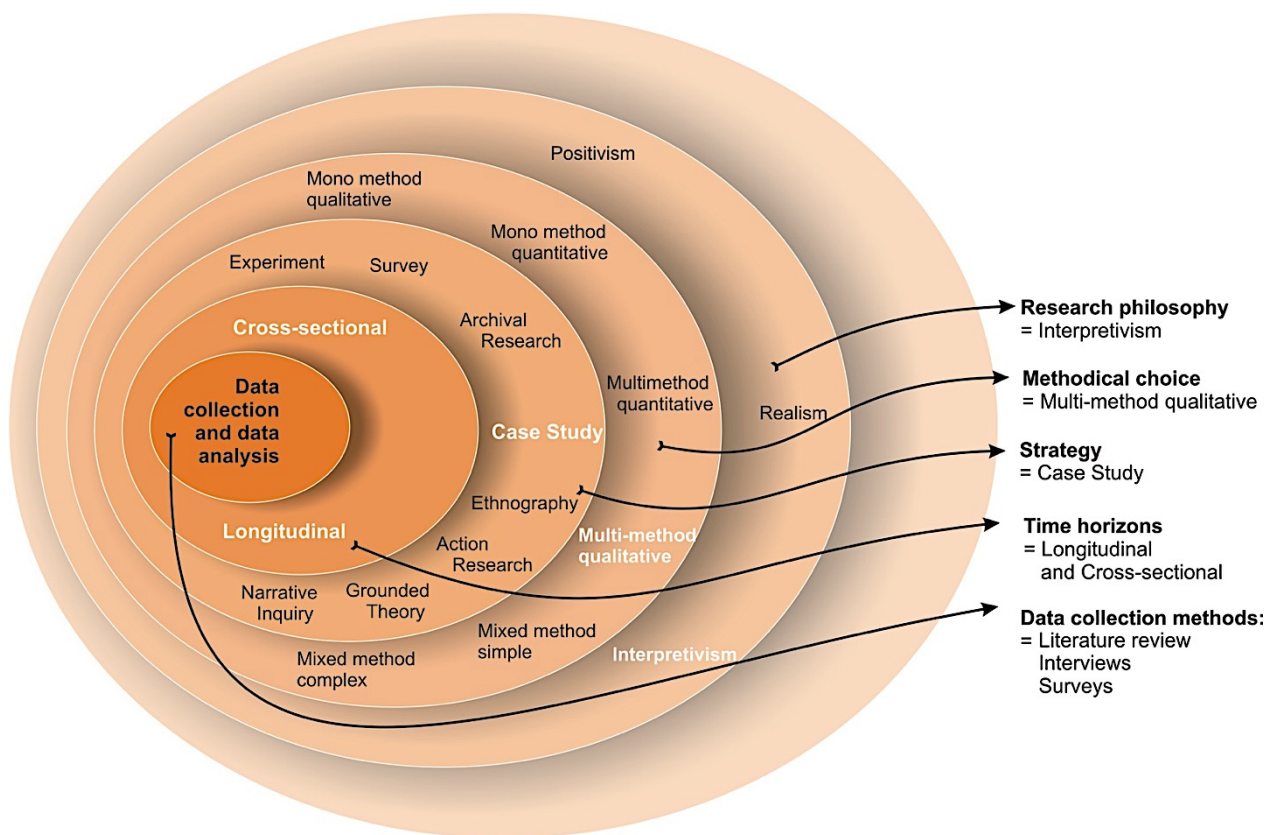
## **1.8 Objectives of the research**

This in-depth study of the graduate attributes of Industrial Design students aims to contribute to developing a clearer understanding of the needs of the student, the needs of academia and the needs of industry, and in so doing, increase the knowledge needed to affect curriculum changes towards an ideal benchmark model that would benefit all. This will be accomplished by an investigation of the R5K project and whether it contributed to, and can better contribute to, student readiness. Based on the findings, a developmental model of graduate employability will be proposed.

## 1.9 Research design and methodology

Following an in-depth literature review in Chapter 2, Chapter 3 explores the strategies and methods that underpin the investigation into the research question: ‘How can Industrial Design graduates better gain employment?’ and describes and introduces the project’s research design.

Saunders and Toseys (2013, p.59) metaphor of the research onion (see Fig 3) will be used to describe the research design used in this thesis.



**Figure 3. The research 'onion' (adapted from Saunders, Lewis and Thornhill diagram, 2013)**

The research philosophy that underpins this thesis is interpretivism. The interpretivist not only investigates the social phenomena within its context but also investigates people within their structures and relational patterns that inform and influence what is perceived and what meaning is derived from those relationships; it is a qualitative approach. The methodological choice of this research involves a multi-method qualitative design, which makes use of literature review, interviews and surveys as its

methods of investigation. The strategy that guides and informs this study is that of a case study, which is designed and conducted along a cross-sectional and longitudinal horizon.

This research is further informed by a constructivist approach. Constructivist learning theory suggests that learners construct meaning on their own and from that meaning learning occurs, which leads to knowledge. This approach lies at the core of the R5K project and its effect on the students' industry-readiness or as Griesel and Parker put it 'looking for what makes a student employable as opposed to getting them ready for employment' (2009). The constructivist approach fits in well with situated learning as both see the learner in context of communities of practice (Hein, 1991). Hein reiterates that there is no such thing as knowledge independent of the knower but rather there is the knowledge that is constructed during the learning process. This idea shared by Dewey, Piaget and Vygotsky informs the epistemological approach of this thesis (Hein, 1991).

This research uses both inductive and deductive reasoning, with the emphasis on the users and their views. All of the graduate participants of the research have been actively involved in the project in the past, and have an in depth knowledge and lived experience of the project as well as of industry (Kemmis & McTaggart, 1999).

## 1.10 Data collection techniques

The following table outlines the data collection methods used to address each of the three sub-questions.

	Research Questions	Research Methodologies and Methods
<b>Sub-question 1</b>	What is the degree of alignment currently between graduate attributes and industry expectations for Industrial Design?	Literature review Interviews
<b>Sub-question 2</b>	What impact has the R5K project had in the preparation of Industrial Design students for industry?	Interviews Survey Situated Learning Participant Observation Focus group
<b>Sub-question 3</b>	How can the R5K project, as a Work-Integrated Learning experience, effectually contribute to an industry responsive learning model?	Components Analysis

### **1.10.1 The Case Study strategy**

The experience of previous groups of R5K graduates are investigated to explore and describe R5K's possible significance and benefits as experienced by the graduates themselves. The exploration of these experiences informs the case study, a strategy which investigates complex situations in a focused and structured way (Yin, 2003; Neale et al., 2006, p.4). This case study reviews individual R5K groups, their processes and resulting learning experiences. Case studies allow one to gather and present data from multiple methods including all of the data collection methods that will be used for this study. The possible limitation of case studies is that they can be perceived as lacking rigour due to bias and the sole use of qualitative methods. This can be overcome using triangulation to ensure validity and reliability (Yin, 2004; 2003). The main data collection methods used to inform the case study are explored in Chapter 3 and include:

### **1.10.2 Participant observation**

Classroom-based observations are held with current students active within the project. Industry and academic experts observe the workshops to judge relevance and are interviewed thereafter. In addition, the researcher had the privileged position as the coordinator of the course, providing him with inside perspective that assists in contextualising the data from other methods. To avoid bias, research findings are triangulated with data from focus groups, class observation and questionnaires.

### **1.10.3 Interviews**

Experts interviewed range from past to present participants of the R5K project as well as industry experts. The sample includes:

- Five past R5K participants (one for each 2010-2015 group)
- Three current R5K group representatives

- Three industry experts<sup>13</sup>.

Ethical clearance has been obtained for all interactions with participants.

#### **1.10.4 Statistics**

Secondary statistics on the design industry and employability are gathered from existing sources<sup>14</sup>.

### **1.11 Epistemological considerations**

Epistemology is the philosophical investigation of the acquisition of knowledge and truth. It asks the question, how can we know what we know? The researcher's personal involvement within the study is integral to the holistic view of the subject. To deny personal involvement would remove truth and limit the acquisition of knowledge as the researcher's involvement is core to the project, the study and the research (Burrell & Morgan, 2005). The project will therefore be taking an anti-positivist stance, believing that purely objective knowing is not possible. To guard against an overly subjective presence, the study employs the case study approach, a rigorous engagement with the literature and triangulation.

### **1.12 Delineation of research**

Participants of the focus groups and interviews were limited to current students and alumni of the Industrial Design course at CPUT and their employers. The research is limited to CPUT as this is currently the only location of the R5K project and currently the only Industrial Design course offered in the Western Cape. Although this study is limited to Industrial Design the intention is to use the findings from this research to propose a model that could inform similar aspirations in other design disciplines. It is

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<sup>13</sup> The selection of industry experts excludes CPUT alumni and focuses on industry experts that hired graduate R5K participants.

<sup>14</sup> Governmental, academic and third parties.



not the intention in this study to test the proposed model; such testing and application would be a suggested area for further research.

### **1.13 Significance and contribution of research**

This study will contribute to the development and understanding of industry focused work-integrated learning projects, with the intended practical application of increasing student's employability and reducing the expectation-versus-delivery gap between industry and academia (Elliott, 2014). The study will investigate and track the success of innovative methods of teaching and learning in response to an ever-changing economy.

### **1.14 Outline of chapters**

- **Chapter 1 – Introduction to the study**

This current chapter serves as an introduction to the research study, how it was accomplished, as well as the relevance of the study. It gives the reader an overview of what similar studies have uncovered and accomplished as well as the direction that this study will follow.

- **Chapter 2 – Literature Review**

The second chapter reviews literature from governmental as well as academic sources. It investigates the current job market for Industrial Design and the skills required to satisfy the needs of the industry. The review looks at the factors that influence employability and investigates the role they play in student graduateness.

- **Chapter 3 – Research Design / Methodology**

This chapter describes and validates the research design choices. It will explain the models and methodologies used within the data collection and analysis chapters.

- **Chapter 4 – Data collection and presentation of findings**

In this chapter the data collected from the surveys and interviews is described and interrogated.

- **Chapter 5 – Discussion of findings**

In the fifth chapter the findings are analysed and discussed, and the skills gap between what the university offers and what industry expects is discussed. This chapter then revisits the research problem set out in the first chapter, and reconciles the answers to the initial problem statement, objectives and questions in order to validate the findings and recommend areas of further study.

- **Chapter 6 – Conclusion and recommendations for future study**

The final chapter proposes a model for the increased employability of Industrial Design Students as well as discussing the studies limitations, contributions and suggestions for further research.

## **1.15 Ethical considerations**

Although this study did not endanger anyone nor involve participants that were unable to give consent it followed stringent ethical standards. There were no incentives for participating nor was delicate information asked for or disclosed to other parties. An open, honest and fair approach was used at all times.

Participants had the choice to remain anonymous if they so chose. All data gathered will be kept in an encrypted file on the researcher's personal password-protected computer and remain so for the duration of the study after which they will be archived for five calendar years for audit purposes (CPUT internal publication, 2013). There is no potential for this study to harm participants, individuals or the environment. The participants involved in this study are alumni of CPUT and have been involved in the project in previous years therefore they are fully cognisant of the details of the study. Current students who participated were assured that their participation and the nature of their responses would have no influence on their marks. All participants signed CPUTs *Ethics consent for research participation* (FID/REC/C0.2) form.

## **1.16 Expected outcomes**

The outcomes of this research intend to aid in improving the Industrial Design R5K project, within its subject of Professional Practice and subsequently enhancing the chance of graduate employability. This research will also provide useful insight into Work-Integrated Learning practices and inform the debate and engagement within CPUT and the industry around developing competencies that will imbue our students with capabilities, proficiencies, skilful practices and understanding to engage with our ever changing and evolving industry. A developmental model is generated which can be generalised for use at other institutions that offer Industrial Design as a work readiness 'barometer'.

## **1.17 Chapter Summary**

This introductory chapter has outlined the rationale for the study and sketched the structure of the remaining thesis. It has discussed the conceptual and theoretical background through a brief literature overview of the topic as well as introduced the methods of investigation for the study.

In the next chapter literature from government, academic and industry sources (focussed on exploring the job market) will be reviewed.

## **CHAPTER 2: Literature Review**

### **2.1 Introduction**

This chapter creates knowledge framework of the quadruple (quad) helix of academia, industry, government and the individual in relation to the Industrial Design sector. By conceptualising all aspects of the quad helix one gains an understanding of the forces at play that govern student pedagogy and the role that this has on their entry into industry after graduation. Once aspects of the conceptualisation have been specified the reasoning will be discussed. Key literature will be reviewed and unpacked to produce a framework of understanding to partially answer sub-question 1 of this study: *What is the degree of alignment currently between graduate attributes and industry expectations for Industrial Design?*

### **2.2 Academic context**

#### **2.2.1 Introduction to the Industrial Design course at CPUT**

Product Design at CPUT is a three-year diploma programme with an optional additional bachelor year, which advances the title to that of Bachelor of Technology in Industrial Design. The Industrial Design department started in 1998 in the then Cape Technikon, which changed to Cape Peninsula University of Technology after the merger with Peninsula Technikon in 2005 (International Council of Societies of Industrial Design, 2015). The subject in which the R5K project takes place is Professional Practice, which according to the CPUT (2015) faculty handbook “develops business and entrepreneurial skills as well as key disciplinary skills and ethics required of a professional designer.”

Orrell (2007, p.2) describes Professional Practice by stating that, in contrast to academic knowledge which is “predictable, intentional, replicable, prolonged and student focused”, professional practice knowledge is “unpredictable, immediate, unique, transient” and has “competing interests”. This research will attempt to establish the R5K projects’ value contribution to the Professional Practice subject.

The R5K project runs for the duration of the academic year. The aim of the R5K project is to make real the theoretical training received in the previous three years, by students not only conceptualising and designing a product for the market but producing it and taking it to market. The project is hence student-centered and client-focused while being the first project in CPUT Industrial Design that is fully industry-based and money-generating. The R5K project thus affords students the opportunity to galvanise the practice and theoretical work done in undergraduate years and to bring about a deeper understanding of the whole design process. An additional goal of the project is to give students a tangible product that has been produced within industry experience that they can use in their portfolios for job seeking. Another goal of the R5K project is for the students to earn money that could subsidise their studies and possibly develop into a lucrative and long-standing company<sup>15</sup>.

As most content of the R5K project is centered on the application of knowledge in practice, continuous evaluation is used. For a better understanding of the teaching process of Industrial Design, below is a table of subjects and their assessment techniques. The contents of this table will be unpacked and discussed throughout the thesis.

**Table 1 - Subject and assessment for Product / Industrial Design at CPUT (CPUT, 2015)**

Subject	Year mark & examination	Continuous evaluation	Theory test	Practical test	Theoretical assignment	Practical assignment	Project presentation and critique	Project group marking
Design Studies 1		yes					yes	
Drawing for Design 1		yes	yes	yes		yes	yes	yes
Technology 1		yes	yes	yes	yes		yes	yes
History of Art 1	yes		yes		yes	yes	yes	yes
Business studies 1	yes		yes		yes	yes		yes
Product Design 2		yes					yes	yes
Design Media 2		yes		yes		yes	yes	yes
Technology 2		yes	yes		yes			yes

<sup>15</sup> This will be discussed further in chapter 5.

<b>History of Design 2</b>	yes		yes		yes	yes	yes	yes
<b>Business studies 2</b>	yes		yes		yes			yes
<b>Product Design 3</b>		yes					yes	yes
<b>Design Media 3</b>		yes		yes		yes	yes	yes
<b>Technology 3</b>		yes	yes		yes		yes	yes
<b>History of Design 3</b>	yes		yes		yes	yes		yes
<b>Business studies 3</b>	yes		yes		yes		yes	yes
<b>Product Design 4</b>		yes			yes		yes	yes
<b>Design Theory 4</b>		yes			yes		yes	yes
<b>Professional Practice 4</b>		yes			yes	yes	yes	yes

Much like the University of Western Sydney’s Bachelor of Design teaching studio which is described as a “living curriculum’ that connects people, enables interaction, dialogue, and the sharing of knowledge” (Edwards-Vandenhoeck & Sandbach, 2013, p.4), the R5K project uses the lessons learned through continuous assessment practices in first, second and third year and takes theory into real, industry based practice.

In the last decade HEIs in South Africa have been actively restructuring and recurriculating so as to make qualifications more responsive and adaptable to the socio-economic needs of our changing society (A Cape Higher Education Consortium (CHEC) Study, 2013). This restructuring resulted in the merging of institutions and the birth of the comprehensive universities and the universities of technology. The aim of these mergers was to transform and align curriculum practices and to improve quality with an outcomes-based approach. Forbes (2006, p.1) says of this process:

*The aim was to enhance the knowledge base and applied competencies of students in an attempt to narrow the gap between knowledge creation at the institution and the transfer and application of this knowledge into reflexive skills and competencies in workplace.*

Crowther (2013, p.18) states that the studio is a signature pedagogy of design education. Industrial Design is also a studio-based course in that classes, theory and practicals happen within the studio. Studio-type models are remnants of the historic apprenticeship models where artisans would be surrounded by the tools of the trade and through a process of inculcation be slowly transformed from an apprentice to a

master of the craft. In today's academic world the term studio has the dual meaning of the space within which teaching takes place as well as a pedagogical strategy (Crowther, 2013, p.22). The studio space is a semi structured environment where students are given space and freedom in which to work, while the lecturers offer flexible, formative pedagogy in individual and personal interactions. As Crowther explains, 'The act of designing is always an act of uncertainty and, as such, the design studio is an environment of unpredictability and serendipity' (Crowther, 2013, p.19). There is a hidden curriculum (Harvey, 2004) that allows students to pick up what it means to be a designer from the lecturers who have teaching and industry experience. Students pick up the values, beliefs and designerly ways in the studio. This can have negative consequences if the lecturer does not have industry experience as the students will pick up characteristics and traits that are not borne from industry experience. Another risk with the hidden curriculum is for students whose cultures differ from that of the lecturer. During end of year critiques the years' work is assessed based on what has been learned and perceived. Certain students might have picked up more because of cultural similarities alone. Crowther seems opposed to this 'somewhat antiquated mode of dialogue [which] is overdue for technological intervention' (Crowther, 2013, p.20).

Industrial Design, as with most educational courses, is interested in how students learn; how teachers teach students with knowledge that is organised within subjects; how these subjects are arranged within a syllabus; and how that syllabus is placed within the curriculum.

## **2.2.2 Employability**

### **2.2.2.1 Graduate Attributes**

Many authors agree that the concept of employability is near impossible to neatly define; it is heavily nuanced and cannot be used as a term without specific context (Yorke & Knight, 2006; Lees, 2002; Hillage & Pollard, 1998; Lowden et al., 2011). According to Lees (2002) employability and employment are not the same thing. Being employable means 'having the qualities needed to maintain employment and progress in the workplace' while being employed merely means having a job. That

said many have attempted to define employability and the graduate attributes that foster that employability or as Harvey and Yorke (Harvey, 2004; Yorke, 2006) put it “graduateness”.

As Barrie, Hughes and Smith put it, “Graduate attributes are an orienting statement of education outcomes used to inform curriculum design and the provision of learning experiences at a university” (Barrie et al., 2009, p.1).

Hillage and Pollard (1998, p.2) developed a framework on employability, in which their key findings were:

- 1 Employability is about having the capability to gain initial employment, maintain employment and obtain new employment if required
- 2 For the individual, employability depends on:
  - a. their assets in terms of the knowledge, skills and attitudes they possess
  - b. the way they use and deploy those assets
  - c. the way they present them to employers
  - d. crucially, the context (e.g. personal circumstances and labor market environment) within which they see work
- 3 The balance of importance between and within each element will vary for groups of individuals, depending on their relationship to the labor market
- 4 Government policy is aimed:
  - a. more at the development and accreditation of knowledge and vocational skills than at the ‘softer’ skills and attitudes
  - b. more on the demonstration of assets than their deployment - particularly for adults
  - c. more at individuals looking to enter the labor market (e.g. from education or unemployment) than those within
  - d. more on the individual and the supply side, than on employers and the demand side (i.e. the labor market contextual factors) (Hillage & Pollard, 1998 p.2).

Hillage and Pollard’s (1998) framework talks to government, industry or employers as well as the personal responsibilities of the graduates. It is evident that graduates



need to be flexible so that they can adapt to the changes in the industry or differing opportunities that may present themselves. These changes may be influenced by the increase in contract work, part-time work and self-employment (Harvey, 2002; Hillage and Pollard, 1998). The phenomena is increasing and the new breed of flexible experts have been termed 'flexperts' (quoted in Lees 2002, p. 13). Individuals in the traditional job market can no longer rely on focused employer-orientated knowledge and skills. To succeed in the market today one has to be able to market oneself, and capitalise on and develop personal traits and abilities (Hillage & Pollard, 1998, p.2). Employability in this way is related not only to the acquisition of skills, but rather to developing individuals who are critical, lifelong learners (Harvey, 2002, p.1).

Dr Lees, the employability co-ordinator at the University of Exeter asks the question, "what is the point of higher education; subject knowledge and understanding, or learning how to learn?". She argues that this agenda of learning how to learn might be driven by government policy and employers rather than academia (Lees, 2002, p.3). Academia's role has always been to train thinkers and promote life-long learning. Dearing (1997) is against producing a generic list of skills and competencies as every programme's requirements are specific, as are the skills employers are looking for. Dearing adds that it is beneficial for students and employers to see a specific programme's graduate attributes as those gaps that need filling from both sides (Dearing, 1997). Harvey (2004) agrees with Dearing and in saying that the high value that is placed on work experience for employability suggests a deeper meaning and greater significance: "The emphasis is not so much on employability as something acquired through skills as on employability as a range of experiences and attributes developed through higher-level learning. Employability is not a 'product' but a process of learning" (Harvey, 2004, p.2).

Hillage and Pollard add: 'Individuals need relevant and usable labour market information to help them make informed decisions about the labour market opinions available to them' (Hillage & Pollard, 1998, p.5).

Lees (2002) in her paper *Graduate Employability*, wrote up a comparative study of many lists of key skills and competencies<sup>16</sup>. Out of these lists Lees extrapolated dimensions of employability based mostly on the work of Knight and Yorke (Lees, 2002, p.20; Yorke & Knight, 2006, p.8), as shown in Table 2. The colour highlights have been inserted to allow comparison with the findings of a study by Ramirez (2002), described hereunder.

**Table 2 - Dimensions of Employability (Yorke & Knight, 2006, p.8).**

<b>PERSONAL QUALITIES</b>		
1	Malleable self-theory	belief that attributes [e.g. intelligence] are not fixed and can be developed
2	Self-awareness	awareness of own strengths and weaknesses, aims and values
3	Self-confidence	confidence in dealing with the challenges that employment and life throw up
4	Independence	ability to work without supervision
5	Emotional intelligence	sensitivity to others' emotions and the effects that they can have
6	Adaptability	ability to respond positively to changing circumstances and new challenges, flexibility
7	Stress tolerance	ability to retain effectiveness under pressure
8	Initiative	ability to take action unprompted and to lead others
9	Willingness to learn	commitment to on-going learning to meet the needs of employment and life, and to develop and adapt learning strategies
10	Reflectiveness	the disposition to reflect on & evaluate the performance of oneself and others
<b>CORE SKILLS</b>		
11	Reading effectiveness	the recognition and retention of key points
12	Numeracy	ability to use numbers at an appropriate level of accuracy
13	Information retrieval	ability to access different sources, technologies and media
14	Language skills	possession of more than a single language
15	Self-management	ability to work in an efficient and structured manner, to deadlines
16	Critical analysis	ability to 'deconstruct' a problem or situation
17	Creativity	ability to be original or inventive and to apply lateral thinking
18	Listening	focused attention in which key points are recognised
19	Written communication	clear reports, letters etc. written specifically for the reader, respond to different audiences & contexts)
20	Oral presentations	clear and confident presentation of information to a group

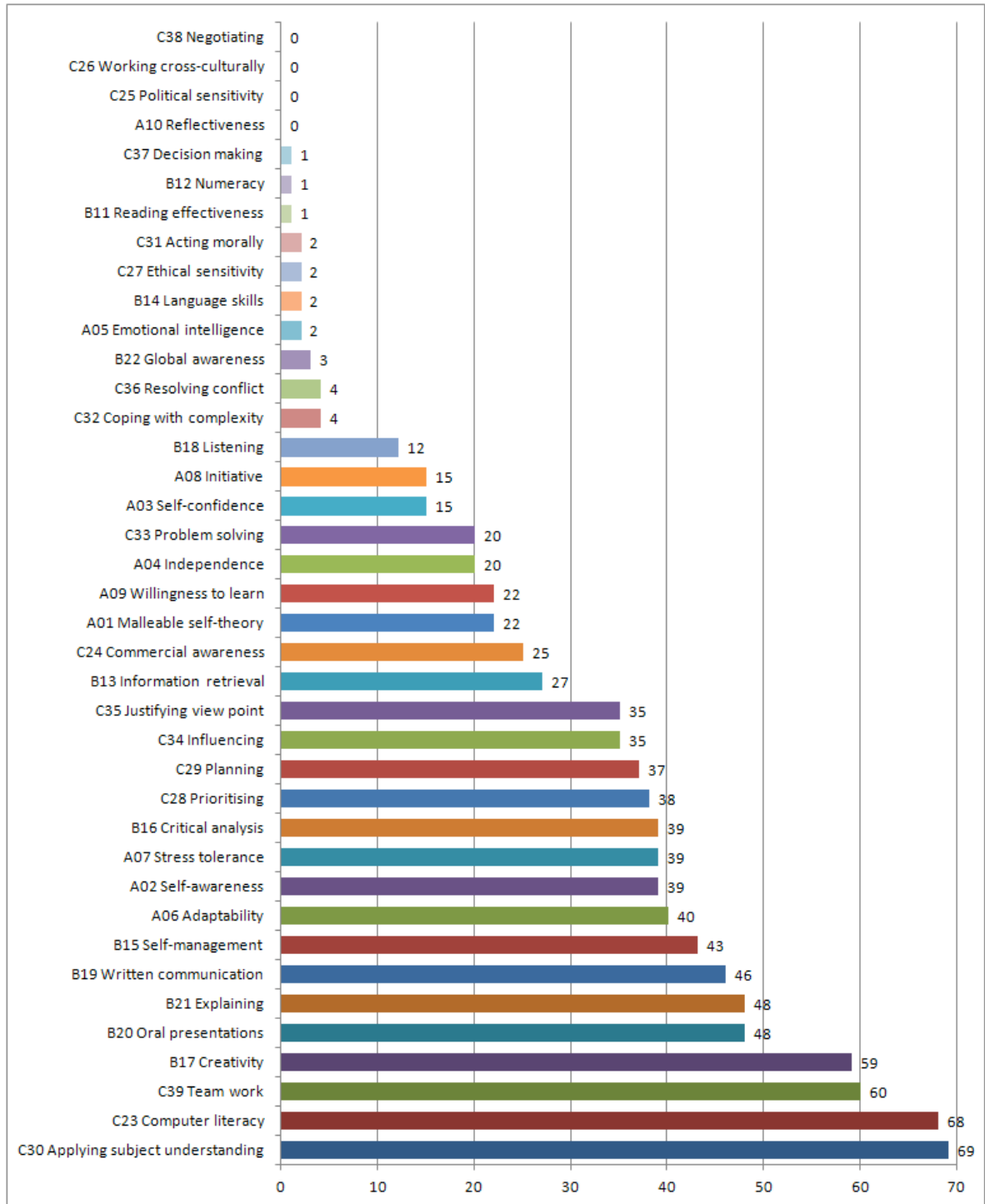
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<sup>16</sup> Based on the following studies: Guardian/Gallup Survey 1993/4, Barclays PLC, Harvey and Green 1994, Brennan 1996, Dearing 1997, Hillage and Pollard 1998, Coopers and Lybrand 1998, Biggs and Moore 1998, Reuters 1999, Knight and Yorke 2000, Orchard, Conway and Ward 2000, Maharasoia and Hay 2001.

21	Explaining	orally and in writing
22	Global awareness	in terms of both cultures and economics
<b>PROCESS SKILLS</b>		
23	Computer literacy	ability to use a range of software
24	Commercial awareness	understanding of business issues and priorities
25	Political sensitivity	appreciates how organisations actually work and acts accordingly
26	Ability to work cross-culturally	both local and abroad
27	Ethical sensitivity	appreciates ethical aspects of employment and acts accordingly
28	Prioritising	ability to rank tasks according to importance
29	Planning	setting of achievable goals and structuring action, organise sub-tasks
30	Applying subject understanding	use of disciplinary understanding from the HE programme
31	Acting morally	has a moral code and acts accordingly
32	Coping with ambiguity and complexity	ability to handle ambiguous and complex situations
33	Problem solving	selection and use of appropriate methods to find solutions
34	Influencing	convincing others of the validity of one's point of view, take role of chairperson
35	Articulation	arguing for and/or justifying a point of view or a course of action
36	Resolving conflict	both intra-personally and in relationships with others
37	Decision making	choice of the best option from a range of alternatives, delegating
38	Negotiating	discussion to achieve mutually satisfactory resolution of contentious issues
39	Team work	can work constructively with others on a common task, adapting to the needs of the group

In Archer and Davidsons' (Archer & Davison, 2008) study it was seen that 'soft skills' like communication and team work were perceived to have more value to employers than 'hard skills' like a good degree. This finding is supported by Ramirez (2012) in his paper *'Employability Attributes for Industrial Design Graduates'*, in which the same 39 employability aspects are listed, with 31 of the 39 dimensions considered to be 'soft skills'. According to Ramirez (2012, p.2464) these dimensions have been adopted by the Higher Education Academy in Australia. Ramirez states statistics that 88% (2012, p.2463) of Industrial Design Graduates in Britain gain employment in creative occupations. In Taiwan that figure is 80%; in the USA it is 100%. The percentage of South African Industrial Design employability will be investigated further in Chapter 4.

Ramirez's (2012) study analysed the specifications of 1287 international Industrial Design job advertisements on Coroflot, the results of which are collated in Figure 4 below.



**Figure 4 - Aspects of employability for Industrial Designers (Ramirez, 2012, p.2464)**

The results from Ramirez’s study that are pertinent to this thesis are:

1. 47% of advertisements were for mid-level staff
2. 18% of adverts were for junior staff
3. 4% of adverts were for freelance designers
4. 68% of posted adverts required working experience

5. All 39 of the dimensions of employability in Table 2 were found in the job postings.

a. The fifteen most important in ranking (from most to least) were<sup>17</sup>

1. Subject understanding (30)
2. Computer literacy (23)
3. Team work (39)
4. Creativity (17)
5. Oral presentations (20)
6. Explaining (21)
7. Written communication (19)
8. Self management (15)
9. Adaptability (6)
10. Self awareness (2)
11. Stress tolerance (7)
12. Critical analysis (16)
13. Prioritising (28)
14. Influencing (34)
15. Justifying view point (35)

In Ramirez' (2012) and Knight and Yorke (Yorke & Knight, 2006, p.6) *Dimensions of Employability* study it can be seen to provide a valid framework and that employers highly value soft skills even though the top three desired attributes are subject-dependant. Yorke (2006), in his report for the Higher Education Academy iterates, "employers generally see a graduate's achievements related to the subject discipline as necessary but not sufficient for them to be recruited. In some employment contexts the actual subject discipline may be relatively unimportant. Achievements outside the boundaries of the discipline, such as the position of so-called 'soft skills', are generally considered to be important in the recruitment of graduates" (Yorke, 2006, p.2).

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<sup>17</sup> Numbers and highlights correlate with Figure 4. The top 15 were chosen, as were the most frequently mentioned attributes from Ramirez's survey. The top 15 were also chosen as the 16<sup>th</sup> had a much lower rating.

The relevance of these soft skills becomes starkly apparent in the context of the demands and challenges of contemporary society. We live in a world whose population is increasing at a rate that is not matched by the evolution of society's systems and practices. We are forever looking for ways to make our systems work, but with ever increasing complexity, can we use the same systems designed for a previous age? Dearing suggests that this "growth without fundamental change was unstable in terms of finance, capacity, quality..." (Dearing, 1997, p.56). Lees argues that because of this increasing population and complexity our graduates will have to fill current employment areas as well as new areas that will be increasingly opening up (Lees, 2002, p.2). The 'flexpert' graduates are the ones that will be able to take advantage of this ever shifting employment landscape.

Harvey (2004, p.9) proposes a three phase model of employability;

1. Institutions should provide implicit and explicit opportunities, which lead to 'job-getting' knowledge. These include the direct tools needed for industry readiness like *curriculum vitae* writing, interview preparedness and labour market information
2. The development of a curriculum-integrated range of implicit and explicit attributes including analysis, critique, team working, communication, interpersonal skills and personal development skills like flexibility, adaptability, self-organisation, time management, risk taking and problem solving
3. Finally the characteristic of life-long learning and the reflection of that learning.

What Harvey is speaking to is a holistic approach to integrating employability into the curriculum, creating a seamless integration of the whole student experience.

In the concluding chapter of Lowden, Hall, Elliot and Lewins' (2011) extensive report on employability skills for new graduates they say, "one of the most crucial measures HEIs can adopt to promote employability is the provision of integrated placements, internships and work-based learning opportunities of significant duration" (Lowden et al., 2011, p.42). A statement that relates strongly to the concept of situated learning.

### 2.2.3 Situated learning

Situated learning as a pedagogic tool dates back to 1929 when Alfred North Whitehead “protested against the way students were taught ‘inert’ knowledge that proved useless to them when they needed to transfer it to real life problem solving” (Vincini, 2003, p.1). Situated learning is therefore a method of teaching that facilitates graduates’ ‘graduateness’ which is a term used by Peter Knight to describe the qualities and readiness that allow a graduate to enter the world of work (Yorke & Knight, 2006). Vincini (2003) argues against schools separating “knowing and doing” as if they belonged in separate places. Even Aristotle in 384BC made explicit that there are various ways of teaching and that they should not be utilised in isolation, namely; *episteme*, *techne*, and *phronesis* (van Niekerk & M’Rithaa, 2008, p.8).

Whereas *episteme* (from which epistemology or the theory of knowledge is derived) and *techne* (meaning technology or technique) have found greater acceptance, Aristotle argues that *phronesis* on the other hand has been generally unappreciated as “there is no active, contemporary equivalent” meaning assigned to its understanding (Hursthouse, 2007, p.4). As Industrial Designers trained in an evolved Bauhaus model, the practice of *episteme* and *techne* modes of teaching happen in part due to the inherent bias towards Western thinking. In *phronesis*, wisdom and artistry as well as art and politics are one. *Phronesis* concerns the competence to know how to exercise judgment in particular cases. It is oriented towards analysis of values and interests in practice, based on a practical value rationality, which is pragmatic and context dependent. *Phronesis* is experience-based ethics oriented towards action (Jönsson & Certec, 2005, p.181). Theorists that are associated with situated learning seem to agree with (or even to continue) Aristotle’s work by arguing that “knowledge must be taught in context and not in the abstract. Learners must use tools as practitioners use them and become ‘cognitive apprentices’ in that discipline’s community and culture” (Vincini, 2003, p.1).

Much like Work-Integrated Learning, which will be investigated in the next chapter, the journey from apprentice to expert begins with learning, observing and emulating

members of the community of practice and then in time, and with tried and tested skills, becoming fully participating members (Vincini, 2003, p.1).

Vincini (ibid) lists instructional technologies that could aid in the design of curriculum instructions along the principles of Situated Learning:

1. Learning is driven and best presented through realistic and complex problems that allow learners to learn, think and practice like experts in the field
2. Content is learned through activities that help solve problems and not from 'packages' of information organised by instructors
3. The instructor's role moves from providing and structuring the information and knowledge through lectures and presentations to modelling, coaching and scaffolding learners as they use information and create knowledge to solve contextual real-life problems
4. Situated learning environments must support active engagement, discussion, evaluation and reflective thinking. Activities and assignments often collaborative and group based.

True Situated Learning environments reflect the tasks that the pedagogy is talking to, as discussed in Garner and Duckworths' paper about the employability of design graduates. They say:

*With the current strength of the SME<sup>18</sup> sector in industrial countries and diversification in undergraduate design education around the world there is a need for research which can help design graduates to promote themselves to SMEs; assist universities with design curricular development; and inform SMEs about the developed and emerging competencies of design graduates (Garner & Duckworth, 2000, p.206).*

This notion of graduateness ties in with the term 'competencies'. It is the Situated Learning context that allows learners to embed knowledge gained in academia within a real-world, live context and thus deepen their knowledge and competencies.

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<sup>18</sup> Small to Medium Enterprise.



In an interview for the *Innovations in Learning* periodical, Rebecca Sholes talks about a project that she runs with her students where they spend half the time in class researching existing literature and the other half being taught by a technical specialist. She iterates “This ability to compare and contrast information is the heart of the social sciences” (Sholes, 2002, p.2). She noted how a combination of the technical angle and the academic angle allowed students to draw upon their different areas of expertise.

Innes (2006) seems to concur when she says “Live projects are an exciting way to do this, with tangible results, and they can also be a productive anchor for situated learning: motivating students with a promise of a professional outcome, giving them a rare opportunity to test out and expand upon skills in a real life context and the chance to perform as a part of a production team” (Innes, 2006, p.191). Even though concurring with Vincini and consciously orientating towards Situated Learning methods, Innes (2006, p.191) warns against potential issues with live projects:

1. Tutors can be torn between the responsibility to the client or to the students
2. The pressure to perform can overwhelm students and the communication between project managers, industry professionals and students can become confused
3. Ensuring that projects serve the learning needs of students rather than serving the requests of the industry
4. There is chance of students not participating in real activities because they are delegated to soft tasks that have the least chance of risk.

Innes (2006) goes on to say that the challenge is then to adapt the curriculum to accommodate and benefit the community of practice but not to allow this to negatively influence students as the main goal of industry is not to teach.

The four main principles that characterise Situated Learning according to Theil and Ulber (2005, p.2) are:

1. Situatedness: Situated Learning takes place in real or near real contexts. The learning environment offers contact with the culture of practice
2. Authenticity: students are forced to solve complex practical problems which gives them an opportunity to handle knowledge as a tool
3. Self-regulation: students are carrying out projects that require self-determination and self-regulation in the learning process
4. Co-operation: Learning is directly or indirectly embedded in a community of practice, and collaborative learning is encouraged.

Situated Learning has its foundation in the concept that learning, thinking and knowing is linked to active participation of individuals in activities that are grounded in a cultural and social context (Lave, 1991, p.67). This aspect is a core component of this study, and is at the heart of the R5K project.

This study will investigate the impact of this real world experience in the development of students, in the case of the R5K project. The complete journey through a design process, from conceptualisation to final sales, as well as the influence of experts in the field may impact the competence of students. The influence of this developed competence in relation to graduate employability and their ability to earn a livelihood, is therefore explored in this study.

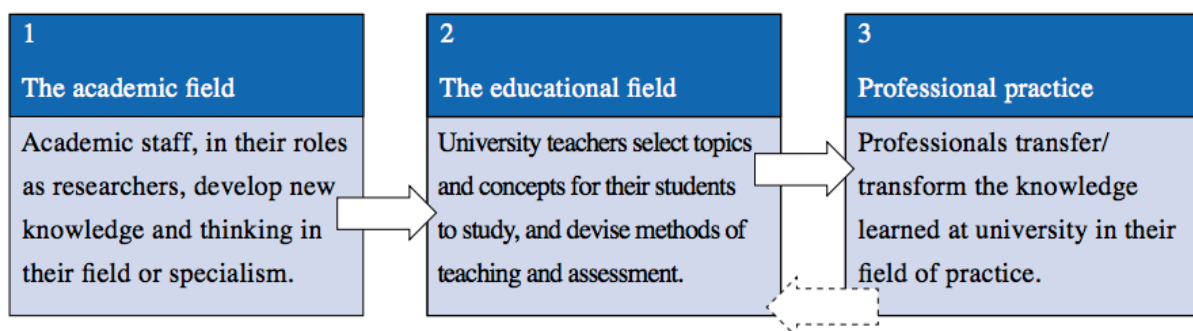
#### **2.2.4 Work Integrated learning (WIL)**

WIL is a career-focused approach to education that aligns industry and academia through a hands-on, practice component within the context of the problem. As early as 1935 educational theorists like Dewey with his pragmatic philosophy believed that genuine education could only occur through real experience (Thomassen, 2011). Dewey (Dewey, 1916, p.144) is quoted:

*We have been concerned with the influences which have affected the division between work and leisure, knowing and doing, man and nature. These influences have resulted in splitting the subject matter of education in two separate studies. They have also found formulation in various philosophies which have opposed to each other body and mind, theoretical knowledge and practice, physical mechanism*

*and ideal purpose. Upon the philosophical side, these various dualisms culminate in a sharp demarcation of individual minds from the world, and hence from one another.*

Kolb (Kolb, 1984) stated that experience and academia work hand in hand to bring about understanding. To further this, Biggs (1999) and Schön (1983) argue that in addition to real experience and academic knowledge, reflection on the learning of theory in the context of work is required to bring about vocational competence (argument found in Council on Higher Education, 2011). The relation between the world of work and academia has been investigated extensively by various authors, institutions and governments alike, the focus point always seeming to be how to overcome the tension between the two. In 1991 CPUT established the Centre for Community Engagement and Work Integrated Learning in response to the education White Paper on the transformation of higher education, which called for “all South African education institutions to demonstrate greater responsibility and commitment to the socio-economic development of communities” (CPUT internal publication, 2013, p.23). The vision of the Centre for Community Engagement and Work Integrated Learning in CPUT is “to establish an empowering environment that supports the development of socially responsive and accomplished students through work-integrated learning based on mutually beneficial partnerships with industry and the community” (CPUT internal publication, 2013, p.24). This vision reflects a wider trend in higher education and professional knowledge systems.

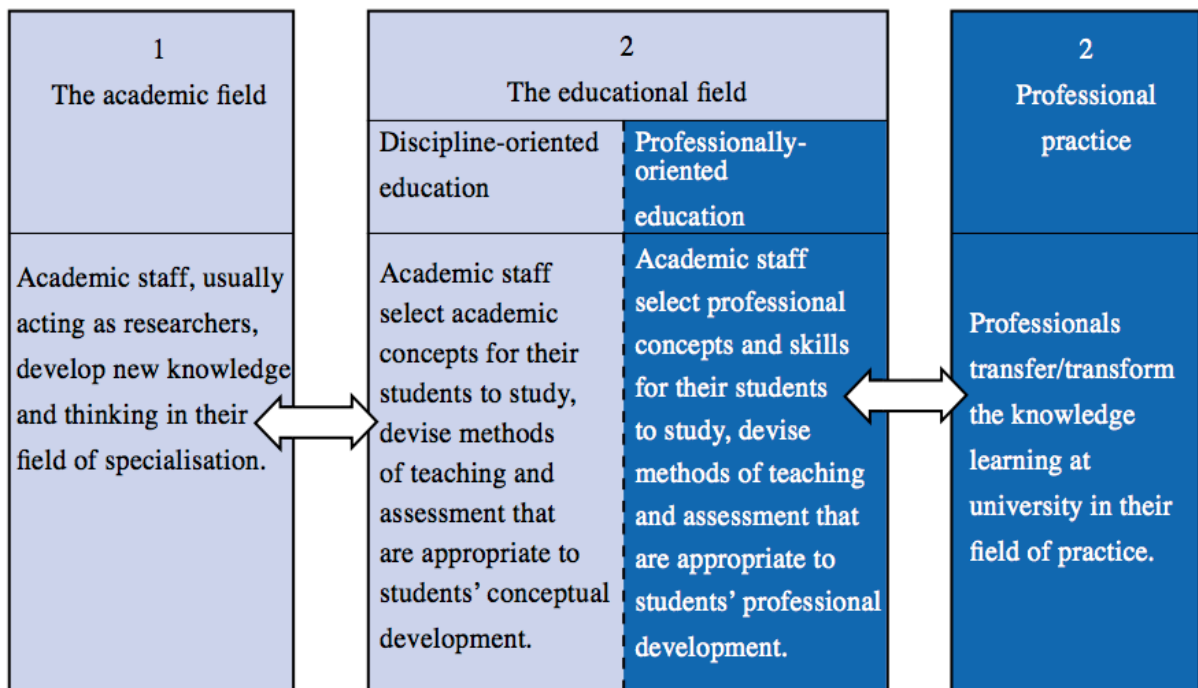


**Figure 5 - A traditional professional knowledge system (Council on Higher Education, 2011, p.8)**

The Council on Higher Education proposes that a framework of a profession is divided into three parts as seen in Figure 5. The first field is the basis for the disciplines of the profession, for example within Industrial Design these would be

design studies, drawing for design, technology, history of design and business studies. The second education field is where curricula within the subjects are developed and teaching and learning happens. The third field is that of professional practice which is entered into upon graduation and employment within the field of practice. Higher education usually focuses on the academic and educational fields, usually delegating aspects of the professional practice to the final year of study (Council on Higher Education, 2011, p.8).

The WIL approach to education maintains that these three parts of a profession need to be aligned into a cohesive modality (Council on Higher Education, 2011). The professional knowledge system in a WIL approach (Figure 5) shows explicitly how a lecturer should organise teaching within the educational field with academic and professional influences.



**Figure 6 - A professional knowledge system in a WIL approach (Council on Higher Education, 2011, p.9)**

South Africa's former Technikons had a history of students gaining important knowledge and skills in the workplace. 'Cooperative education', a term used in the past, was often seen to value the lessons learned in the workplace over the classroom (Groenewald & Schurink, 2003, p.95), while WIL takes graduates' career

trajectories into account and therefore aligns the academic side with work-based learning.

When the Higher Education Quality Committee, a unit of the Higher Education Qualifications Framework (HEQF), was tasked to design a quality assurance system in the context of restructuring higher education they published a number of publications to “increase the level of national and institutional debates on the conceptualisation, quality and practice of teaching and learning” (Council on Higher Education, 2011, p.1). When discussing the role of academics involved in teaching the authors of *Work Integrated Learning: Good Practice Guide* stated “University teachers should be concerned to ensure that the students that graduated from their programmes are prepared for the world in which they will live and work” (Council on Higher Education, 2011, p.65).

WIL is summarised by the authors of the Good Practice Guide (Council on Higher Education, 2011, p.4) as:

*Work integrated learning is a term used to describe curricular, pedagogic and assessment practices across a wide range of academic disciplines that integrate formal learning and workplace concerns. The integration of theory and practice on student learning can occur through a range of work integrated learning approaches, apart from formal or informal work placements. Work integrated learning is primarily intended to enhance student learning, and to this end several innovative curricular, pedagogical and assessment forms have been developed in response to concerns about gradueness, employability and civic responsibility; examples include: action learning, apprenticeships, co-operative education, experiential learning, enquiry learning, inter-professional learning, practicum placements, problem based learning, project based learning, scenario learning, service learning, team-based learning, virtual or simulated work integrated learning, work-based learning, work experience and workplace learning*

In short, Work Integrated Learning is learning from experience or in Latin *experientia docet* which mean ‘experience teaches’. There are four main categories of WIL, namely: work-directed theoretical learning (WDTL), problem based oriented learning (PBL), project based learning (PJBL) and workplace learning (WPL) (Council on Higher Education, 2011, p.21). The table overleaf describes the terms and practices associated with the curricular activity, gives examples of where they would be

relevant and within which setting they would be used.

**Table 3 - A Work-Integrated Learning typology** (Council on Higher Education, 2011, p.21)

Curricular Modality	Work-Directed Theoretical Learning - WDTL	Problem Based Oriented Learning - PBL	Project Based Learning - PJBL	Workplace Learning -WPL
<b>Terms and practices associated with the curricular modality</b>	Classroom-based instruction, Lecture, Tutorial, Peer learning, Groups	Sequenced real world problems, Integrated learning, Discovery learning, Self-directed learning, Peer learning groups	Industry project, 'Real world' learning, Guided practice, 'Capstone' modules	'In-service' Work placements, Cooperative education, Practicum Work-based learning, Sandwich' courses, Apprenticeships, Internships, Traineeships
<b>Examples</b>	Career-focused courses and curricula (e.g., Maths for Engineering, communication for Business), Guest lecturers (e.g., from industry), Authentic examples, Workplace assessors	Work simulated problems, Case studies and scenarios, Team learning	Study visit, Site visit, Job shadowing, Authentic tasks & texts, Fieldwork, Interviews, Team work, Service Learning, Integrated trans- or inter-disciplinary projects	Learning contracts, Work record books, Learning logs, Journals, Mentoring, Specific training, Learning portfolios
<b>Sites of learning</b>	Lecture theatre, Classroom, Laboratory, Studio, Websites Blogs	Classroom, Laboratory, Group sessions, Library, Electronic media	Multiple sites: Classroom & Workplace, Laboratory & workplace, etc Electronic media	Workplace & classroom (for preparation & reflection) Electronic media

The Council on Higher Education<sup>19</sup> (2011) iterates that there is agreement between industry and academia that WIL practices benefit students' professional and employability standing. Some of the many advantages of WIL include:

1. Academic benefits such as improved general academic performance, enhancements of interdisciplinary thinking, increased motivation to learn
2. Personal benefits, such as increased communication skills, teamwork, leadership and co-operation
3. Career benefits, for example, career clarification, professional identity, increased employment opportunities and salaries, development of positive work values and ethics
4. Skills development, including increased competence and increase technical knowledge and skills (Council on Higher Education, 2011, p.6).

Forbes emphasises that WIL is not a substitute for education; it should not stand alone as the tool that raises skills and competencies of learners: "Any suggestion to pass on such responsibility for learning entirely to industry would be short-sighted and irresponsible" (Forbes, 2006, p.3)

Rather, WIL should be seen as a contextualising tool for theory and systems that allow students to connect the taught framework and the expression of that framework in industry with all the nuances and permutations and opportunities that brings (The National Committee of Inquiry into Higher Education , 1997, p.56). In conclusion let us look at two Work Integrated Learning quotes, the first from Forbes (2006) and the second from Yorke and Knights (2006), about embedding employability into the curricula:

*The challenge for higher education institutions is to ensure that work-integrated learning forms part of and is integral to the exit level outcomes of the qualification. It is then incumbent on the higher education institution to ensure that the assessment and evaluation of the students' learning experience is managed and measured with*

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<sup>19</sup> This refers to the South African Council of Higher Education.

*the same rigour and accreditation that applies to the theoretical component of the curriculum (Forbes, 2006, p.4).*

*Work experience may become a passport to employability when employers use work placements as essential part of the graduate recruitment process. Some employees will admit that they prefer to recruit from placement students since they have had a chance to weigh them up in the workplace and know much more about their suitability for a particular job than any other transcript or assessment centre could tell them. However, the extension of work-based learning is not without problems: employer and academic schedules may not dovetail, and small and medium-sized enterprises may be inhibited by the cost and time commitment involved (Yorke & Knight, 2006, p.17).*

The overwhelming support for Work Integrated Learning activities promotes a flexible feedback loop by means of student / industry interactions that is informed by all stakeholders, the students, staff and industry.

## **2.2.5 Design Education**

### **2.2.5.1 Constructivist learning**

There are numerous teaching and learning modalities that reflect the constructivist approach. Some of these include problem-based learning, real-world simulations, case study approaches, and student reflection (Savery & Duffy, 2001).

Constructivism is a learning theory that focuses on people and how they understand or know or to put in another way how they construct through personal experiences. There are three primary propositions that characterise constructivism (Savery & Duffy, 2001):

#### **1. Understanding is in our interactions with the environment**

Simply put, the result of learning is caused by a number of variables including content, context, learners' background and current state of mind as well as the intentions of the learner. The implication of this statement is that cognition is not a



science but more of an art. An art of creating understanding or knowing by making sure the context as well as the content is ideal and that the learners are in a stimulating and energised state of mind.

2. Cognitive conflict or puzzlement is the stimulus of learning and determines the organisation and nature of what has been learnt.

It is the learners' objective that dictates what is learned. If the learner is not interested or engaged it is a clear indication that they are either not being challenged sufficiently or there is a personal matter that needs resolution.

3. Knowledge evolves through social negotiation and through the evaluation of the viability of individual understandings.

It is through a collaborative environment that understanding and knowledge is developed. Social groups can better negotiate a shared understanding and create a context for learning, a place where learners can explore, question and reflect (Savery & Duffy, 2001, p.1).

Therefore constructivism emphasises that a synergistic interaction between learner, teacher and task is the route to fuller understanding of the subject matter being taught.

Savery and Duffy value Lebows' (2001) instructional principles from constructivism and iterate that it could serve as guide of instructional principles:

1. Anchor all learning activities to the larger task or problem
2. Support the learner in developing ownership for the overall problem or task
3. Design an authentic task
4. Design the task and the learning environments to reflect the complexity of the environment they should be able to function in at the end of learning
5. Give the learner ownership of the process used to develop a solution
6. Design the learning environment to support and challenge learners' thinking
7. Encourage testing ideas against alternative views and alternative contexts

8. Provide opportunities for and support reflection on both the content of learning and the learning process (Savery & Duffy, 2001, p.3-6).

As discussed previously the studio based learning style facilitates a constructivist approach to education as the focus is placed on the learning activity. The student creates new concepts in defined contexts<sup>20</sup> in a learning environment where the student creates their own meaning (Crowther, 2013).

Crowther lists three types of learning that can happen in a studio that works with Savery and Duffy's instructional principles in that it is a space that makes learning possible.

1. The development of knowledge – learning about design
2. The development and application of skills – learning to design
3. The transformative pedagogy in which learning is identified as changing as a person – to become a designer (Crowther, 2013, p.20)

From this description of literature on constructivist learning, the next section examines problem based learning.

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<sup>20</sup> In this case, the context of the design brief.

### 2.2.5.2 Problem Based Learning

According to Savery and Duffy the Problem Based Learning approach best exemplifies the principles of the constructivist learning theory. Problem Based Learning or PBL was developed in the 1970's in medical education, since then it has been adopted by schools of business, education, architecture, law, engineering and social work (Savery & Duffy, 2001, p.7).



**Figure 7 - Barrows PBL learning model (Savery & Duffy, 2001)**

The R5K process has many similarities to the PBL model. Savery and Duffy present an example of PBL that could help show these similarities<sup>21</sup> (Savery & Duffy, 2001, p.10).

Students first get divided into groups of five, these groups report to a facilitator. Students are presented with a problem that requires them to use all learned and acquired knowledge in order to recommend a solution. Students discuss the problem and generate hypotheses, the areas of concern are noted by the students and these are raised so that they can be clarified or so that a lesson can be built around them later. Students have no other defined tasks or readings, they are responsible for their

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<sup>21</sup> Explanation below

own learning and have access to all staff, libraries, an industry mentor / consultant and other recourses needed to accomplish this task. After self-directed learning the students compare notes and redirect their efforts based on this new information, this process may repeat itself until sufficient clarity about the situation is gained. The final assessment is based on how far the students travelled and how their learning and understanding lead them to a successful conclusion to the problem. Self and peer assessments are essential to PBL as there are no tests and it is peer and self-reflection which brings about a greater level of reflection about the process and what is gained. How this is taken further with the R5K project will be discussed in the fourth chapter.

The PBL process has many benefits that make transfer of knowledge and knowledge acquisition easier in terms of student engagement and students being invested in the process. Savery and Duffy explain this well when they say “The design of this environment is meant to simulate and hence engage the learner in the problem solving behaviour that is hoped a practicing physician would engage in. Nothing is simplified or pre specified for the learner. The facilitator assumes a major role in modelling the metacognitive thinking associated with the problem solving process. Hence this is a cognitive apprenticeship environment with scaffolding designed to support the learner in developing the metacognitive skills” (Savery & Duffy, 2001, p.10).

In this context PBL shares many of the hallmarks of WIL and Situated Learning. Again Savery and Duffy explain: ‘The focus is on learners as constructors of their own knowledge in a context which is similar to the context in which they would apply that knowledge. Students are encouraged and expected to think both critically and creatively and to monitor their own understanding’ (Savery & Duffy, 2001, p.12).

That said the goal of the process is for the learner to discover the outcome and learn specific knowledge that the lecturer designs into the process. The learning happens in the safe space of the studio and the risk is dramatically reduced but the illusion of a real life situation is gained. This way of thinking is on par with what John Seely Brown calls the entrepreneurial learner. He says (Brown, 2012, p.1):

*“We need to teach students to want to constantly learn new types of things, because that is the world that we are moving into – a world of constant and rapid change. Learning systems today primarily ‘push’ information to students’ and educators are not taking sufficient advantage of these new methods that could enable rapid creation and collaboration in ways previously unfathomable”.*

### **2.2.5.3 Graduate attributes at CPUT**

Cape Peninsula University of Technology (CPUT), the university in question in this case study, has published a general set of graduate attributes that keep with the vision and aim of the university (CPUT, 2014, p.8):

1. Our students should be technologically adept both in the ability to use technology and in their capacity to apply knowledge to real life issues
2. Our students should be eminently employable because they have a solid disciplinary knowledge base and the capabilities to apply this knowledge
3. Our students should be socially responsive in the sense that they should be aware of the important social issues in South Africa and be able to apply their knowledge and skills to address social needs
4. In line with one of our crosscutting themes, our students should be innovative in their thinking and actions
5. All our graduates should be environmentally conscious.

However there are no specific graduate attributes for Industrial Design or even Design more generally at the moment. In the publication ‘Vision 2020: The strategic plan’ the university iterates that faculties and departments will “tease out more explicit attributes related to particular disciplines” (CPUT, 2014, p.8).

### **2.2.5.4 Comparable projects**

There are a number of projects similar to the R5K project and many have similar aims and goals. The following projects offer a sample of these.

Swiss universities have adopted the Swiss Apprenticeship System, which accounts for the low youth unemployment of 10% while other European countries range from 25-50% (Langenegger, 2014, p.1). They offer a dual education system where youth can choose between academic and an apprenticeship vocation. The apprenticeship route trains learners for the hands-on economy of Switzerland's high tech industrial sector. Prof Dr Stefan C. Wolter who is the director of the Swiss Coordination Centre for Research in Education listed the advantages of the apprenticeship route (Langenegger, 2014, p.2):

1. Adds applicable know how
2. Creates a strong work ethic
3. Adds real life problem solving skills
4. Working with people of different ages
5. Socialisation into the world of work

This model, although more specific and structured includes many of the characteristics of the R5K project.

## **2.3 Industry and government context**

### **2.3.1 Western Cape Design Strategy**

The Western Cape Strategic Framework for Design document (2013) agrees with previous statements that South Africa is experiencing challenges in matching skill supply with the demands of employers. This skills shortage is cited as a major factor that limits South African economic growth and competitiveness (Western Cape Government, 2013, p.3). The document goes on to say that we are not alone and that it is the complexity caused by rapid growth of population and technology faced by all developing countries that is partially to blame (Western Cape Government, 2013, p.3):

*In South Africa, where the high unemployment rate has made a current skills shortage particularly aggravating, a demand-led approach has been adopted by the national government as evidenced in institutional restructuring of the skills landscape over the last 20 years. Through a demand-led approach, skills development should be able to be more responsive to the rapid technological changes of commerce as well as allow for speedy alignment to the dynamic nature of the region's competitiveness.*

The Western Cape Government (WCG) has adopted the approach of the National Skills Development Strategy in the province, placing value on local skills development in response to the demands of the economy. They go on to caution that without a feedback loop to ensure that the deliverable doesn't exceed the need. The WCG's focus in two particular areas sets out to address the challenges recognised:

1. The co-ordination of stakeholders so that the skills ecosystem can find alignment and therefore allow for better planning
2. Catalytic demand-led interventions that focus on supplying skills in response to large-scale economic opportunities, which are:
  - a. Broadband
  - b. The Green Economy
  - c. Design
  - d. Industrial development infrastructure (Western Cape Government, 2013, p.4)

The Western Cape Strategic Framework for Design specifically labels design as an economic driver and a key factor in improving quality of life in the Western Cape (Western Cape Government, 2013, p.4). In response to the need for skills a 2014 Government Gazette<sup>22</sup> (South Africa, 2014) labelled Industrial Design to be a scarce skill and started incentivising Industrial Design employment to foreigners in relation to obtaining a scarce or critical skill visa for permanent residence (see Appendix L).

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<sup>22</sup> Of 3<sup>rd</sup> June number 459, Act no.13 of 2002.

The Strategic Framework document goes on to state: “Design is the bridge between creativity and innovation, technology and the user and scientific and commercial disciplines for economic benefit”. It cites bear various examples where design has aided in economic growth (Ramirez, 2012, p.6)

- A study in Denmark where companies that increased design activity gained up to 40% in revenue compared to companies that didn't increase investment in design
- As a result of this study Turkey, Brazil, Singapore, New Zealand, the Netherlands, South Africa and Mexico also incorporated design into their economic strategies and as a result have shown GDP growth of 8% in Turkey, 5.9% in Chile, and 4% in Mexico.

As part of the WC Strategic Framework a situational analysis was done of the design industry in the Western Cape to find the main gaps within the design system across all levels of design, summarised in Table 4.

**Table 4 - Gaps in the design system (Western Cape Government, 2013, p.13)**

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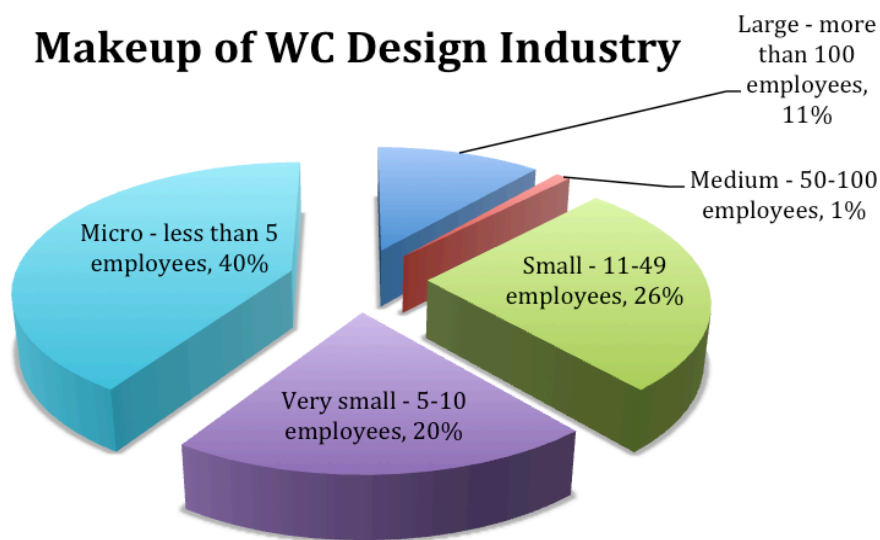
1. Lack of support for design infrastructure and enabling environment
2. Low levels of local product development activity in the Western Cape
3. Low levels of innovation support and promotion
4. Low levels of collaboration between design and other sectors
5. Design education system not producing sufficient and appropriately skilled graduates

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Further findings from the Western Cape Strategic Framework for Design support that there are sufficient opportunities for design in the Western Cape (Western Cape Government, 2013, p.98):



- There are approximately 1022 design businesses and 3829 design related businesses in the WC
- The Western Cape design industry accounts for approximately R13.4B of South Africa's GDP
- Between 40 982 – 238 192 designers are employed in the WC depending on which report is referenced<sup>23</sup>
- Internationally the growth of creative industries of 14% far outmatched inflation
- Small, very small and micro enterprises account for 88% of the design businesses in the Western Cape (See Figure 8)
- The design industry GDP contribution has grown 10% over 2011-12.



**Figure 8 (Western Cape Government, 2013)**

In the SABS Design Institute's publication '*Building a stronger Africa through design*' (2013, p.9) it is stated, "New jobs will not come from the formal employment sector. South Africa's youth need to design sustainable entrepreneurial businesses". Considering this statement and the finding cited above (WCG, 2013) that 88% of design jobs are in the small, very small and micro enterprises, it is significant to note that the smaller niche design businesses are thriving in Cape Town's economy. This

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<sup>23</sup> The Western Cape Government paper did not mention which other reports showed different figures.

is relevant to understanding how best universities can prepare graduates for the world of work.

## 2.4 Chapter Summary

This chapter investigated the literature in relation to the quadruple helix of academia, industry, government and the individual in order to investigate the alignment between what academia offers and what the industry needs for Industrial Design.

It is through practices like Situated Learning, Work Integrated Learning, constructivist learning and Problem Based Learning that universities are best able to match what and how they teach and the graduate attributes that industry needs. These practices have been investigated in this chapter and will be further investigated through primary research in Chapter 4.

This chapter can be concisely summarised by quoting Lave:

*This view [Situated Learning] also claims that learning, thinking, and knowing are relations among people engaged in activity in, with and arising from the socially and culturally structured world. This world is itself socially constructed. (Lave, 1991, p.67)*

It indicates that what happens in academia and what government should support, is guided by the socially and culturally constructed world. It is within this world that graduate attributes are tested and adapted and it is there that primary data will validate this adaption. This sentiment is mirrored in the Western Cape Strategic Framework, which says 'Design is the bridge between creativity and innovation, technology and the user and scientific and commercial disciplines for economic benefit.' The paper brings to bear various examples where design has helped with economic growth (Western Cape Government, 2013, p.6).

# Chapter 3: Research Design and Methodology

## 3.1 Introduction

The purpose of this study is to examine and describe the interactions and experiences of a group of BTech Industrial Design students who had taken part in the R5K project in order to assess and evaluate an industry responsive model that enhances students' ability to secure employment. The research design that follows in this thesis is that of a qualitative single case study. The research instruments that will be discussed in this chapter are survey questionnaires, interviews and thematic analysis. This chapter describes the research methodology and the research instruments in more depth.

## 3.2 Research Design as layers of an onion

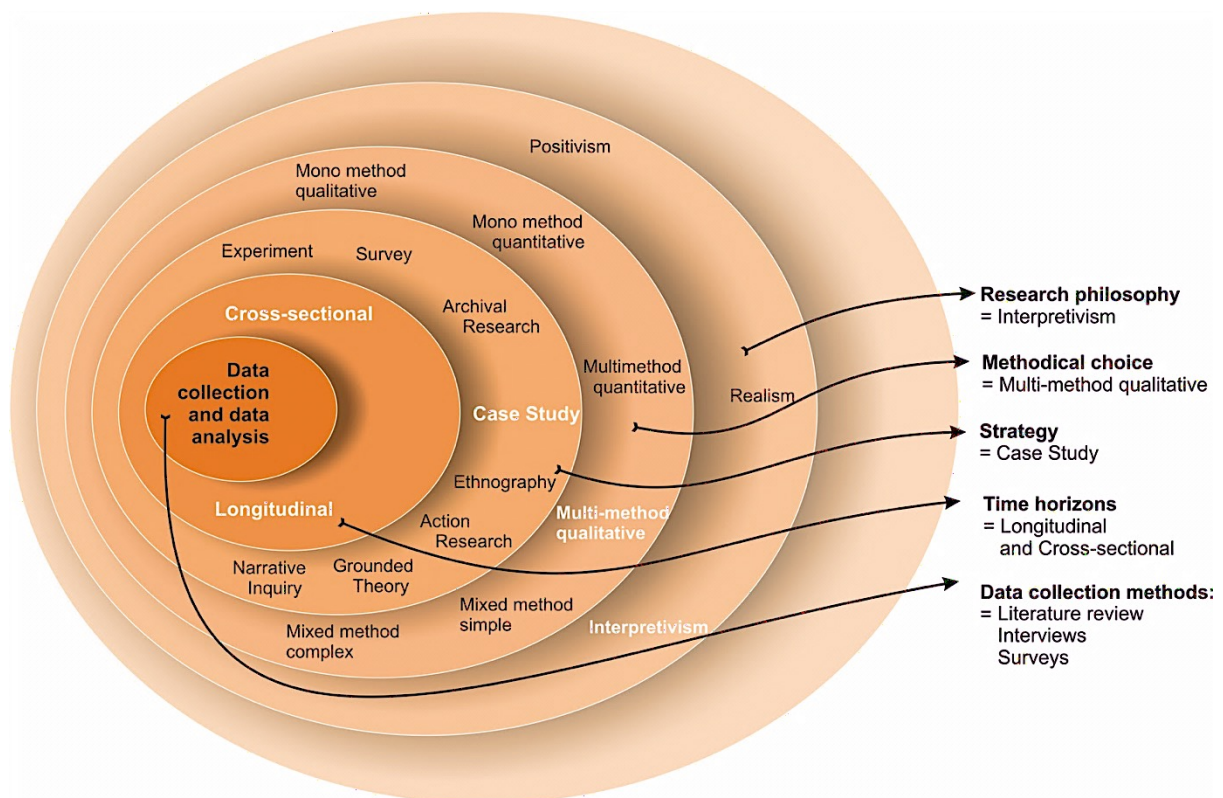


Figure 3 - The 'research onion' (adapted from Saunders, Lewis and Thornhill diagram, 2013)

The research onion<sup>24</sup> (Figure 3) will be used as a visual representation of the conceptual and methodological layers explored in this project. The visualisation forms the basis for an exploration of the research design in the following sections. This approach portrays the research design from philosophical perspectives in the outer layer, to data considerations at the core (Saunders & Tosey, 2013, p.59).

### **3.2.1 Research philosophy: epistemology and ontology**

A researcher's view of the world influences what they see as acceptable knowledge and how they perceive phenomena (Saunders & Tosey, 2013, p.58). It is critical to identify the ontological and epistemological assumptions at the start of a research process, as these have implications for the methodological choices that follow. In simple terms, ontology addresses the question "What's out there to know?" while epistemology answers "How do we know what we know?"

Ontology is described as the interaction between the brain, the body and the world, it is a description of how an individual interprets and develops a sense of expectation from objects (Gosden, 2008, p.2). Whether we see this interaction as objective or subjective is a key question that needs to be considered when conducting research (Darke et al., 1998, p.4).

Epistemology is concerned with the quest for valid knowledge and the academic rigour needed to prove its validity. Epistemology is core to academic inquiry as it is the basis on which valid knowledge claims are made and methodological approaches are motivated.

The philosophical paradigm that underpins this research, including the ontological and epistemological stance, is that of interpretivism which, according to Gray (2004, p.19) is similar and related to constructivism. Constructivism sees truth and meaning as intrinsically linked to the subject's interactions and dealings with the world. So meaning is *constructed* and not discovered as in positivism. This stance assumes

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<sup>24</sup> As suggested by Saunders, Lewis and Thornhill (2003, p. 83)

that all knowledge is contextual; it is the sum of all our past experiences, expectations and perceptions.

The constructivist and interrelated interpretivist approach were chosen as most suitable for investigating a project that is based in the context of Work-integrated Learning and Situated Learning, and where students' unique lived experiences and pathways from university to the world of work need to be understood. Interpretivism is further explained in the remainder of this section.

Interpretivism has an anti-positivist stance, which is a context and content dependent interpretation of the social world. It sees the world as being observed through the mind's schematics and classifications based on our past dealings and experiences (Gray, 2004, p.23). It is therefore a stance that seeks subjective knowledge.

According to Gray (2004, p.24) there are five types of interpretivist approaches, of which the first four types are relevant to this study:

1. Symbolic interactionism
2. Phenomenology
3. Realism
4. Hermeneutics
5. Naturalism.

Symbolic interactionism grew from a reaction of philosophers such as Dewey to the philosophy of the 1930's. They wanted to find a way to understand human behaviour based on the context in which they lived and how they lived within those contexts.

According to Gray there are three tenets of symbolic interactionism, namely:

1. People interpret the meaning of objects and actions in the world and then act on those interpretations
2. Meanings arise from the process of social interaction
3. Meanings are handled in, and modified by, an interactive process used by people in dealing with the phenomena that are encountered (Gray, 2004, p.24).

The basis of this view of interpretivism is that individuals' perceptions of situations change depending on their viewpoint and their investment in the situation. Research which assumes this viewpoint is then hands-on and involves direct contact with the research subjects so as to get first hand observations and direct exposure of the situations in which the data is found.

Phenomenology is grounded in an individual's experiences within a social reality. It asks us to not be locked into what we think we know and rather to approach situations afresh and allow our new experiences to reveal new meanings. This method aims to remove preconceptions and prejudices based on what we think we know (Gray, 2004, p.24).

Realism sees systems and structures as separate from the observer, but this reality cannot be objectively known. These systems are susceptible to scrutiny, analysis and theory building but may be proven to be illusions or immeasurable. Realism holds that the entire truth may be very difficult to perceive as they are dependent on our ever changing beliefs and interpretations based on frames of mind and circumstance (Gray, 2004, p.26). Realism admits that the production of knowledge is inherently subjective.

The last of the four types of interpretivist approaches relevant to this strategy is hermeneutics, which holds that social reality is constructed rather than being objective fact. Direct interpretation of reality should therefore be given more emphasis than explanation and description, since social reality is too complex to be understood through observation alone. Research rigour and correct academic inquiry is therefore essential to uncover the layers of complexity in any situation (Gray, 2004).

Having set out the research philosophy that guides this study, the next layer of the research onion to be described is that of research methodology, selected as the most appropriate means for acquiring the knowledge based on the ontological and epistemological stance stated here.

### 3.2.3 Methodological choice<sup>25</sup>

Given the stance of this study that knowledge needs to be understood and developed from the perspective of research subjects in the context of their environment and experiences, the most suitable methodological choice is that of qualitative research. In this study, multi-method qualitative research is used.

Qualitative research is concerned with the quality of data gathered from situations and experiences. The potential limitation of all research gathered from subjects is their subjectivity and differing perspectives based on their viewpoints and interpretations of what is experienced (Leedy, 1997, p.105).

Mays and Pope (2000, p. 52) argue that there are no simple solutions to eradicate errors or incorrect data but that there are methods that are used to improve validity if used correctly by the researcher.

1. Triangulation compares the results of two or more sources of data collection. The researcher evaluates the data gathered and compares it with other sources to determine its validity or corroboration. The danger with this process lies in the assumption is that weakness in one method will be compensated by the others. The essence of the case study methodology is triangulation (Johansson, 2003, p.14; Darke et al., 1998, p.286; Johansson, 2003, p.8; Perry, 1998, p.798; Stake, 1995, p.6).
2. Respondent validation checks the subjects' responses with valid data. The levels of validity are determined by the effort of the researcher, whether they use peer reviewed and corroborated data or less valid methods of member checking. The danger of this method is that different participants will most likely produce different results as they have different roles in the research process.
3. Clear exposition of methods of data collection and analysis will ensure that the reader can see that process from data collection to analysis, and then how the

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<sup>25</sup> See research onion, Figure 3.

researcher dealt with the data. The reader can then judge if the researcher has interpreted that data adequately and sufficiently.

4. Reflexivity looks at how the researcher has dealt with the study and if their own assumptions and subjectivity has affected the result. Any bias or phenomena that could distort the conclusions need to be made explicit in the outset.
5. Attention to negative cases<sup>26</sup> aids in improving the quality of explanations as they help refine the analysis of the data.
6. Fair dealing describes the widest possible range of perspectives needed to ensure the greatest possible viewpoints about the topic of research
7. Probability sampling ensures that the range of settings chosen is representative of the wider sample
8. Theoretical sampling ensures that the maximum sample includes the fullest range of behaviours so that a full range of relevant settings is covered.

The above methods from Mays and Pope (2000) could ensure the highest possible interpretation and delivery of research. Relevance and validity in qualitative research is based on the “systematic, self-conscious research design, data collection, interpretation and communication (of the data)” (Mays & Pope, 2000, p.52).

### **3.2.4 Research Strategy<sup>26</sup>**

Within the qualitative methodological choice made, the next layer of the onion takes us to the research strategy to be employed, which in this project is that of a case study. Case studies are used to gain a rich and deep understanding of the entire context of the project and its ramifications. According to Robert Yin (2003, p.13), a respected and much cited author on case study:

*Case study is an empirical enquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between the phenomenon and context is not clearly evident.*

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<sup>26</sup> See research onion, Figure 3.



The case study approach is relevant to this study as the complexity of the R5K project can be investigated within its context, considering the project as a whole, the individual units of analysis within it, and the wider environment of Industrial Design education and work to which it relates.

Case study methods first appeared within anthropology around 1900 as part of participant observation or casework (Johansson, 2003, p.6). Only after the Second World War was the so-considered 'non-scientific' approach of qualitative research given credence within 'real' research. Later the anti-positivist stance gained a following but was still seen as lacking scientific credibility and merit. In the 1960's the second generation of case study methodology emerged out of grounded theory which was rooted in qualitative and quantitative methods (Darke et al., 1998, p.280). Since then theorists and academics have slowly proved the rigor of the case study methodology through exhaustive discussion and making methods explicit.

In Baxter and Jacks' (2008) paper that covers the research design of qualitative case study methodologies, they discuss the two key approaches that guide case study methodologies. Both use similar methods to ensure the topics are thoroughly explored and both look for the quintessence of the case. Both Stake (1995) and Yin (2006) approach case studies from a constructivist model that, as stated earlier, sees the truth as relative to the individual's perspective (Baxter & Jack, 2008, p.545).

According to Yin (Yin, 2004, p.13) a case study method should be considered when:

- The focus is on 'how' and 'why' questions
- The participants of the study cannot be manipulated
- The study is dependent on contextual conditions.

Yin (2003) lists five important components of a research design

1. **The study questions**, the 'who', 'what', 'where', 'how' and 'why' of the research question will help determine which research strategy is to be used (Yin, 2003, p.21)

2. **Study propositions** are the objectives that direct the study towards something that should be examined within the scope of the study (Yin, 2003, p.20)
3. **Unit of analysis**, which is an occurrence occurring in a bound context (Yin, 2003, p.21). Baxter and Jacks (2008, p.545) offer questions that help determine what the case or unit of analysis is
  - a. Do I want to “analyse” the individual?
  - b. Do I want to “analyse” the programme?
  - c. Do I want to “analyse” the process?
  - d. Do I want to “analyse” the difference between programmes?

Baxter and Jacks iterate that the danger of case studies are that the cases are too broad and that there are too many objectives. Being focused on the unit of analysis is therefore essential so as not to fall into this trap (Baxter & Jack, 2008).

4. **Linking data to propositions** is not as well defined as the previous three. One approach is ‘pattern-matching’ where a theoretical proposition is linked to pieces of information from the same case. Other approaches are explanation building and time-series analysis, linking data to propositions, logic models and cross-case synthesis (Baxter & Jack, 2008, p.254)
5. **Criteria for interpreting studies’ findings** is also not as well defined as the first three. The concern with the criteria is that there is no set method of interpreting findings as there is no clear ruling on how close a pattern from one case has to be to match another case and therefore prove a match (Yin, 2003, p.32).

Types of case study depend on whether the study is concerned with describing, exploring or comparing cases (Baxter & Jack, 2008, p.547; Stake, 1995). Robert Stake (1995) differentiates case studies as intrinsic, instrumental or collective while Yin (2003) differentiates explanatory, exploratory or descriptive case studies, and further distinguishes single, multiple or holistic case studies.

Baxter and Jack note that multiple data sources are core to validity and credibility in case studies (Neale et al., 2006, p.7). Data sources could include:

- Documentation
- Reports
- Monitoring visits
- Assessment reports
- Archival records
- Interviews
- Questioners
- Surveys
- Physical artefacts
- Direct observation
- Participant observation
- Other

Data sources in this study are described further below. Once the data is gathered “each data source is one piece of the puzzle with each piece contributing to the researcher’s understanding of the whole phenomenon. This convergence adds strength to the findings as various strands of data are braided together to promote a greater understanding of the case” (Baxter & Jack, 2008, p.554). The same advantage can be a disadvantage if not planned properly, too many data sources could result in excessive data and the researcher being overwhelmed by their data gathered.

According to Baxter and Jack (2008, p.555) analysing the data can run concurrently to the collection of the data. Yin and Stake (2003) describe different techniques of analysing data, including categorical aggregation and direct interpretation (Stake, 1995). The danger of the analysis phase is that data gathered might be treated as separate from each other and the findings reported separately. According to Yin (2003) the data should converge so as to understand the entire case as a whole.

Baxter and Jack (2008, p.555) offer the following advice when reporting on a case study:

- The report should be so comprehensive that the reader feels as if they took part in the study
- The context of the phenomena is as important as the phenomena itself
- Suggested methods of reporting a case study include:
  - Telling a story
  - Providing a chronological report

- Addressing each proposition as per the research questions
- Comparing and contrasting to literature.

Yin (2003) suggests six methods for reporting case studies.

1. Linear
2. Comparative
3. Chronological
4. Theory building
5. Suspense
6. Unsequenced (Yin, 2003, p.3).

Along with other dangers or limitation of case studies discussed above Yin (2003) as well as Neale et al (2006) adds that historically many researchers have shown disdain for the strategy and explains why they think this is so.

- Perception of a lack of rigor due to biased views that could influence results
- There is little basis for scientific generalisation because of only using one case
- Case studies could take too long and as a result produce long documents (Yin, 2003, p.13; Neale et al., 2006, p.4).

To overcome these dangers, the techniques cited above from May and Pope (2000) for improving data quality in qualitative research are applicable. In addition, Yin (2003, p.33) lists the tests that can be used to judge (and ensure) quality of research design (Figure 9):

1. **Construct validity** by setting up and ensuring that the methods of measuring the concepts are valid
2. **Internal validity** shows that there is a logical flow between the cases and themes within cases
3. **External validity** shows the domain that the study
4. **Reliability** shows repeatability and therefore validity of findings.

Tests	Case study tactic	Phase of research in which tactic occurs
<b>Construct validity</b>	<ul style="list-style-type: none"> <li>• Use multiple sources of evidence</li> <li>• Established chain of evidence</li> <li>• Head key informants review draft case study report</li> </ul>	<ul style="list-style-type: none"> <li>• Data collection</li> <li>• Data collection</li> <li>• Composition</li> </ul>
<b>Internal validity</b>	<ul style="list-style-type: none"> <li>• Do you pattern-matching</li> <li>• Do explanation-building</li> <li>• Address rival explanations</li> <li>• Use logic models</li> </ul>	<ul style="list-style-type: none"> <li>• Data analysis</li> <li>• Data analysis</li> <li>• Data analysis</li> <li>• Data analysis</li> </ul>
<b>External validity</b>	<ul style="list-style-type: none"> <li>• Use theory in single-case studies</li> <li>• Use replication logic in multiple-case studies</li> </ul>	<ul style="list-style-type: none"> <li>• Research design</li> <li>• Research design</li> </ul>
<b>Reliability</b>	<ul style="list-style-type: none"> <li>• Use case study protocol</li> <li>• Develop a case study database</li> </ul>	<ul style="list-style-type: none"> <li>• Data collection</li> <li>• Data collection</li> </ul>

Figure 9 - Case study tactics for four design tests (Yin, 2003)

The four types of research designs for case studies can be seen in Figure 10.

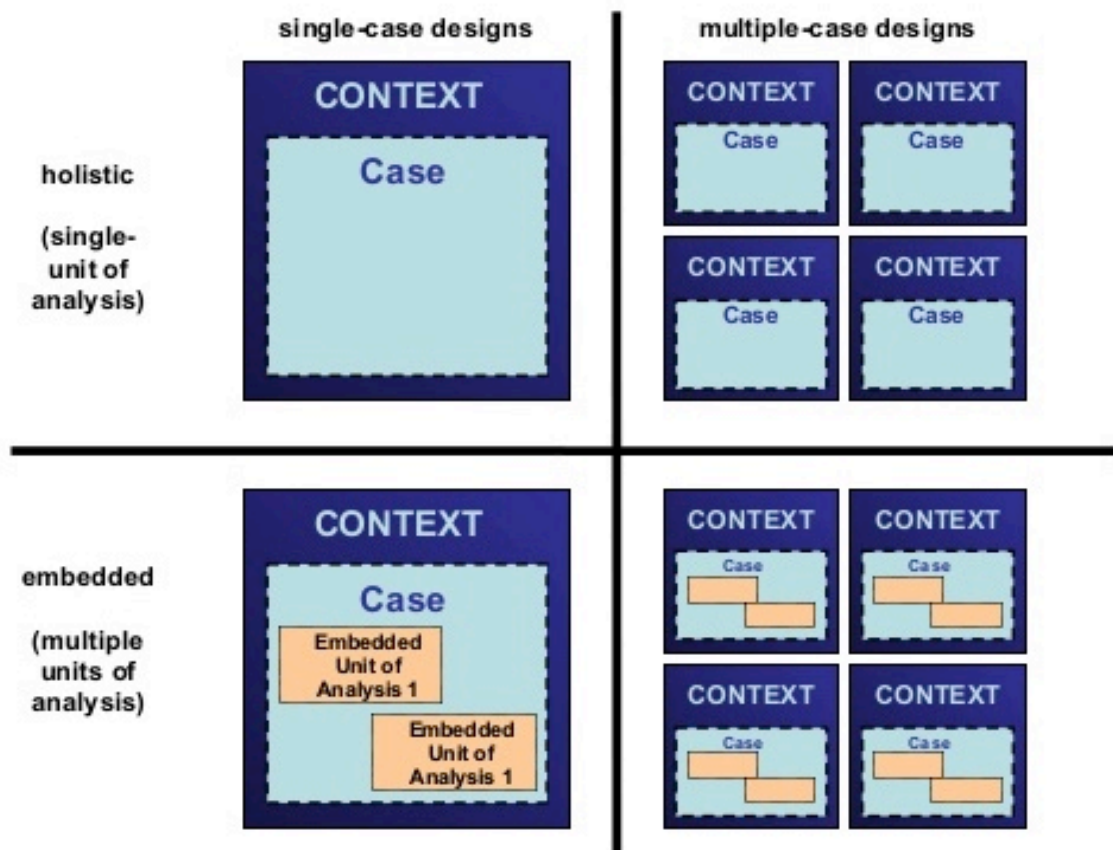


Figure 10 - Basic types of designs for case studies (Yin, 2003, p.39)

**Holistic case study** examines the nature of one unit of analysis within the case.

**Embedded case study** involves more than one unit of analysis within the case.

In the case study research of the R5K project the two units of analysis are the project as a whole and the individual projects run by students within. The type of case study design is therefore the embedded case study as it is determined by multiple units of analysis.

The research onion is unpeeled further in the next section, next considering the time horizons and finally the data collection and analysis utilised in the study.

### **3.2.5 Time horizons<sup>27</sup>**

The R5K project is an annual, year-long Industrial Design BTech project. This case study explores the process and outcomes of individual projects between 2010 and 2015. As the research will investigate one project over a course of time this will combine cross-sectional and longitudinal time horizons. The cross-sectional aspect will look at the project as it was running at the time of this study with BTech students of 2015, and use their responses and participation to understand various aspects of the project. From a longitudinal perspective, the study will interview and survey the alumni of the R5K project across its history since inception in 2010.

### **3.2.6 Data collection and data analysis<sup>28</sup>**

As this interpretivist case study has a mixed-mode orientation, it will use a combination of qualitative data collection techniques. Within the case study strategy, these techniques include surveys, interviews, document analysis and questionnaires. The use of a variety of data sources builds rigour by enabling construct validity and

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<sup>27</sup> See research onion, Figure 3.

<sup>28</sup> See research onion, Figure 3.

triangulation, following the recommendations of May and Pope (2000) and Yin (2003) as described above.

### **3.2.6.1 Population and sampling**

#### **3.2.6.1.1 Population**

University students from the BTech: Industrial Design course at CPUT (2015) and alumni from the same course (2010-2014), as well as their employers, will be the focus of research activities in this study. The population will therefore be those who have participated in the R5K project as well as their employers. The unit of research is Industrial Design practice and the unit of analysis are the participants. This study is to identify what the R5K project has contributed to the learning experience of students and evaluate how effective it has been in preparing students for the working world.

#### **3.2.6.1.2 Sampling technique**

As mentioned the sample for this research is centred on the past and present R5K project participants, and stakeholders in industry who have employed them. This is a purposeful sample as these participants were considered most likely to provide contextually relevant and reliable data. The relevance of the participants is due to the fact that they participated in the R5K project at CPUT for the duration of their year of BTech study.

The sampling was made up of:

- An online survey of all 129 R5K participants since 2010
- 5 alumni of Industrial Design who participated in the R5K project
- 3 Industrial Designers who hired R5K alumni
- 3 R5K alumni who hire Industrial Designers
- 3 current groups comprising of 19 students

As this project has been running since 2010 with 129 participants to date, the data collection included a survey of all students and interviews with one alumnus per year of the R5K project as well as one member of each group of the 2015 R5K project. To corroborate and triangulate findings, interviews were also conducted with three employers of R5K alumni as well as three R5K alumni who hire other Industrial Designers.

### **3.2.6.2 Participant observation**

From 1900 during the first generation of the case study method participant observation was the predominant method of data collection (Johansson, 2003, p.14), likely related to its origins in anthropological research. One of the hallmarks of case study research is its use of mixed methods including documents, videos, recordings, interviews, surveys or other qualitative data (Darke et al., 1998, p.276). As Baxter and Jack state “each data source is one piece of the puzzle with each contributing to the researcher’s understanding of the whole phenomena’ (Baxter & Jack, 2008, p.554). Participant observation is one method of data collection within the case study method.

In one respect the researcher acts as participant observer in that he is the coordinator of the course and project on which the research is based, thus providing him with direct inside perspective. This offers a privileged position in understanding the trajectories of the project and the students over the years, which assists in contextualising the data from other methods employed. For example, the descriptions of the R5K projects draw heavily on his personal experience. However, to avoid the potential pitfall of subjective bias, the data from other structured methods is allowed to speak for itself.

In other respects the researcher is a participant observer within research methods such as the thematic analysis workshop. Here the researcher’s role will be to facilitate the workshop in such a way that encouraged the student participants to surface their insights without the researcher influencing the outcomes. Although the researcher will be present in the workshop it has been clearly stated that he is on



study leave and has no sway on the participating students marks or project outcomes.

### **3.2.6.3 Surveys and Questionnaires**

Baxter and Jack emphasise the importance of survey data as it “facilitates reaching a holistic understanding of the phenomena have being studied” (Baxter & Jack, 2008, p.554). Surveys must be designed to avoid the potential bias of survey participants not being sufficiently diverse (Leedy, 1997, p.219).

*Survey sampling is the process of choosing, from a much larger population, a group about which we wish to make generalised statements so that its selected parts will represent the total group (Leedy, 1997, p.211).*

Another danger to avoid with surveys is the possible lack of depth due to subjects’ limited understandings of the subject or ability to deliver their understanding of the subject (Mouton, 2009, p.153). In the case of this study all participants of the survey have been participants in the R5K project, they all therefore have a intimate understanding of the project.

In this study, an online survey questionnaire was designed and sent to all past and current R5K project participants to assess their experience of the project and of their experience since then in industry.

### **3.2.6.4 Interviews**

Interviews seek to find common threads of viewpoints from multiple participants. Interviews can be structured or semi-structured, a structured interview contains a set of closed and predetermined questions similar to that of a questionnaire while a semi-structured format allows for probing questions to gain more clarity after the set questions are asked (Leedy, 1997, p.199).

In this study, interviews were designed after the survey responses were received, so that the findings thereof could be further explored in more depth. A semi-structured

interview schedule was designed, and the researcher met with each respondent face to face to conduct the interview.

### **3.2.6.5 Thematic Analysis**

According to Braun and Clarke (2006) thematic analysis is a qualitative analytic method for identifying, analysing and reporting themes within data. It describes data in detail often from creative angles. Patterns within data describe and show important meaning that emerges about the subject of enquiry (Braun & Clarke, 2006, p.82).

The aim of a thematic analysis approach is to capture something important about the data which can be shown as a theme within the data by participants who have direct knowledge about the data.

Braun and Clarke suggest the following guide when conducting thematic analysis (Braun & Clarke, 2006, p.16):

- 1 Becoming familiar with the data
- 2 Generating initial codes
- 3 Searching for themes
- 4 Reviewing themes
- 5 Defining and naming themes
- 6 Producing the report.

In this study, a participatory thematic analysis workshop was facilitated with representatives of the 2015 R5K groups, in which they were invited to review the data of the survey and interviews, and identify themes in the patterns of data. This step in the research thus comprises an overlap between data collection and analysis, as the workshop participants' views reveal additional data about their experience, while beginning to make sense of the significance of the data.

The qualitative data gathering will be subject to factor and content analysis. All data will be collated and aggregated, themes will be interrogated through a process of appreciative inquiry with current R5K students.

### **3.3 Executing the Research Design**

The 'research onion' has been unpeeled layer by layer to describe what is, in its whole, the research design for this study. Finally, the steps taken to plan and execute this research design are drawn from Neale et al (2006).

The case study method (for multiple case studies or embedded studies) was derived by Yin in collaboration with Bateman and Moore (1983). The first step in a case study method is to develop the theory and define the parameters of the case, thereafter cases are chosen and the collection protocol is designed. Each case consists of a whole study, the aim of the study is to find convergent evidence which can be replicated by other studies.

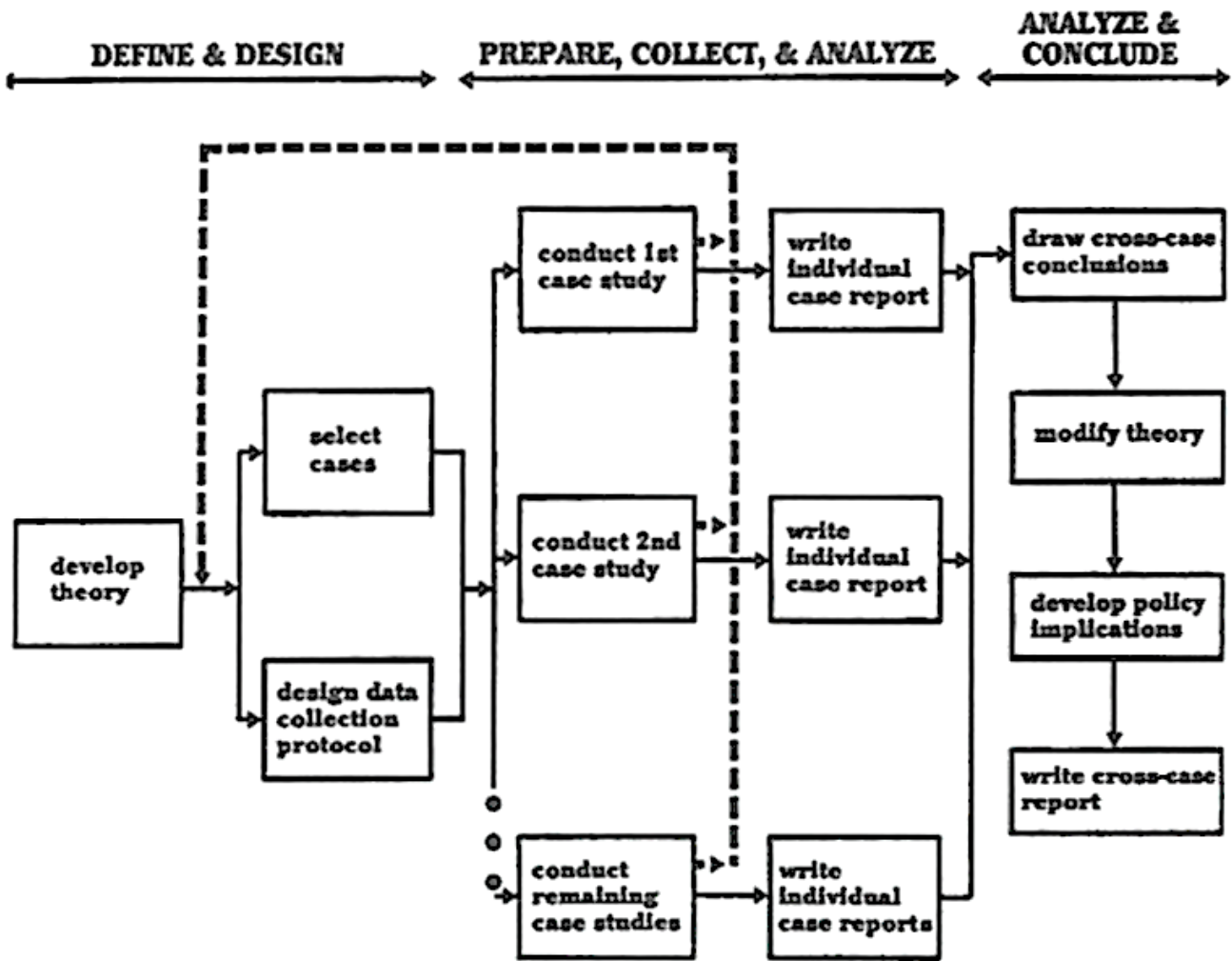


Figure 11 - Case study method (Yin, 2003, p.49)

Each case then has an individual case report written up summarising the particular proposition that was, or wasn't, demonstrated (Yin, 2003, p.50).

Yin's method is much aligned with Neale et al's (2006, p.6) steps for running a Case Study and will be used to plan and execute the Case Study in this study:

**Table 5 – Case Study method** (Yin, 2004, p.50)

<b>Plan</b>	Identify stakeholders
	Brainstorm a case study topic
	Identify what information is needed and from whom
	Identify any documents needed for review
	List stakeholders to be interviewed or surveyed and determine sample
	Ensure research will follow ethical research standards
	Identify stakeholders
	Brainstorm a case study topic
<b>Develop Instruments</b>	Develop interview / survey protocols. The instructions that are followed to ensure consistency across interviews/surveys, and thus increase the reliability of the findings. The following instructions for this should be included in the protocol: <ul style="list-style-type: none"> <li>• What to say to interviewees when setting up the interview or survey</li> <li>• What to say to interviewees when beginning the interview or survey</li> <li>• What to say to respondent in concluding the interview</li> <li>• What to do during the interview</li> <li>• What to do following the interview or survey</li> </ul>
	Develop an interview guide/survey that lists the questions or issues to be explored and includes an informed consent form
<b>Train Data Collectors</b>	Identify and train data collectors (if necessary)
	<b>Collect Data</b>
	Gather all relevant documents
	Set up interviews and surveys with stakeholders
	Seek informed consent of each respondent
If the respondent has consented, conduct the interview or survey	
<b>Analyse Data</b>	Review all relevant documents
	Review all interview and survey data
<b>Disseminate Findings</b>	Write report
	Solicit feedback
	Revise
	Disseminate

A summary of the process based on Yin's Case Study methods for this study could be:

1. Identify stakeholders
2. Identify what information is needed and from whom
3. List stakeholders to be interviewed or surveyed and determine sample group
4. Ensure research will follow ethical research standards
5. Review literature
6. Gather and analyse relevant documents pertaining to the project
7. Design and send survey questionnaire to 170? Participants
8. Receive and analyse findings, identifying themes for further exploration
9. Design and conduct semi-structured interview schedules for (1) industry experts and (2) alumni.
10. Design, plan and facilitate a participatory thematic analysis workshop with representatives of current R5k student groups
11. Analyse all data in relation to the literature.

### 3.4 Ethical considerations

It is not expected that this research will contravene any ethical boundaries or present any ethical risks nor harm to research participants. Formal clearance was granted by the Ethics Committee of the Faculty of Informatics and Design at CPUT, attesting that proper procedures and protocols were followed at all times. See Appendix B for examples of completed individual Ethics Consent forms.

I have been in sabbatical for the second half of 2015 to complete this study, had I not been there would have been ethical issues with regard to conflicts with students as they would have told me everything I wanted to know. It was made explicit that I had no sway over their marks.

The researcher has recognised and upheld the responsibility to ensure the fair cultivation, dissemination and replication of all data, including the respectful and equitable treatment of research participants. The following measures were taken to fulfil these responsibilities:

- Permission was granted from the Faculty of Informatics and Design ethics committee
- Informed consent was obtained from all research participants
- There were no incentives offered to any participant
- Survey participants were given the option of anonymity
- Interview participant were offered confidentiality
- Current students in the project were assured that their marks would not be affected in any way by their participation in the study.

### 3.5 Chapter Summary

This Chapter used Saunders, Lewis and Thornhills' (2013) example of the research onion to describe the research design of this thesis.

Epistemology and ontology were investigated as aspects of research philosophy, and constructivism and interpretivism were motivated as the paradigm of choice for this study. Thereafter the methodical choice of multi-method qualitative research was described, including methods to ensure maximum validity. The strategy of the case study which forms the foundation of this research was investigated. The combination of a longitudinal and cross-sectional time horizon was set out. The data collection techniques were described, including interviews, participant observation, surveys and questionnaires, as well as data analysis. Finally the stipulated population and sampling for this case study was detailed, selecting a purposeful and diverse sample that would ensure accurate and valid feedback about the R5K project.

Although some of the sources in this thesis are older they are mostly seminal papers which are substantiated with newer papers that referred to the seminal sources. For example Yin (Yin, 2004) is a classic seminal author whose older texts are still being interrogated and discussed in later papers.

In Chapter 4, the data collected is presented. The findings of a structured survey with all R5K participants across the history of the project is described. The complexities of the relationship between what industry expects and what academia thinks industry expects is investigated through a multiple interview approach where alumni are asked what they learned during R5K and if this has helped them in industry. This is triangulated by interviewing employers of R5K alumni as well as self-employed R5K alumni. In addition, participant observation feeds through to thematic analysis of the data with the participation of current R5K students of 2015.



## Chapter 4: Data Collection and presentation of findings

### 4.1 Introduction

In this chapter Case Study data that has been collected through surveys, interviews, document analysis of past project posters and thematic analysis workshops is summarised and thereafter discussed.

To give a clearer understanding of what the R5K project entails the following section will summarise the process of the project since its inception to give an overview of the process and stages, drawing on document analysis. This will be followed by a presentation of the data from the survey, interviews and participatory thematic analysis workshop.

### 4.2 About the R5K project

Appendix E shows the R5K brief that is handed to BTech students as they start the academic year in early February. A summary of the R5K brief is given in Table 6.

**Table 6 – Summary of R5K Brief.**

R5K brief summary	
1	This project forms part of the subject Professional Practice 4
2	The project is done in groups of 3, depending on class numbers
3	The lecturer in charge acts as the CEO and will resolve any problems that the teams can't resolve themselves <sup>29</sup>
4	Guidance is given by lecturers at every stage and lessons are tailored around aspects of the process and business as they come up, these include:
	<ul style="list-style-type: none"><li>• Choice of products</li><li>• Company structures</li><li>• Company contracts</li><li>• Non disclosure agreements</li><li>• Quoting, invoicing and general paperwork</li><li>• Crowdfunding and other funding strategies</li><li>• Company start ups</li><li>• Corporate identities</li><li>• Design ethics and company ethics</li><li>• Making the most of social media</li></ul>

---

<sup>29</sup> It is imperative that the lecturers or CEO's have sufficient industry experience to ensure accurate mentorship of the 'hidden curriculum', as described in Chapter 1 and 2.

• Company dynamics and interpersonal relations	• Branding
• Deadlines and structures	• Cutting costs
• Patents, registrations and copywriting	• Product pricing, costs and other expenses
• Memorandum of understandings	• Management skills
• Marketing skills	• Dealing with clients
• Tax related issues	•
<b>5</b>	There are rules that govern the project so as to keep it fair and within the scope of the project
<b>There are restriction of sales rules that limit:</b>	
Sales to family members	
Sales to friends	
Funding to be fairly acquired and must be paid back	
<b>Rules that ensure teamwork is equally dealt with:</b>	
Peer assessment during and after the project is complete	

The R5K project started in 2010 and since then there have been 28 projects run by 107 Industrial Design BTech students. In the pages that follow there are samples of one R5K project per year<sup>30</sup>. Each of these projects has resulted in a company initiated and set up by the students themselves with staff support. Workshops are held throughout the year and are designed to aid students to come up with a viable product, business structure, business systems, product development, manufacture, marketing and sales strategies. The groups are run like businesses with weekly meetings, attended by the lecturer in charge, which are minuted and filed for records and later assessments.

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<sup>30</sup> All participants have given permission for their names to be used in this study.

## 4.2.1 Past R5K projects

As the R5K project has been this researcher's project the following projects are intimately known to him. The data text describing each project comes from both the interviews and the design reports written by the students about their projects. The R5K projects selected are included to give context to the project.



### Crane

Crane is a new age coat stand solution, which highlights a clean minimalistic look. The form of this product certainly follows its function and allows the user to manipulate its form in a way that best suits its surroundings and usage. A user-friendly approach to design was considered through out the design time of Crane, therefore resulting in a finalized product, which has self-explanatory functions. The DIY assembly of Crane creates a personalized link between the user and the product, therefore increasing the products personal value, as well as transporting convenience.



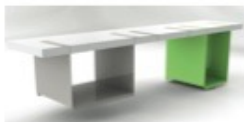
### Hardtime

Hardtime is a unique wall mounted clock, which is reduced to a very simplistic look. Being made primarily of a specialized cement like compound, Hardtime is not your usual looking clock. Its extreme simplicity and combination of colours and materials gives it the wanted edge. The simplistic appearance of this product gives itself the ability to fit comfortably in a variety of different surroundings.



### Spun

Spun incorporates elements of both functionality as well as aesthetic form. There is a constant feeling of contrast in this product from the clean basic appearance of the base, which has a pure-colour powder coated finish, to the geometric and highly reflective polished stainless steel lines used in the upper section. These elements of contrast continually compliment one another and finally result in a well-executed balance of materials, colours and form. The detachable wire frame structure pursues the idea of form follows function, and allows the user to create a more accurate arrangement of flowers.



### Piano

Piano shelf has taken the common floating shelf and converted it into a playful yet modern looking floating shelf unit. This unit allows the user to personalize the shelf to their wanted look, through the amount, positioning and colours of floating boxes. Piano allows for extra storage/ display space and the combination of colours permit this unit to fit comfortably in a wide variety of surrounding environments.

Figure 12 - 2010 R5K Project (Image from R5K project archives, with permission)

In 2010, the first year of the R5K project there were four groups

1. *Mugo* designed, manufactured and sold a double-walled ceramic mug
2. *Ghost* designed, manufactured and sold an aluminium laptop stand
3. *The B-Team* designed, manufactured and sold a bamboo wallet
4. *Think* is described in detail below.

*Think* decided that they would find a company in Cape Town for which they could design and manufacture a range of furniture (See Figure 12). They found LUM, a boutique furniture store which agreed to stock their products. The group had the parts manufactured locally and assembled them in the CPUT Industrial Design workshop.

In the student interviews, which will be unpacked later in this chapter, Jasper Eales stated that it was the R5K project that gave him the confidence to start his own company upon graduation. Jasper's company is now one of the leading Industrial Design start-ups in Cape Town. Jasper has a staff of seven and is well on his way to becoming a leading design brand name.

From 2010 - 2013 the *Think* group made R120 000 profit on the furniture pieces. Although they didn't stay together after graduation they did continue producing furniture for a few years and Jasper is planning on reviving one of the pieces and producing it under his name.

*Mugo*, one of the other 2010 R5K groups has made over R250 000 on one product over the years since R5K began.


In 2011 there were six groups.

1. *Left Right Design* designed, manufactured and sold a knockdown table set
2. *SMAC Harry* designed, manufactured and sold an organizational shelf
3. *Frag Bag* designed, manufactured and sold a gaming bag
4. *Five 45* designed, manufactured and sold a multipurpose couch
5. *Root Design* designed, manufactured and sold a defence armband for hiking
6. *Because 789* is described in detail below.

The *Because 789* (See Figure 13) group decided to manufacture a USB reader made from repurposed woods, wine barrels, antique doorways and floors. The group sourced their woods from ethical sources and made a point of tracking the story of the wood all the way to the origin. They then sold each USB stick with a customised story of the wood's origin and journey, much to the delight of the customers.



Max Basler  
Anine Kirsten  
Chris Metcalfe  
Karl Schulschenk



because789

## Wooden Flash Drive

These 8GB and 32GB flash drives are designed and hand-finished in Cape Town and currently are available in three different repurposed woods: Red Oak from an old doorway in a large department store, Canadian Maple from floor boarding in an old house in Sea Point and French oak from red wine barrels. Each flash drive is laser engraved with a unique number so that you can read about its history on our website. A custom design can additionally be etched if requested eg. for promotional purposes or corporate gifts. Each contains magnets to hold the lid in place when in and not in use.

For more information, please visit [www.because789.co.za](http://www.because789.co.za)


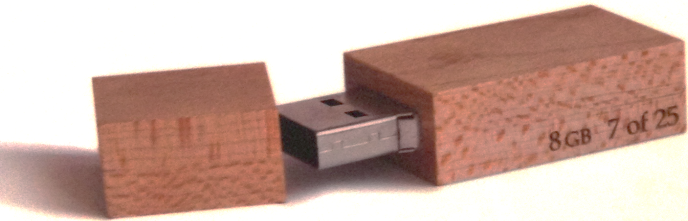
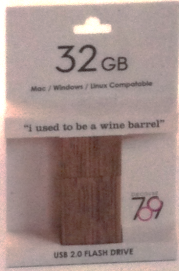


Figure 13 - 2011 R5K Project (Image from R5K project archives, with permission)

In 2012 there were six groups.

1. *Bark* designed, manufactured and sold a notebook
2. *Piece* designed, manufactured and sold a skimboard
3. *Afterdarx* designed, manufactured and sold clubbing glasses
4. *MASS* designed, manufactured and sold an armband for storage while doing water sports
5. *SES* designed, manufactured and sold a drinks holder for clubs
6. *Shoots* is described in more detail below.

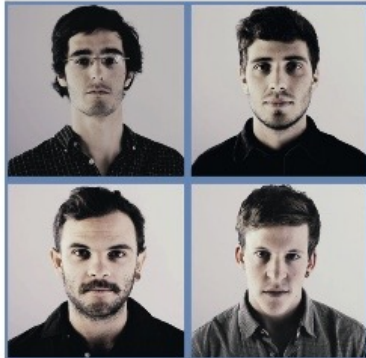
The *Shoots* team designed, manufactured and sold a pair of bamboo earphones (see Figure 14). In their journey to design a high-end pair of earphones for a medium price range they researched acoustics with sound engineers and materials with materials engineers. The result was a pair of earphones that various sound experts stated had an incredibly high definition sound and superior comfort for the price.<sup>31</sup>



Figure 14 - 2012 R5K Project (Image from R5K project archives, with permission)

<sup>31</sup> This research was verified through the students' thesis.

# 2013 | UpRite



## Lettuce Design

**Lettuce Design** is a newly formed Industrial Design company, made up of four young designers.

We strive to deliver products with intuitive functionality, and a unique and minimal aesthetic.

The products we create attempt to transcend their position as objects of consumption through the creation of a narrative between object and user

The **UpRite** Monitor Stand is a product designed to enhance the wellbeing of computer users through improved posture and the creation of space.

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UPRITE  
MONITOR STAND

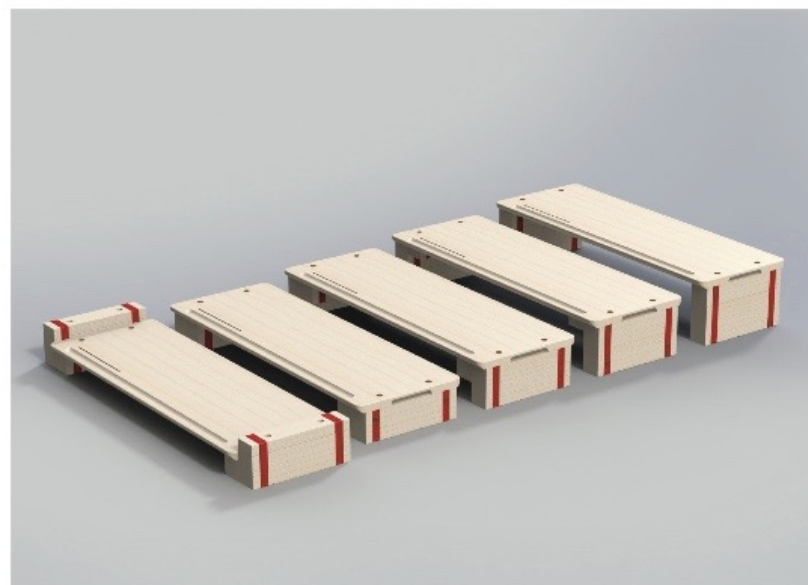


Figure 15 - 2013 R5K Project (Image from R5K project archives, with permission)

In 2013 there were six groups:

1. *Silver Acorn* designed, manufactured and sold a car bag hook
2. *Plain paper* designed, manufactured and sold a paper wallet
3. *Mint* designed, manufactured and sold a first aid kit
4. *Spoked* designed, manufactured and sold set of cork grips for bicycles
5. *Three3one* designed, manufactured and sold a SMORES kit
6. *Lettuce* is described in detail below.

*Lettuce* designed, manufactured and sold an ergonomically proven monitor stand made from repurposed wood (see Figure 15). The group researched the loss of working hours due to bad posture and positioning of monitors and used these results to pitch the sale of the monitor stand to customers. The group made in excess of the minimum R5000 profit (van Niekerk, 2015). The product was shown at a CPUT exhibition and received funding from the Technology Innovation Agency (2013) to take the product into mass production, which they are in the process of doing.

In 2014 the R5K project had three groups:

1. *Hey Presto* designed, manufactured and sold a dehydrator
2. *Bees Knees* designed, manufactured and sold a Keg braai
3. *The Braai Tool* is described in detail below.

The *Braai Tool*, or as it is now known – TBT, group designed, manufactured and sold a pair of braai tongs (see Figure 16). The World Design Capital year created media coverage for the groups as the R5K project was a WDC2014 project (See Appendix C). The group did in-depth research into braai tongs and found that there wasn't a pair of tongs that could do what they wanted TBT to accomplish. The design was very popular and the group got Technology Innovation Agency funding to take the project further. They are in the process of getting the product manufactured in China and expected to have made approximately R200 000 by the end of 2015 based on orders and stock.



# 2014 | THE BRAAI TOOL



## about

INSERT COOL NAME is a design studio dedicated to excellence. We pride ourselves in creating and developing exceptional products that are based on sound user centred principles. We place the user at the forefront of every design decision and as such guarantee an exceptional experience for our product users. This is probably one of the main secrets to the success of our first product, TBT: THE BRAAI TOOL.

## members

Sebastian Bosman  
 StèHan Botha  
 Salmon Nortje  
 Alejandra Olivera

## contact

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[hello@insertcoolname.com](mailto:hello@insertcoolname.com)  
 mobile: +27[0] 72 73 9710



Figure 16 - 2014 R5K project (Image from R5K project archives, with permission)

In 2015 there were three R5K groups:

1. *Lum* designed, manufactured and sold an inductive charging light as a response to load shedding
2. *White Bison* designed, manufactured and sold a portable light box for photographing small products
3. *Pivot* is described in detail below.

*Pivot* designed, manufactured and sold a Swiss Army knife-style key organiser (see Figure 17). The group researched what people carry day to day and decided to simplify and reduce the hassle their audience said they had with bunches of keys. The *Pivot* group made a profit of R120 000 within the first 3 months and R170 000 before the end of 2015. The group planned to continue production after graduation.



**Figure 17 - 2015 R5K Project (Image from R5K project archives, with permission)**

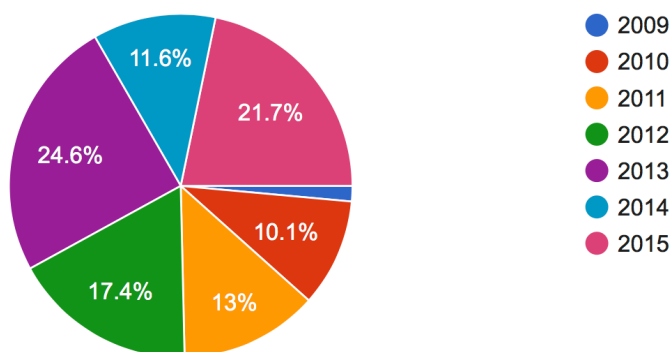
## 4.3 Survey results

The survey sent to all 170 past R5K students had a response of 69, which is a 65% response rate over the 5 days that the survey was active. All respondents gave permission for their views and responses to be used in this study. The survey was anonymous, in other words the data recorded was not allocated to a name. There is therefore no danger of the comments given negatively affecting the respondents.

The survey had an introductory statement that explained the project and gave basic detail about the study.

*This research involves the study of how different individuals perceive the CPUT, BTech R5K project and how the project might or might not prepare them better for industry. The survey should take you no longer than 10 minutes. Your decision to participate is completely voluntary (although I would be indebted to you if you participate). Please note your responses will be held strictly confidential, no individual scores will be identified and reported within a final written study. All raw data will be held by the principal investigator and will not be distributed to any other and authorized individual. All personal identification on the survey forms will be removed. For further information on the research please contact Johan van Niekerk*

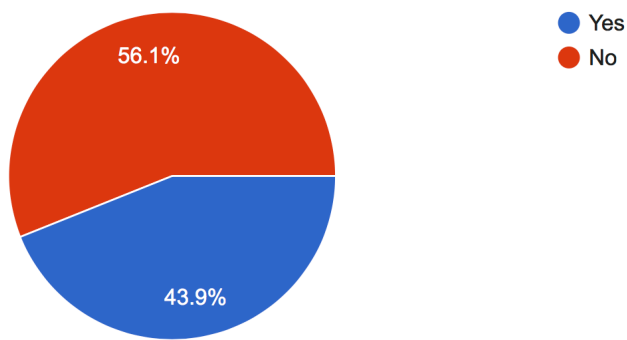
### 4.3.1 Survey question 1: Which year did you complete the R5K project?



**Figure 18 - Survey results**

To gauge if there was an equal response from all the previous years the first question ascertained from which year the respondents answered. Aside from one input error of 2009 (as the R5K only started in 2010) the spread was statistically equitable.

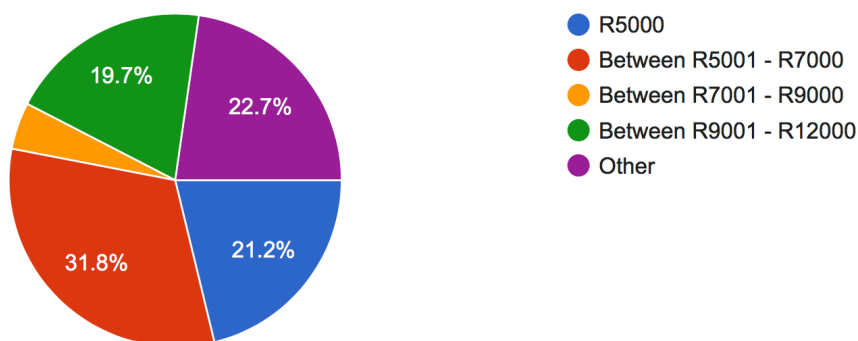
### 4.3.2 Survey Question 2: Are your R5K groups still active?



**Figure 19 - Survey results**

Question two was asked to give an idea of how many groups were still active. The data is an approximate figure as the thirty eight respondents that did not answer might have all been in groups that didn't continue and a majority of respondents could have been in groups that did reply.

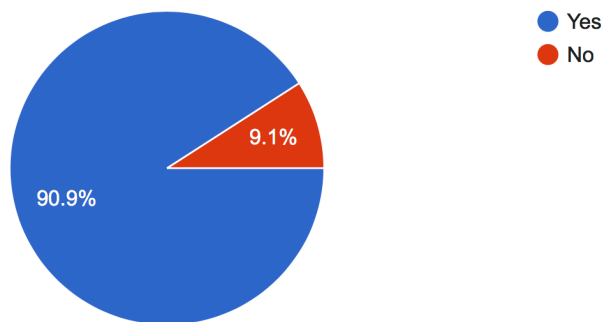
### 4.3.3 Survey Question 3: How much did your group make after expenses?



**Figure 20 - Survey results**

Question three gauged the approximate range of profits for the R5K projects. The scope of this thesis is not to ascertain an exact figure but rather to gauge if the projects succeeded in satisfying the brief.

#### 4.3.4 Survey question 4: Would you recommend the R5K project to the 3<sup>rd</sup> years that will do the project next year?



**Figure 21 - Survey results**

Question four gauged the extent that alumni of the project would recommend the R5K project to the next year of BTech students. A high rate of 91% of the respondents found the R5K project to be beneficial for the next year's BTechs.

#### 4.3.5 Survey question 5: Did the R5K project give you enough experience to start a company?



**Figure 22 - Survey results**

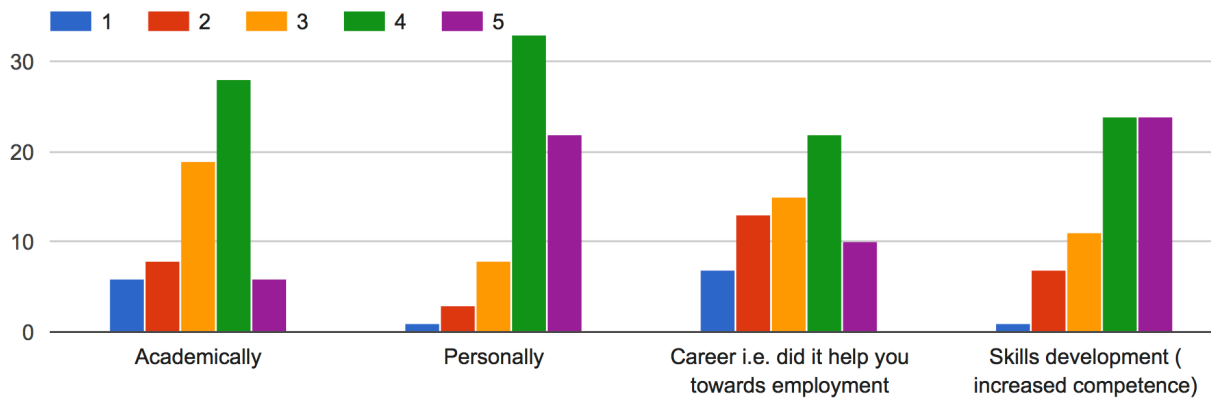
Question five included a probing question whose response was used in the interviews to gain deeper understanding of the project from a student's perspective. This aspect of the question will be unpacked during the research findings.

This question was asked with a yes, no or clarify your answer option, if all the clarifications<sup>32</sup> are taken into account, most being clarifications on an affirmative answer then the result adjusted for verbal affirmations is a 90.1% yes.

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<sup>32</sup> Which can be seen in Appendix I

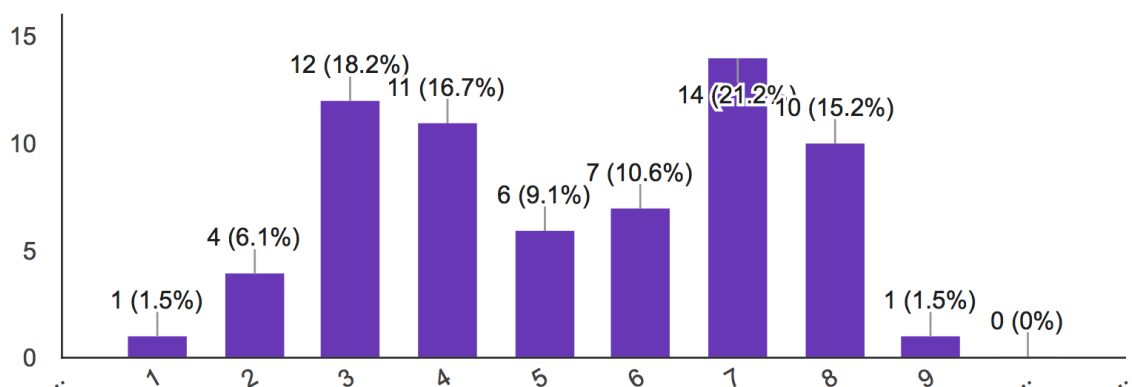
**3.3.6 Survey question 6: How much did the R5K project develop you in the following areas? (a rating of 1 didn't develop much and 5 indicates significant development)**



**Figure 23 - Survey results**

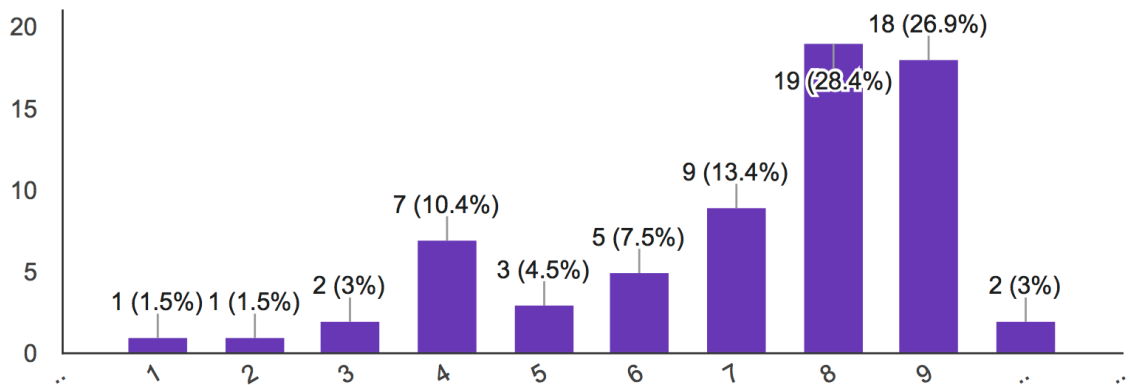
Question six was asked to determine how the students perceived the contribution of the R5K project to their own development. The response options ranged from 1 (blue) being the least valued to 5 (purple) being the most valued. Personal development emerged as the aspect where the project was perceived to contribute the most. Because of this result the interviews probed deeper into this question.

**4.3.7 Survey question 7: How much did 3<sup>rd</sup> year develop you for industry? (a rating of 1 didn't develop much and 10 indicates significant development)**



**Figure 24 - Survey results**

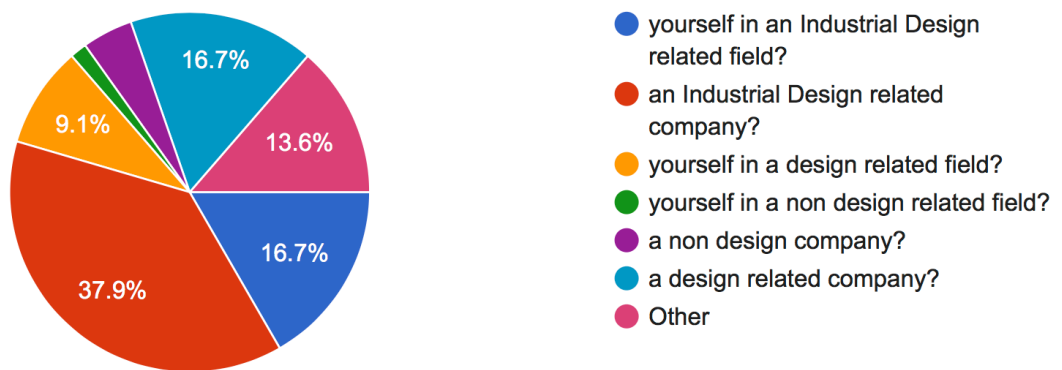
### 4.3.8 Survey question 8: How much did 4<sup>th</sup> year develop you for industry?



**Figure 25 - Survey results**

Questions seven and eight compared respondents' perception of the value of their third and fourth year in preparing them for industry. It can be seen that although the 3<sup>rd</sup> year scores are high for the seven and eight categories, it can also be seen that the three and four are high whereas in question eight regarding 4<sup>th</sup> year, scores eight and nine are high without the distractor of the negative lower numbers.

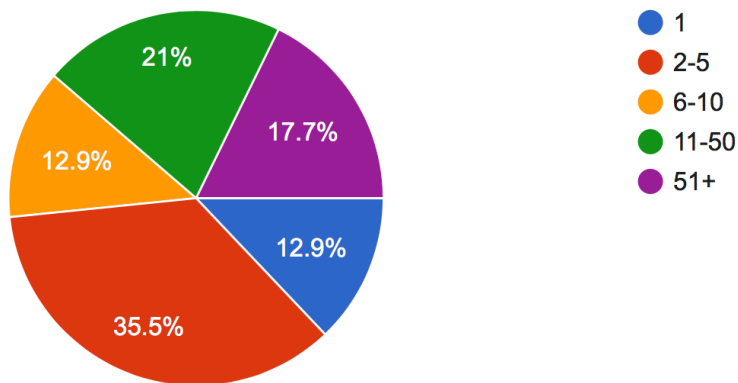
### 4.3.9 Survey question 9: Which company type do you work for?



**Figure 26 - Survey results**

Question nine was asked to determine the areas in which graduates find jobs. This data shows that 28% of graduates become self employed while 59% left and attained employment in a company. The other 17% are unaccounted for.

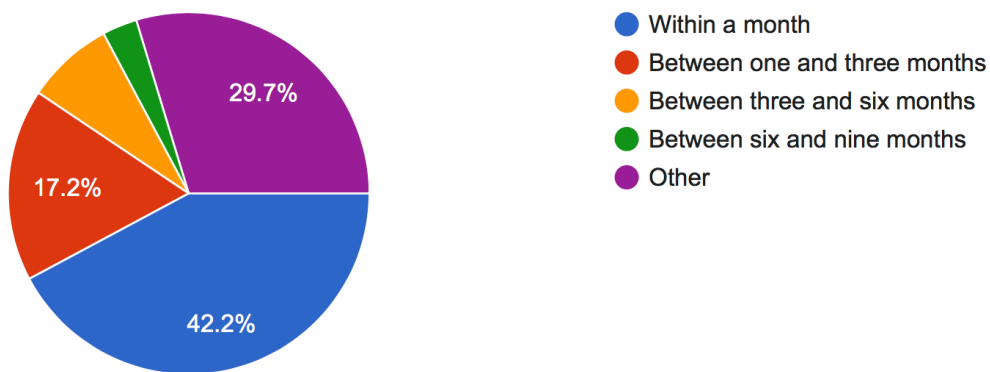
#### 4.3.10 Survey question 10: How many personnel in the company?



**Figure 27 - Survey results**

Question ten determined the size of the companies that graduates joined or started. 62% of graduates belong to micro or small businesses with under ten employees. Of the total, 38.7% of the graduates entered companies larger than 10 employees.

#### 4.3.11 Survey question 11: How long did it take to get design work after graduation?



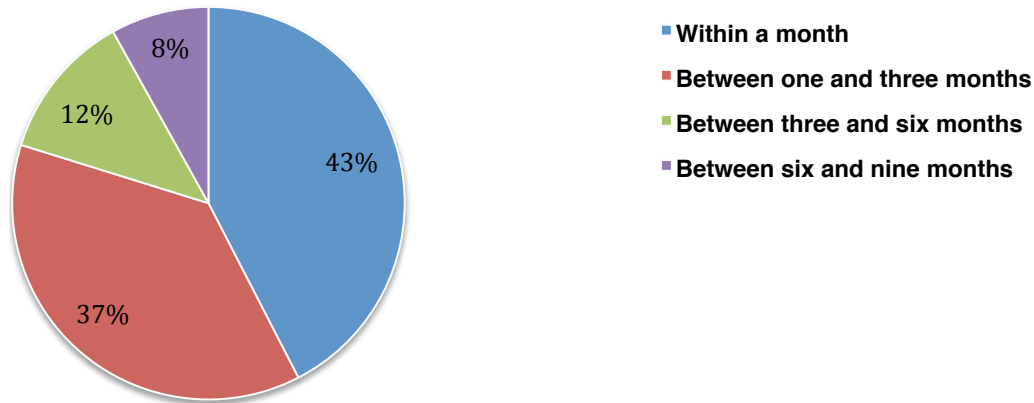
**Figure 28 - Survey results**

Question eleven indicates that 30% of graduates took longer than nine months to gain employment but if the comments in 'Other' (See Appendix I) are factored in then only two graduates took longer than six months to gain employment but did so before nine months after graduation.



A better representation of this graph with the 'Other' comments factored in would be the graph below.

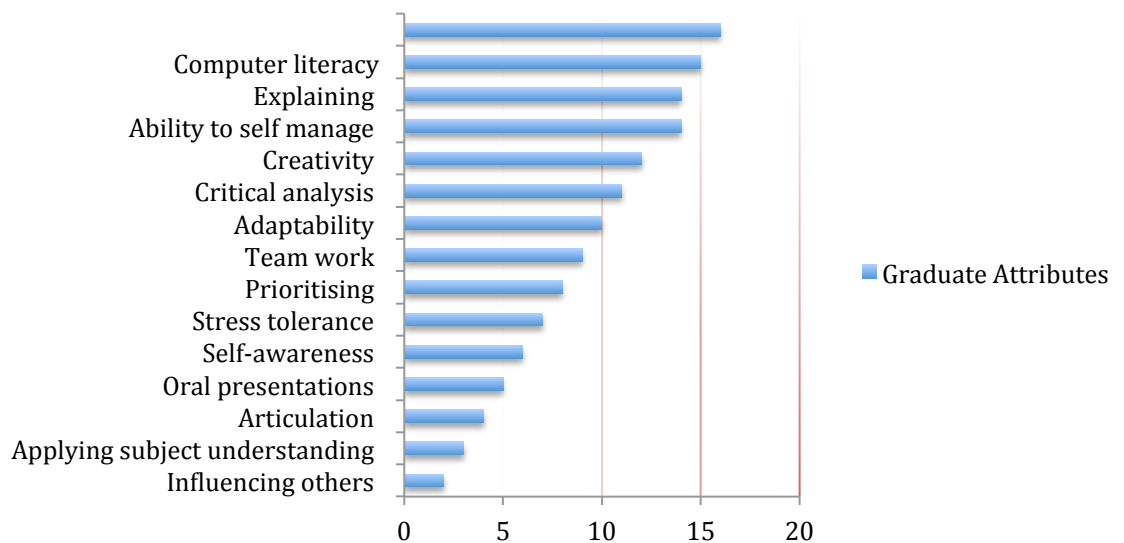
**Survey Question 11 (Adapted): How long did it take to get design work after graduation? Including 'Other' responses**



**Figure 29 - Survey results**

**4.3.12 Survey question 12: Which of these dimensions of employability do you think Industrial Design employers find most important?**

**Graduate Attributes**



**Figure 30 - Survey results**

Question twelve asked the respondents to gauge the accuracy and applicability of Ramirez's (2012, p.2464) and Knight and Yorke's (Yorke & Knight, 2006, p.8) studies on graduate attributes. Respondents were not shown the original graphs themselves nor told that the ranking was as per the original study. This graph has been further summarised and compared to interview responses in Table 9 on pg.105. This feedback was very detailed and copious (see full transcript in Appendix J). The feedback has been divided into the thematic categories below. The blue number next to each point indicates how many times that point was repeated.

1. Adding more or better specialisation areas
  - a. Business 8
    - i. Finance 1
    - ii. Managing costs 4
    - iii. Starting a business 4
    - iv. Tax implications 1
    - v. Bookkeeping 2
    - vi. Management structures 2
    - vii. Marketing training 6
    - viii. Outsourcing of manufacturing 3
    - ix. Local manufacturing processes 2
    - x. Small business methodologies 3
2. Less members per group 5
3. Lessons from previous R5K groups 2
4. Themed R5K projects between the class 1
5. Smaller, simpler projects 2
6. Introducing mentors to the R5K groups 5
7. Do not start businesses with friends 1
8. Only allow lecturers with enough industry experience to do the R5K project 5

Question thirteen asked respondents to give feedback about what they learned about themselves during the R5K project. As with question twelve the feedback has been broken down into themes of similar responses with a blue number indicating how often a similar response was given. (See Appendix K for full transcription)

1. Newly found managerial skills 7
2. I have what it takes to work for myself 4
3. Learned to start a product with little funds 1
4. Real world experience 10
5. Found my passion in design 4
6. Personal development
  - a. Detail orientated 3
  - b. Learned to trust in team work 9
  - c. Emotional development 3
  - d. Too controlling 2
  - e. Learning to speak up 2
  - f. Learned to trust others 1
  - g. Being independent 1
  - h. Being consistent 1

## 4.4 Interviews

After the survey and lead by the data gathered in the survey, semi structured interviews were designed and held with:

- Five past R5K participants
- Three industry experts

### 4.4.1 Overview of alumni interviews

Although anonymity was offered, permission was given by all interviewees to use their names and data. Ethics forms were signed by each individual (see Appendix B) and the process explained to each participant. Before presenting the interview findings, a brief overview is given of each respondent.

#### **Jasper Eales (JE)**

Jasper was a graduate from 2010 and was the lead in the R5K team *Think. Think* earned approximately R120 000 on the furniture they designed and sold. Jasper went on to start his own brand of industrially designed products and has worked his way up in the Cape Town design industry. Jasper is often on the cover of local magazines

and in media. Jasper now runs a successful Industrial Design company with seven employees.

### **Calvin Botha (CB)**

Calvin graduated in 2011 and was a member of the R5K group *Root design*. *Root design*, designed, manufactured, marketed and sold a self-defence armband that could be used by hikers. The armband brought in R140 000 profit in its first year of production. Calvin graduated and through his experience with the R5K project realised that he would rather work in a large company than become self-employed. After a short time of producing his own bicycle frames Calvin quickly got a job with an international bicycle company and now has moved on to head his division in another bicycle component company.

### **Brad Inch (BI)**

Brad was a member of the R5K group *Bark* in 2012. *Bark* produced an environmentally sustainable notebook that was produced using green principles. After graduation Brad got a job with IDESO, one of the leading Industrial design companies in South Africa.

### **Brian Thomkins (BT)**

Brian was a member of *UPRIGHT* in 2013. This R5K group designed and produced a monitor stand. The project won them a grant from the Technology Innovation Agency (TIA) for R500 000 to take their project into mass production. Brian graduated from Industrial Design with the realisation that he could and desired to work for himself. Brian has been self-employed since graduation and is now hiring staff for his growing client base.

### **Sebastian Bosman (SB)**

Sebastian was a member of *The Braai Tool* or TBT in 2014. Sebastian and his R5K team also got funding from TIA to the value of R480 000 to take their project into mass production, which they are currently doing. Sebastian realised through the R5K project that he would prefer self-employment and has pursued that path. Sebastian is

busy opening an innovation lab based on a similar model that was used during the R5K project.

### Alumni interview questions

Below is a table which includes a summary of responses to the semi-structured interview questions.<sup>33</sup>

**Table 7 – Alumni interview questions**

1: Did anything on the survey stand out for you?	
JE	It was a reminder about how beneficial the R5K project was to me and where it lead me in my career. It particularly lead me to realize that I could go alone (self-employment) and gave me the real world thinking to make that choice real.
CB	There should be two streams of R5K, one for self-employment and one for employment.
BI	Unfortunately I didn't complete the survey.
BT	There is a vast difference between academia and the real world.
SB	R5K was one of the highlights of my studies
2: Do you have a R5K story that you would like to tell?	
JE	We made in excess of R120 000 since the project launched until now and very soon I will prelaunch the products.
CB	I found it wasn't a good idea that groups chose themselves. There should be a psychometric evaluation to fairly assess and choose the groups. Our group was a group of friends that was set up in third year and it didn't work at all.
BI	There was a lot of conflict between our teams. I think it's because the R5K project was real and involved our own money that people took it very seriously.
BT	I found true friendship within my group. It was the most real group project we had done in the time at CPUT.

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<sup>33</sup> The recordings of these interviews are held securely in a password protected folder and will remain so if they are needed.

SB	Strong relationships are built during R5K, it's a real project and those in the groups take it very seriously.
3: Do you feel Industrial Design should be apprenticeship based (hands on) or should it follow a curriculum (heads on)?	
JE	Combination of both. I think the Masters and Doctoral students should help mentoring as well as bringing in industry experts. Industrial Design is about a way of thinking
CB	Apprenticeship but with a difference. I think students should find internships in their own time while being students. They could easily do a month accumulatively over the year and end up with four months internship by the time they graduate.
BI	Apprenticeship with mentors from industry coming in to help groups
BT	Apprenticeship with visiting industry experts. Carry on with the Work Integrated Learning aspect of the R5K project
SB	Both, more collaborations with other departments as well as industry mentors coming in to guide and help
4: What was the hardest thing for you during your time in Industrial Design, CPUT?	
JE	Tedious exercises in first year
CB	Being poor. Not earning while being a student.
BI	The theory subjects especially history
BT	Presentation drawing and writing
SB	I found the institutional systems very difficult. Socially, groups stuck together and only in group projects did we mingle. There should be more group projects.
5: What did you need that you didn't get from Industrial Design at CPUT?	
JE	Entrepreneurial skills, people skills. Do more R5K like projects
CB	I was happy with what I received from CPUT, I was taught how to think and from that point anything is possible.
BI	I didn't leave with enough CAD and drawing skills. But I don't think you could ever leave with enough of those.
BT	I got everything I needed but could have used more in-depth real-world design practices.
SB	Mentorship with industry experts

6: Do you agree or disagree that the list (PTO) is in order of most to least important? Why?	
JE	See Table 9
CB	See Table 9
BI	See Table 9
BT	See Table 9
SB	See Table 9
7: Anything you would like to add?	
JE	Emotional Intelligence (EQ) is far more important than what you know or how much you know.
CB	Thank you for starting the R5K project
BI	Solid Works should be taught from second year At the end of R5K I found I was much more confident than in third year and was ready to face industry.
BT	R5K gave me confidence and showed me my strong points and with those I felt I was ready to face industry.

#### 4.4.3 Overview of industry expert interviews

There are many worthy experts that could have been chosen to interview, the three chosen below were chosen as they have all been moderators for final year students at CPUT, they all have copious local and international experience which is necessary to benchmark and properly gauge the R5K project.

- 1 Marc Ruviel (MR) is an owner of the acclaimed Cape Town based IDESO
- 2 Byron Qually (BQ) trades under his own name and is a known as one of the leaders of the local design industry.
- 3 Roelf Mulder (RM) owns ...XYZ which is South Africa's second largest Industrial Design firm

Below is a table which includes a summary of the semi-structured interview questions from the industry experts.

**Table 8 – Industry expert interview questions**

1. What do you know about the R5K project? (Holistic approach to integrating employability into the curriculum creating a seamless integration of the whole student experience)	
MR	Great project
BQ	It's a great challenge and gives a glimpse of the real world of work
RM	Great project
2. How well are BTech graduates prepared to start work?	
MR	I think the course is too craft focused, there should be more emphasis on mass production.  Generally CPUT graduates can stand their ground to any international university
BQ	In the last 3 years they are well prepared and are taking it more seriously
RM	They are comparable to any university in the world except for awareness of deadlines and limits in technology
3. Do you agree or disagree that the list PTO is in order of most to least important? Why?	
MR	See Table 9
BQ	See Table 9
RM	See Table 9
4. What is the most important factor that you look for in an employee or someone you contract?	
MR	Computer literate as that's where most of the work is
BQ	The desire to learn and a personable way about them
RM	How they think or EQ and if they are a team player
5. How do CPUT Industrial Design alumni compare to other universities?	
MR	Not better or worse
BQ	I only have experience within South Africa. We are well ahead of the University of Johannesburg in skills and EQ
RM	They are comparable to any university in the world except for awareness of deadlines and limits in technology
6. What are the gaps in ID alumni's education?	



MR	Technology and sketching
BQ	The few lecturers that have lost the spark to teach shouldn't be teaching as well as those with little to no industry experience
RM	Lecturers don't have enough industry experience Depth of projects not sufficient
7. What could we (CPUT Industrial Design) do to fix these gaps?	
MR	Quick sketching exercises
BQ	Source training, mentoring and financial resources within industry
RM	Deepen projects with deepening cycles every year Incentivise lecturers to do outside work
8. What are your thoughts on internships in Cape Town	
MR	Yes, we need them. Minimum three months
BQ	Yes definitely, we should compile a list of possibilities within Cape Town
RM	Yes, do it. Minimum six months
9. Should curriculum be industry pulled, government pushed or left up to the universities?	
MR	Government should not interfere. Industry should lead academia. But until we have an association academia should make sure they align with industry
BQ	It should be left up to the University
RM	Academically but in line with industry through a quad helix approach.
10. What do you think about this statement from the SABS Design Institutes publication 'Building a stronger Africa through design' (2013, Pg.9) 'new jobs will not come from the formal employment sector. South Africa's youth need to design sustainable entrepreneurial businesses. 88% of design jobs come from the small, very small and micro enterprises'	
MR	I wish it wasn't true
BQ	I agree, Industrial Design fixes problems and we need to place ourselves where those problems are
RM	Disagree, students can't do it all, most need to learn wisdom from those that have gone before
11. Anything you would like to add?	
MR	Students should be told the course is 70% taught and the rest is self-education
BQ	The R5K project is critical for student learning at a 4 <sup>th</sup> year level

RM	Let's chat further. I'd like to be a mentor in the future.
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**Table 9 - Summary of graduate attributes question**

R5K GA survey & interview results	Survey	Byron	Reolf	Marc	Jasper	Calvin	Brad	Brian	Sebastian
Applying subject understanding	5	5	1	1	1	2	1	5	1
Computer literacy	1	6	2	2	2	6	2	7	2
Team work	7	1	3	4	3	7	3	8	3
Creativity	4	2	4	5	4	8	4	9	6
Oral presentations	11	4	5	9	6	3	6	10	7
Explaining	2	3	6	6	7	4	7	11	8
Written communication	15	8	7	8	8	5	8	12	9
Ability to self manage	3	9	8	3	5	9	9	2	5
Adaptability	6	10	9	10	9	16	5	3	10
Self-awareness	10	11	10	11	10	11	10	1	11
Stress tolerance	9	12	11	7	11	12	11	13	12
Critical analysis	5	7	12	12	12	1	12	4	13
Prioritising	8	13	13	13	13	13	13	6	4
Influencing others	14	14	14	14	14	14	14	14	14
Articulation	12	15	15	15	15	15	15	15	15

Table 9, as referred to above, summarises the responses from the survey as well as interviews with CPUT alumni and industry designers. The numbers in the columns represent the ranking that they received from the participants in the header row. These rankings were averaged out into the ranking of Graduate Attributes in the left hand column. The significance of this ranking being the same as Yorke and Knights as well as Ramirez's will be discussed in chapter 5.

#### 4.5 Participatory thematic analysis workshop

Three current R5K group representatives were invited to take part in a formal thematic analysis workshop. The intention of the workshop was to go through all the findings from the survey and interviews to find possible data themes, thus using a participatory approach to involve the current project participants in the data analysis. This introduced another mechanism to minimise researcher bias and optimise validity.

As with the interviews, consent forms were signed by each individual after they were informed about the study. This information was given in such a way that would not influence the workshop or the direction, as this was left up to the participants. See Appendix C for workshop schedule. The participants were assured that the workshop was held after the R5K marks were awarded for the year and there was no possible way that anything said could interfere with their marks. As the participants had just completed their R5K project they were freshly aware of the intricacies and the nuances of the project.

The thematic analysis workshop was based on Braun and Clarke's six-step guide to conducting thematic analysis workshops. (Braun & Clarke, 2008)

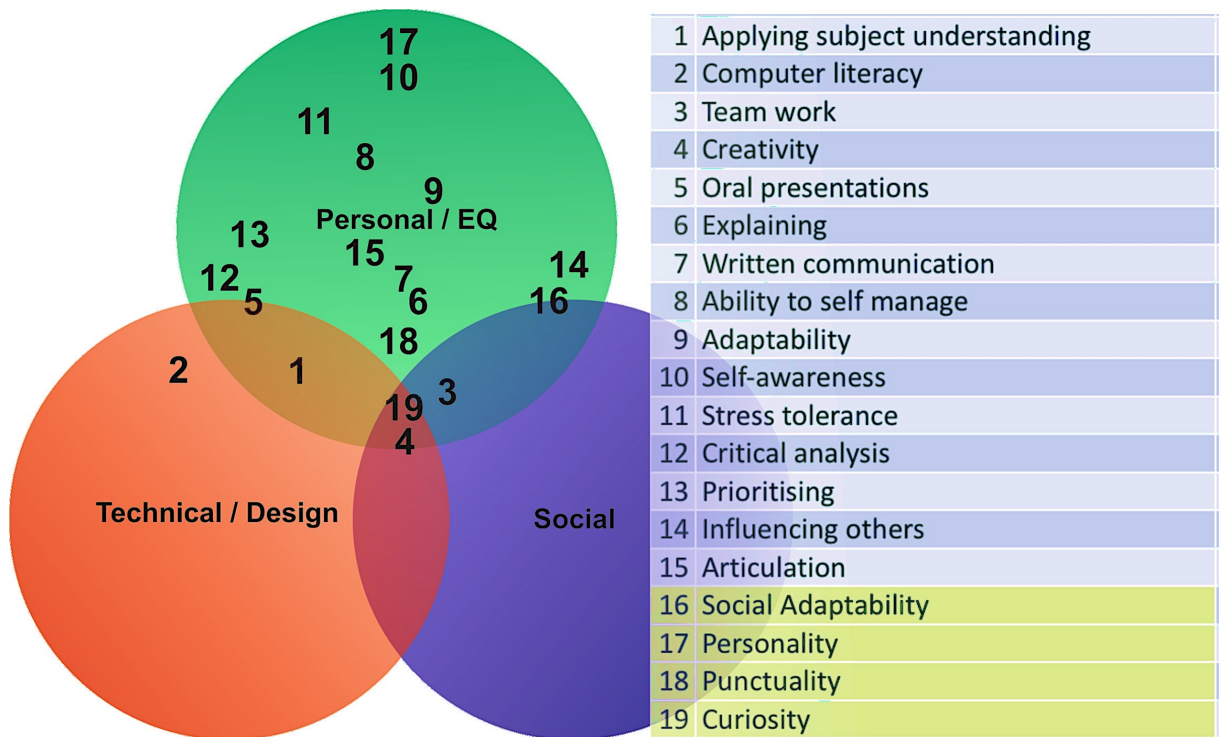
- 1 Becoming familiar with the data  
Go over the survey and interviews with participants
- 2 Generating initial codes
- 3 Searching for themes  
Discuss the data and if the participants can find a theme within the data and codify that data
- 4 Reviewing themes  
Does the theme represent the survey and interview responses?
- 5 Defining and naming themes  
Finding a method of representing the data
- 6 Producing the report



**Figure 32 - Thematic analysis workshop**

After giving the thematic analysis group a brief description of Braun and Clarke’s six steps, the students quickly saw that the survey and interview data revealed a pattern, which they discussed in depth. The researchers role was to supply the information needed but not to influence the flow of the participants process. The participants saw three broad areas that the patterns of data could fall into.

- 1 Personal / emotional intelligence - the aspects that required more personal development or aspects that developed maturity or emotional intelligence
- 2 Technical / Design – skills that can be taught in class
- 3 Social – personal behaviour that requires skilful interactions with others.



**Figure 31 – Graduate Attribute Bubble derived from thematic analysis workshop**

It was decided by the participants of the thematic analysis workshop to categorise the graduate attributes within a framework of these three areas (Figure 31) as they were found to capture the ‘essence’ of the surveys and interviews. There was lengthy debate about exactly where the attributes should go as the functioning of the bubbles were such that the placement of each attribute would indicate its relation to each

category and the closer to the centre of all three bubbles the more each attribute would belong in all three categories.

Interestingly the participants added four additional attributes (16-19), which are not explicitly part of York and Knights nor Ramirez's dimensions of employability in Table 2 and Figure 5 (Chapter 2) although they are implied within some of the other dimensions. These additional points agree with the industry experts' thoughts around emotional intelligence and professional attitudes.

These and all the findings presented here will be discussed in the next chapter.

## **4.8 Chapter Summary**

This chapter introduced the R5K brief and presented an outline of R5K projects to give context to the data that was gathered during the survey and interviews. The data was presented and described but not analysed.

On reflection this process has uncovered a rich pool of data that goes far beyond the aims of this research paper. There will be much added in the recommendations for future research section.

In the next chapter the literature from chapter 3 will be interrogated in relation to the data described in chapter 4.

## Chapter 5: Discussion of findings

After a thorough interrogation of the R5K project and aspects that influence the project's seeming success as well as literature research into governmental, academic and industry influences this chapter will discuss the data collection findings while reflecting on the literature. The result of this undertaking will be discussed and a model for future iterations of R5K projects will be developed based on all data and findings. This model of an industry-responsive project that develops the professional practice of students and therefore increases their graduateness will contribute to the Industrial Design field of knowledge. The proposed model will aim to facilitate a deeper understanding and connectedness between government, academia and industry.

As Baxter and Jack (2008, p.554) say “each data source is one piece of the puzzle with each piece contributing to the researcher’s understanding of the whole phenomenon. This convergence and strength to the findings as various strands of data are braided together to promote a greater understanding of the case”. It is through the investigations of all of these puzzle pieces that a clear understanding will be presented in this discussion of finding chapter.

### 5.1 Introduction

The research findings and the data for this thesis will be discussed around the themes of each of the research sub-questions.

#### **Sub-question 1: What is the degree of alignment currently between graduate attributes and industry expectations for Industrial Design?**

Employability is not merely reflected in the quality of graduates but also in the adaptability of these students to an ever-changing world of employment. Prevailing conditions beyond the control of the university and often the government dictates the direction and emphasis of what is needed from students. What is needed is a flexible student with abilities that lead to employment.

The academic context within the literature review chapter discussed the history of the Industrial Design course and the subjects that result in the student's acquisition of the right attributes needed for meaningful employment in a field of their choosing.

As discussed in the literature review chapter Hillage and Pollard (1998, p.2), Yorke and Knight (2006, p.8), Lees (2002, p.20), Ramirez (2012, p.2464), Harvey (2004, p.9) and CPUT have developed frameworks of employability. The methods used to describe these graduate attributes vary between producing generic lists of attributes to a more holistic list of competencies and skills. Dearing (1997) and Lees (2002, p.3) are opposed to lists of attributes but acknowledge that knowing what the attributes are can allow the gaps to be filled from both sides (academic and industry). If we see education as a process and not a product of the system then as Harvey and Pollard (1998, p.5) states, "individuals need relevant and usable labour market information to help them make informed decisions about the options available to them".

This "relevant and usable labour market information" in question can be gained through practical exposure to industry through the Work-Integrated Learning that happens during the process of the R5K project. The perceived value of this experience was gauged through the survey in this study, as described in Chapter 4.

As Yorke and Knight, Ramirez and Harvey's graduate attributes form an integral part of the survey done, the details of their dimensions of employability (or GA) will be discussed through the survey results.

To understand what the alignments are between graduate attributes and industry expectations for Industrial Design there needs to be a clear understanding of what industry expects and what academia offers. As discussed in the previous chapters there is no South African Industrial Design society that can dictate what the agreed graduate attributes are for Industrial Design. We therefore have no option but to accept the standard GA standards as proposed by studies done by Guardian/Gallup Survey 1993/4, Barclays PLC, Harvey and Green 1994, Brennan 1996, Dearing 1997, Hillage and Pollard 1998, Coopers and Lybrand 1998, Biggs and Moore 1998, Reuters 1999, Knight and Yorke 2000, Orchard, Conway and Ward 2000, Maharasoa

and Hay 2001 and corroborated by Ramirez, which are accepted by the majority of Industrial Design academia as well as the respondents of the survey in question.

Alignment as defined by the Merriam Webster dictionary states “an arrangement of groups or forces in relation to one another”. Therefore to create alignment between industry expectations and academia there needs to be a clear agreement between what academia offers and what industry expects and that agreement must be clear from both sides.

The fact that 13 of the 29 R5K groups are still active is a confirmation that a mere student project could bridge the gap and continue creating an income for graduates. It also speaks to the validity of the R5K project as the survey and interviews state that the R5K project gave many students the motivation and the skills needed to succeed in industry.

Below are select (anonymous) comments gleaned from the survey:

- 1 “R5K Professional Practice in fourth year was the best run of all the years business lectures”
- 1 “The R5K project is probably one of the best aspects of the course as a whole”
- 2 “The R5K was a huge turning point in my life. It gave me the courage to do the second thesis. It totally opened me up as a person”
- 3 “I learned what it was to stand on my feet. Thank you”
- 4 “The R5K project gave me the confidence to enter the design industry and not feel totally unequipped for what awaited. It gave me independent thought, originality and great networking possibilities. I felt more supported”
- 5 “I grew up a lot from BTech and I believe the BTech Industrial Design year is the most important year out of the course”
- 6 “This is one of the best projects I know about in a study course”

As 62 of 69 (or 90%) of the survey participants found employment in the design sector, of which 30 found employment in the Industrial Design sector it is statistically relevant that 63 would recommend the project to other Industrial Design students and 62 stated that the R5K project gave them enough experience to start a company after



graduation. Some qualified their answers by adding recommendations for improvements (see Appendix J). Question six asked how the R5K project developed students, and gave the categories of academically, personally, career and skills development. Students chose first 'personally' and secondly 'skills development' as the areas where they thought they gained the most development. This correlates with the three industry experts who in interviews valued personality indicators or emotional intelligence over skills (see Table 4 – Summary of graduate attributes question). In summary here are the responses from industry experts. Blue indicates personality indicators and orange indicates skills.

#### MR

1. Emotional intelligence
2. Self education, motivation
3. Increase sketching skills
4. Overall technology is lacking

#### BQ

1. Emotional intelligence
2. Must see the need for life long learning
3. Must appreciate the seriousness of business
4. Emotional intelligence
5. Increase sketching skills
6. Overall technology is lacking

#### RM

4. Must appreciate the seriousness of business, especially time
5. Increase sketching skills
6. Overall technology is lacking

These responses came without prompting or coercion. It can be seen from the pattern that there is an alignment between what the students saw they gained from the course and what the industry experts need from Industrial Design students.

When comparing Yorke and Knight's (2006, p.8) dimensions of employability, Ramirez's' (2012, p.2464) aspects of employability and the results from the R5K

survey including the interview data it can be seen, remarkably, that all three sources ranging a decade in time came up with exactly the same ranking of graduate attributes.

1. Subject understanding
2. Computer literacy
3. Team work
4. Creativity
5. Oral presentations
6. Explaining
7. Written communication
8. Self management
9. Adaptability
10. Self awareness
11. Stress tolerance
12. Critical analysis
13. Prioritising
14. Influencing
15. Justifying view point

To further explain why this ranking is highly significant here is a summary of the sources of the data. Lees in her paper *Graduate Employability*, wrote up a comparative study of many lists of key skills and competencies, these were based on the studies of Guardian/Gallup Survey 1993/4, Barclays PLC, Harvey and Green 1994, Brennan 1996, Dearing 1997, Hillage and Pollard 1998, Coopers and Lybrand 1998, Biggs and Moore 1998, Reuters 1999, Knight and Yorke 2000, Orchard, Conway and Ward 2000, Maharasoja and Hay 2001.

Out of these lists Lees (2002) extrapolated a list of dimensions of employability with reference that it correlates with Knight and Yorke's dimensions of employability.

Ramirez conducted a separate qualitative study with his keywords (graduate attributes) gathered from 1287 Industrial Design Coroflot job postings out of which

the top fifteen were exactly the same as those of Lees and Yorke and Knight. Ramirez's study was conducted after Yorke and Knight's list came out.

When doing the surveys and interviews for this study the participants were not shown the actual studies of Yorke and Knight's nor Ramirez's lists and the same keywords and ranking of those keywords are found in this study's results. The ranking was averaged from nine sources of data including a survey, eight separate interviews and a student workshop.

From this data analysis it can be seen that there is a clear and definitive alignment between the previous studies, the existing students who took part in the survey and the interviews, the industry experts who were interviewed and the alumni Industrial Design students who took part in the survey and some in the interviews.

From the government context there can be little direct influence when it comes to alignment of the Industrial Design course with industry, as there is no formal governing body that could guide such decisions. There are a number of institutes and government agencies that are closer to Design and have done studies on design in Cape Town, some of these studies have included Industrial Design within the study but none are dedicated to it. The major studies reflected in the literature review chapter are the Western Cape Design Strategic Framework document as well as a number of studies done by the Cape Craft and Design Institute who worked closely with the Western Cape government in the studies.

The Western Cape Government Design Strategic Framework document (2013) state that skills shortage is cited as a major factor that limits South African economic growth and competitiveness (Western Cape Government, 2013, p.3). They also mentioned that design was specifically one of the demand-led interventions that could lead to large-scale economic opportunities and be a driver for our economy. That the framework takes design seriously is captured in the statement "Design is the bridge between creativity and innovation, technology and the user and scientific and commercial disciplines for economic benefit".

Looking back to Table 4 which listed the main gaps within the design system in the Western Cape it can be seen that the R5K project as a model for professional practice aids in the alignment between graduate attributes and industry expectations for Industrial Design by working with the industry and therefore facilitating the move from the educational field to the professional field through Work Integrated Learning and situated learning (Council on Higher Education, 2011).

The Council on Higher Education, which advises the Minister of Higher Education and Training have proposed that the method of ensuring alignment with the academic and professional practice (industry) is by means of a Work Integrated Learning strategy by means of a hands-on practice including real experience, which would galvanize the theory learned within the university with the reality of the working environment. Thereafter the experience gained by doing can deepen understanding of knowing and culminate in a practiced knowledge that Aristotle called *phronesis* (van Niekerk & M'Rithaa, 2008) or practical wisdom thus teaching in context and avoiding the abstraction that comes from teaching without context.

The data gathered in the survey and interviews agrees with this hypothesis of situated learning. As one of the (anonymous) comments in the survey mentioned: *"The R5K project gave me the confidence to enter the design industry and not feel totally unequipped for what awaited. It gave me independent thought, originality and great networking possibilities. I felt more supported"* as well as *"I grew up a lot from BTech and I believe the R5K BTech Industrial Design project is the most important out of the course as it makes things real"*.

Constructivist learning theory states that students learn through personal experiences, collaboration and being challenged. This can be seen through the responses from the survey for example "The R5K project was a huge turning point in my life. It gave me the courage to do the second thesis. It totally opened me up as a person". This is mirrored by the interviews with the industry experts, one of whom said "It's (R5K) a great challenge and gives a glimpse of the real world of work".

The R5K project is housed within the university but from day one of the year long project, the students are subjected to continuous industry contact, as the brief makes it explicit that they need to research, design, manufacture, market and sell their products outside of the university. The project is situated within the context of the 'real world'. This 'real world' context presented to the students many positive attributes that were unintentional but welcome (comments from survey).

- Many groups earn enough money from the R5K project to pay for their full tuition in BTech
- Students works on weekends and after hours without being asked or expected to because they believe in their products
- What other student project earns the participants over R100 000 in a year?
- 44% of the graduated R5K groups are still active.

The industry experts interviewed are of the most prolific and successful Industrial Designers in Cape Town. They have hired students from the R5K project as well as students from the other two Industrial Design institutions in South Africa and when asked how the students compared to others the response was that they were well ahead of the other South African universities and on par with any international student that they have worked with (See Table 8 – Industry expert interview questions).

Therefore answering question one, there is definite and clear alignment between graduate attributes in CPUT's Industrial Design course and industry expectations for Industrial Design.

### **Sub-question 2: What impact has the R5K project had in the preparation of Industrial Design students for industry?**

What should we teach students so that they are prepared for their future careers? As educators we need to ensure continued relevance between academic preparedness and what industry needs, while being aware of governmental initiatives and driving forces.

Aligning what we teach and what industry expects is a clear indication of student preparedness and industry readiness.

Some rich and clear data has led to realisations about group work and the value of soft skills development. As seen in Figure 31, the graduate attributes bubble, there is a high regard for personal or EQ related skills, these soft skills described in the interviews and the survey deserve further investigation and research.

Based on interview and survey responses the following points are clear indicators that the R5K project has been somewhat successful in preparing students for industry.

1. 44% of the R5K groups are still active after graduation.
2. 47% of groups made significantly more than the minimum of R5000 profit with 23% making more than R13000.
- 2.1 Two of the 2015 groups made over R100 000, *Pivot* making R170 000 and *SOOC* making R110 000 profit
3. 90% of the respondents affirmed that the R5K project gave them enough confidence to start their own company after graduation.
4. 92% graduates found relevant design employment within six months and the other 8% found employment within 9 months of graduation while the universities average is 77% employment.
5. All of the industry experts affirmed that the R5K project was critical for student development.

Much like the Swiss Apprenticeship System, which improves employment by 15-40% over neighbouring European countries (Langenegger, 2014, p.1) it is clear through these indicators that the R5K project is both aligned with industry and that through this alignment student preparedness is facilitated.

**Sub-question 3: How can the R5K project, as a Work-Integrated Learning experience, effectively contribute to an industry responsive learning model?**

It is through industry interaction with the R5K project that students find themselves in a WIL environment where they gain situated learning within context of their chosen areas of interest. This intimate interaction with the development, manufacturing, marketing and sales of products, that was merely simulated in previous projects, takes this project to a new level of learning potential.

This research has uncovered many areas of improvement that will be implemented in future R5K projects. Those being:

1. Industry mentors will help each R5K group throughout the year
2. Professional practice will deal more stringently with deadlines and timeous behaviour
3. Lecturers without sufficient industry experience won't teach the R5K project
4. Introduce guest experts to help with specific modules of the R5K project

Introducing industry mentors to the R5K project seems to be the most effective method of ensuring a clear feedback loop for industry responsiveness. The mentor system was already introduced to the 2016 R5K project. In 2016 there are six groups and each have an industry mentor that has volunteered their time and expertise. It will take further study to gauge the effectiveness of the mentor programme but the hypothesis is that the mentors will create a further feedback loop between industry and academia so that, as Yorke and Knight (2016, p.21) put, it the curriculum can constantly be *tweaked*.

The embedding of employability as an outcome within the curriculum can ensure a relevant and industry responsive learning model.

It is through the mentor programme within the R5K project that students will benefit from the hidden curriculum (Harvey, 2004) that allows students to pick up what it means to be a designer from industry mentors who have relevant industry experience. Students will learn the values, beliefs and designerly ways from the mentors in model, close to the apprenticeship roots from which Industrial Design training evolved.

To revisit the address delivered by Deputy President at the time Ms Phumzile Mlambo-Ngcuka at the Third Annual Julius Nyerere Memorial Lecture, at the University of the Western Cape (2006):

*The phenomenon of unemployed graduates, who are without abilities to self-employ and self-determine, after spending three to four years of post secondary education is an indication to all of us of the challenge in our education at a tertiary level...the curriculum developers are not paying enough attention to issues of relevance and ensuring that we all pay attention to the skills and the competencies learners require when they come out of higher education...we need a skills revolution in the curriculum of tertiary education.*

It is this skills revolution that the R5K project addresses, it has proven to be a resilient adaptable project that captures the students' imagination through exciting and challenging them sufficiently. This is achieved by a constant reminder that what they have studied can be consolidated and applied within this one project, that substantial profits can be made and that after this one project they will never be told that they have no industry experience nor will they be told that they don't have a live project within their portfolio.

The Council on Higher Education advises how a lecturer should organise teaching within the educational field with academic and professional influences. As discussed in chapter three there are three fields, the academic field, the educational field and the professional field. These fields are integrated throughout the R5K project by design but what has been inherently lacking is the professional field. The assumption has been that the lecturers teaching the course had sufficient industry experience to relay the hidden curriculum to the students. What has been missing is what Duffy (2001) states: "understanding is in our interaction with the environment". He states that learning is caused by many variables and is more of an art than a science. The art of creating understanding is finely balanced between ensuring the content and the context are in alignment. Duffy shows that the knowledge and experience is gained through a collaborative environment of social groups. There is a synergistic interaction between learner and lecturer and the task being taught. It is the lecturer's



place to ensure the content is aligned but the mentor is better placed to ensure industry context.

### **5.3 Chapter Summary**

This chapter has interrogated the three research questions through the finding of the previous chapters. From this piecing together of this research puzzle it has demonstrated the validity of the R5K project by proving a clear alignment between international Graduate Attribute studies, local Graduate Attribute studies and the local industry's Graduate Attribute needs within the local context.

In the next concluding chapter the answered research questions will be translated into a proposed industry-responsive model for Industrial Design graduate employability.

## Chapter 6: Conclusion

This final chapter presents a conceptual model based on the literature review, the data collection and the review of that data. As with most studies, this thesis cannot claim to adequately address all questions arising from the research process, therefore this chapter will contain limitations of the study and further questions arising from this research process.

### 6.1 Proposed model of graduate employability development

The following proposed model of graduate employability development is based on Harvey's model in Figure 7 - A model of graduate employability development (Harvey, 2002, p.4). The analysis of the data presented in the previous chapter has led to evolving Harvey's model with certain additions and adjustments.

These adjustments are as follows:

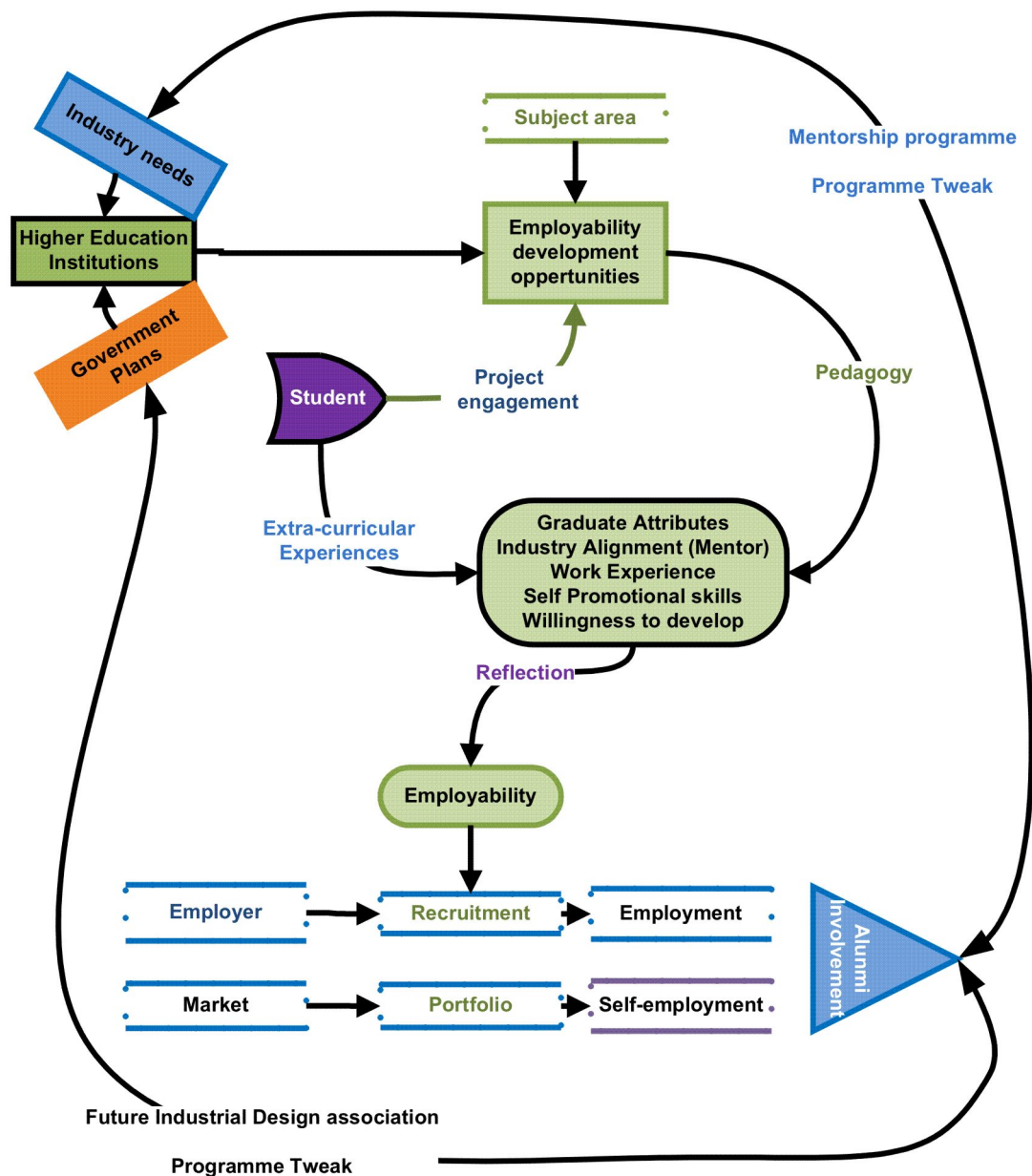
- Employability attributes have been changed to Graduate Attributes as through this study it has become clear that industry expectations of GA in Industrial Design is in alignment with university deliverables. This is derived from the results of the survey summarised in Table 9, where it is seen that the industry experts highly valued the 'real world' experience that the R5K project offered. The survey results also clearly indicated that through the GA gained in the R5K project gaining employment increased from the 77% university norm to 100% while the R5K project was running.
- The most important addition to Harvey's already elegant model is the addition of a feedback loop from graduates who return as mentors<sup>34</sup> years after graduation and tweak the programme based on what they know of the course

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<sup>34</sup> The mentor addition to the R5K project was initiated in 2016, there were seven alumni volunteers who had extensive industry experience. These volunteers asked for no compensation and were willing to meet with the groups weekly for the whole year of the project.

and what they have learned from industry. This addition came about through alumni interviews, industry expert interviews as well as survey comments.

- A further feedback loop would be initiated once a much-needed Industrial Design association has been established. Once this is done the association would feedback to government based on the alumni feedback and involvement within curriculum. This addition is derived from industry expert interviews.
- The linear structure of Harvey’s model has been changed to a more circular feel so as to indicate the flexibility and adaptability of the proposed model.



**Figure 32: Proposed model of graduate employability development**

The effectiveness of this new model of graduate employability will be tested during 2016 by this researcher and a paper will be written as to its success. This study did not include data or research in the current year of 2016 but the model has subsequently been initiated within the R5K project. A call for mentors for all R5K groups went out to social media. The response was overwhelming, there is a waiting list for the next three years for mentors who want to interact with the R5K project pro bono.

## **6.2 Discussion of Limitations**

The potential limitations of this project were outlined in the methodology chapter. Upon completion, the following two limitations are salient, while mechanisms were also integrated to mitigate their influence:

- Personal involvement (subjectivity): The researcher's involvement in this study has been an invaluable resource, without personal involvement this study would have lasted many years before the insight and history of the project was gained. To avoid bias research was triangulated with questionnaires, working groups and surveys.
- This research is limited to present and past students who have completed the R5K project. The focus is therefore limited to Industrial Design at CPUT. The intention is for this project to be adapted for a wider market (outside of Industrial Design) and a broader context (outside of Cape Town). Although data collection was limited the findings of that research were corroborated by findings for two separate studies in the literature.

## **6.3 Suggestions for future research**

This study provides a foundation upon which future research can be built:

- Test the proposed R5K model in an on-going longitudinal study at CPUT and other South African universities where it can be implemented.

- Evaluate if the R5K project answers the Cape Higher Education Consortium Study (2013) on South African HEI's, that looks at the essential 'critical cross-field outcomes' needed for employability.
- There is a clear need for a council of Industrial Design in Cape Town if not South Africa. Future studies are needed in how such a council could be a feedback loop for the proposed model to government.
- There is a rich source of data gathered detailing the need for further action research around group work and group dynamics. This researcher will implement a number of suggestions in the 2016 R5K project and build on these in the future.
  - Suggestions include
    - Group numbers,
    - Training team leaders,
    - Psychometric tools to group students
    - Group coaching
    - Debriefing sessions.

## **6.4 Study's contributions**

The following contributions have been made by this study to the curriculum development and the future implementation of the R5K project.

Improvements for the R5K project based on surveys and interviews:

- The introduction of more industry experts that will guest lecture business practices
- Psychometric assessments to allocate individuals to groups. This is based on numerous sources of feedback that gave insight into previous groups and their function and malfunction
- Two streams of the R5K project, one for students that prefer self-employment and one that leads to employment
- Numerous aspects of the project will be developed including:
  - Punctuality

- Group dynamics
- Emotional intelligence
- Improved sketching skills
- Computer literacy

The proof of the success for this project can act as a stepping-stone for further research and projects in different fields of design. These future R5K or similar projects are effective means of introducing students to the world of work and improved employment through graduateness.

## 6.5 Closing

This thesis has been a personal journey and a triumph that will bolster the researcher's efforts to continue this and similar projects. The R5K project has been flagged as a project to roll out to other design departments as a WIL and SL project that will prepare students for graduation.

The complexity of the subject matter surrounding this thesis requires a creative and methodical unpacking of all aspects being governmental, social, industry and academic to gain full understanding. As the landscape is constantly changing research such as this will have to be constantly evolving but to ensure relevance, and through that relevance produce a student that is flexible and adaptable to the changes in technology, economy, society, alignment to governmental imperatives, global economic crises, a shrinking workforce and market changes. We must not relent: education should be a passport to employment with long-term visas attached.

The effectiveness of this project is suggested by evidence that a number of these businesses are still running after graduation, and that the amount of sales generated within the required timeframe far exceeds the minimum required with an estimated R1 250 000. This developmental model which can be adapted for use in other institutions that offer Industrial Design or similar design related courses could act as 'barometer' for work readiness.

Education must never limit itself to purely epistemological pursuits, as Aristotle understood those many years ago it is only when the hands (*techne*) is tempered by the head (*episteme*) can the fusion of the two result in practical wisdom (*phronesis*) which leads to emotional intelligence and graduateness.

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## Appendix A: Timeline

	Apr 14	Jun 14	Aug 14	Oct 14	Dec 14	Feb 15	Apr 15	Jun 15	Aug 15	Oct 15	Nov 15
<b>Submit Topic HDC1.1</b>											
<b>Write Proposal</b>											
<b>Proposal Edit</b>											
<b>Defend Proposal</b>											
<b>DDR Paper</b>											
<b>Literature Review</b>											
<b>Data Collection</b>											
<b>Research Findings</b>											
<b>Conclusions and Findings</b>											
<b>Edit</b>											
<b>Final Hand in</b>											Nov

## Appendix B: Examples of completed individual Ethics Consent form.

### Cover Page

Each participant filled in and signed such a form before any interview case study or group work, below are samples. For all completed forms contact the author.



<b>The Cape Peninsula University of Technology</b>			
<b>FID Research Ethics Committee (REC) – ETHICS CONSENT FOR RESEARCH PARTICIPATION FORM</b>			
<p>In order to meet the requirements of the university's Higher Degrees Committee (HDC) the student must get consent to collect data from organisations which they have identified as potential sources of data.</p> <ul style="list-style-type: none"> <li>• Where applicable mark relevant boxes <input type="checkbox"/> with an x = <input checked="" type="checkbox"/></li> <li>• Replace red text with further description if needed or delete if not.</li> <li>• Delete grey descriptor text.</li> </ul> <p>For further clarification on this matter please contact either the supervisor(s), or the Faculty Research Ethics Committee secretary (Ms V Naidoo) at 021 469 1012 or <a href="mailto:FIDEthics@cput.ac.za">FIDEthics@cput.ac.za</a></p>			
<b>1: Researcher:</b>	Mr Johan van Niekerk	Masters <input checked="" type="checkbox"/>	Doctorate <input type="checkbox"/>
Office Telephone:	Cell:0823357920	e-mail:vanniekerkj@cput.ac.za	
Student/Staff Number: 197069886	Start and proposed end of Study: 2012 – December 2015		
<b>2: Supervisor/ Project leader</b>	Title, name & surname: Vikki Du Preez		
Office Telephone:	Cell:	e-mail: <a href="mailto:dupreezv@cput.ac.za">dupreezv@cput.ac.za</a>	
<b>3: Project , Thesis, Article Title:</b> as per HDC 1.1			
An industry-responsive model of Professional Practice for Industrial Design: a Work-Integrated Learning case study at a local University of Technology, Western Cape.			
<b>4: Project Description and procedures:</b>			
<p>As the Industrial Design industry in South Africa has no active national association or professional body, it is difficult to gauge the success of a project that is specifically designed to ease the transition from university into the working world. The intention of this research study is to determine the effectiveness of the R5K project as a bridging project from academia to industry.</p> <p>The R5K project has been a fourth year Industrial Design project since 2009. The project was started to increase students' awareness and involvement with industry. The brief requires students to earn a minimum profit of R5000 using the skills gained from previous undergraduate years. As part of the project students have to start a company and set up all structures to allow for idea generation, concept development, prototype testing, manufacturing, marketing and selling of an industrially designed product. The effectiveness of this project is suggested by evidence that a number of these businesses are still running after graduation, and that the amount of sales generated within the required timeframe far exceeds the minimum required.</p> <p>This research will investigate and analyse the relationships between the design industry, a University of Technology and the students in order to propose a developmental model.</p> <p>Alongside the investigation into the experience 'gap' between industry and academia, this study will also assess the effort, motivation, involvement and learning that the R5K project fosters and how Work-Integrated Learning (WIL) methods and methodologies can increase the quality and relevance of teaching and learning at Universities of Technology.</p> <p>To gain a relevant understanding from the students and practicing Industrial Designers this study will use the Participatory Action Research approach. This quasi-experimental research will make use of constructivist methods in a cross sectional and longitudinal study.</p>			
<b>5: Confidentiality</b>			
I have received assurance from the researcher that the information I will share will remain strictly confidential unless noted below. I understand that the contents will be used only for Masters Thesis and that my confidentiality will be protected.			
<b>6: Anonymity</b>			
Anonymity will be protected in the following manner (unless noted below) The recording will be used only by the principal researcher as a backup to the interview. If desired no names, faces or voices will be shown in any way.			
<b>7: Conservation of data</b>			
The data collected will be kept in a secure manner. The recording and any sensitive data will be kept on a password protected computer and not shown in any way if that is the wish of the interviewed.			

1

Faculty of Informatics and Design Research Ethics Committee (REC) - FID/REC/C0.2  
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## Appendix B: Examples of completed individual Ethics Consent form.

<b>8: Voluntary Participation:</b>			
I am under no obligation to participate and if I choose to participate, I can withdraw from the study at any time and/or refuse to answer any questions, without suffering any negative consequences. If I choose to withdraw, all data gathered until the time of withdrawal will be destroyed.			
<b>9: Informed and Continuous Consent</b>			
Permission has been gained from all participants in this study. If permission can not be granted from the individual because of age, ability or other circumstances written permission will be sourced from the appropriate gatekeeper. If language or culture differ considerably a relevant assistant researcher is required to gain consent. (Informed implies the subject is fully aware of the nature of the study)			
<b>10. Conflict of interest</b>			
There is no conflict of interest (including financial gain, vested interest etc.) likely to result from my participation.			
<b>11: Additional consent: I make the following stipulations (please tick as appropriate):</b>			
	In thesis	In research publications	Both
My image may be used:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
My name may be used:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
My exact words may be used:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Any other (stipulate):			
<p>Acceptance: I, Brad Inch agree to participate in the above research study conducted by Johan van Niekerk of the Faculty of Informatics and Design Industrial Design Department at the Cape Peninsula University of Technology, which research is under the supervision of Vikki Du Preez          If I have any questions about the study, I may contact the researcher or the supervisor. If I have any questions regarding the ethical conduct of this study, I may contact the secretary of the Faculty Research Ethics Committee at 021 469 1012, or email <a href="mailto:naidoo@cpu.ac.za">naidoo@cpu.ac.za</a></p>			
Participant's signature:		Date: 10th November 2015	
			
Researcher's signature:		Date: 10th November 2015	
			
Supervisors signature:		Date:	

2

**Faculty of Informatics and Design Research Ethics Committee (REC) - FID/REC/C0.2**  
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 80 Roeland Street, Vredehoek, Cape Town 8001

## Appendix B: Examples of completed individual Ethics Consent form

### 8: Voluntary Participation:

I am under no obligation to participate and if I choose to participate, I can withdraw from the study at any time and/or refuse to answer any questions, without suffering any negative consequences. If I choose to withdraw, all data gathered until the time of withdrawal will be destroyed.

### 9: Informed and Continuous Consent

Permission has been gained from all participants in this study. If permission can not be granted from the individual because of age, ability or other circumstances written permission will be sourced from the appropriate gatekeeper. If language or culture differ considerably a relevant assistant researcher is required to gain consent. (Informed implies the subject is fully aware of the nature of the study)

### 10. Conflict of interest

There is no conflict of interest (including financial gain, vested interest etc.) likely to result from my participation.

### 11: Additional consent: I make the following stipulations (please tick as appropriate):

	In thesis	In research publications	Both
My image may be used:			<input checked="" type="checkbox"/>
My name may be used:			<input checked="" type="checkbox"/>
My exact words may be used:			<input checked="" type="checkbox"/>
Any other (stipulate):			

Acceptance: I, Marc Ruwiel agree to participate in the above research study conducted by Johan van Niekerk of the Faculty of Informatics and Design Industrial Design Department at the Cape Peninsula University of Technology, which research is under the supervision of Vikki Du Preez  
If I have any questions about the study, I may contact the researcher or the supervisor. If I have any questions regarding the ethical conduct of this study, I may contact the secretary of the Faculty Research Ethics Committee at 021 469 1012, or email [naidoove@cput.ac.za](mailto:naidoove@cput.ac.za)

Participant's signature:

Date: 10th November 2015

Researcher's signature:

Date: 10th November 2015

Supervisors signature:

Date:

2

## Appendix B: Examples of completed individual Ethics Consent form

**8: Voluntary Participation:**  
I am under no obligation to participate and if I choose to participate, I can withdraw from the study at any time and/or refuse to answer any questions, without suffering any negative consequences. If I choose to withdraw, all data gathered until the time of withdrawal will be destroyed.

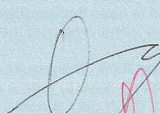
**9: Informed and Continuous Consent**  
Permission has been gained from all participants in this study. If permission can not be granted from the individual because of age, ability or other circumstances written permission will be sourced from the appropriate gatekeeper. If language or culture differ considerably a relevant assistant researcher is required to gain consent. (Informed implies the subject is fully aware of the nature of the study)


**10. Conflict of interest**  
There is no conflict of interest (including financial gain, vested interest etc.) likely to result from my participation.

**11: Additional consent: I make the following stipulations (please tick as appropriate):**

	In thesis	In research publications	Both
My image may be used:			✓
My name may be used:			✓
My exact words may be used:			✓
Any other (stipulate):			

Acceptance: I, Byron Qually agree to participate in the above research study conducted by Johan van Niekerk of the Faculty of Informatics and Design Industrial Design Department at the Cape Peninsula University of Technology, which research is under the supervision of Vikki Du Preez  
If I have any questions about the study, I may contact the researcher or the supervisor. If I have any questions regarding the ethical conduct of this study, I may contact the secretary of the Faculty Research Ethics Committee at 021 469 1012, or email [naidoove@cput.ac.za](mailto:naidoove@cput.ac.za)

Participant's signature:  Date: 6th November 2015

Researcher's signature:  Date: 6th November 2015

Supervisors signature: \_\_\_\_\_ Date: \_\_\_\_\_

2

Faculty of Informatics and Design Research Ethics Committee (REC) - FID/REC/C0.2  
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## Appendix B: Examples of completed individual Ethics Consent form

### 8: Voluntary Participation:

I am under no obligation to participate and if I choose to participate, I can withdraw from the study at any time and/ or refuse to answer any questions, without suffering any negative consequences. If I choose to withdraw, all data gathered until the time of withdrawal will be destroyed.

### 9: Informed and Continuous Consent

Permission has been gained from all participants in this study. If permission can not be granted from the individual because of age, ability or other circumstances written permission will be sourced from the appropriate gatekeeper. If language or culture differ considerably a relevant assistant researcher is required to gain consent. (Informed implies the subject is fully aware of the nature of the study)

### 10. Conflict of interest

There is no conflict of interest (including financial gain, vested interest etc.) likely to result from my participation.

### 11: Additional consent: I make the following stipulations (please tick as appropriate):

	In thesis	In research publications	Both
My image may be used:			<input checked="" type="checkbox"/>
My name may be used:			<input checked="" type="checkbox"/>
My exact words may be used:			<input checked="" type="checkbox"/>
Any other (stipulate):			

Acceptance: I, Roelf Mulder agree to participate in the above research study conducted by Johan van Niekerk of the Faculty of Informatics and Design Industrial Design Department at the Cape Peninsula University of Technology, which research is under the supervision of Vikki Du Preez  
If I have any questions about the study, I may contact the researcher or the supervisor. If I have any questions regarding the ethical conduct of this study, I may contact the secretary of the Faculty Research Ethics Committee at 021 469 1012, or email [naidoove@cput.ac.za](mailto:naidoove@cput.ac.za)

Participant's signature:

Date: 2nd November 2015

Researcher's signature:

Date: 2nd November 2015

Supervisors signature:


Date:

2

## Appendix C: Published R5K projects

FEB 12, 2014

# #WDC250 R5K




*The problem that we have in education is that graduates need experience and a portfolio to get employment. The R5K project gives them the experience of a viable business as well as an entry into a market by means of a product that they earn an income from.*

The task of the R5K project is to earn at least R5000 by selling Industrially Designed products to a South African market. We are in our 4th year of this project, and it has proven an invaluable tool in the transition from education to industry. In some cases groups have eared R140 000 and most product continue to sell after graduation. Names are made, and the companies started at CPUT gain attention and acclaim. We would like our R5K project to help our students even more by giving them more coverage.

### **how does it use design to improve lives?**

Our students use the R5K to pave a path into self employment (or as a portfolio piece for employment.) It gives the opportunity to start and maintain a live business and make a profit far beyond the constraints of our brief.



The figure shows a collage of five small images. From left to right: 1. A poster for 'shools' with a yellow banana-shaped object. 2. A poster for 'jifit iDox' with a group of people and a blue bicycle. 3. A poster for 'R5K' with a wooden handle and a yellow cylindrical object. 4. A poster for 'Designing your first experience to be fun, to be a not memorable?' with a yellow cylindrical object. 5. A poster for 'R5K' with a yellow cylindrical object and a person's face.

Figure 8 (<http://imaginethat.org.za/r5k/>)

## Appendix D: Industrial Design as a scarce skill

12 No. 37716 GOVERNMENT GAZETTE, 3 JUNE 2014 No. 459	3 June 2014						
<p><b>IMMIGRATION ACT, 2002</b> (Act No. 13 of 2002) [Sections 19(4), read with Regulation 19(5)]</p> <p><b>SKILLS OR QUALIFICATIONS DETERMINED TO BE CRITICAL FOR THE REPUBLIC OF SOUTH AFRICA IN RELATION TO AN APPLICATION FOR CRITICAL SKILLS VISA OR PERMANENT RESIDENCE PERMIT</b></p> <p>I, Mr MKN Gigaba, MP, Minister of Home Affairs, hereby, in terms of sections 19(4) and 27(a)(ii) of the Immigration Act, 2002 (Act No. 13 of 2002), determine the following skills or qualifications to be critical for the Republic of South Africa in relation to an application for a critical skills visa or permanent residence permit:</p> <table border="1"> <thead> <tr> <th>Classification of Education Subject Matter</th> <th>Occupation/Critical Skill</th> <th>Requirements</th> </tr> </thead> <tbody> <tr> <td>Agriculture, Agricultural Operations and Related Sciences</td> <td> <ul style="list-style-type: none"> <li>Agricultural Engineer</li> <li>Agricultural Scientist</li> <li>Forestry Technician</li> </ul> </td> <td> <ul style="list-style-type: none"> <li>Confirmation in writing from the accredited professional body, council or board recognised by SAQA or any relevant government Department confirming the skills or qualifications of the applicant and appropriate post qualification experience</li> <li>Proof of application for certificate</li> </ul> </td> </tr> </tbody> </table>		Classification of Education Subject Matter	Occupation/Critical Skill	Requirements	Agriculture, Agricultural Operations and Related Sciences	<ul style="list-style-type: none"> <li>Agricultural Engineer</li> <li>Agricultural Scientist</li> <li>Forestry Technician</li> </ul>	<ul style="list-style-type: none"> <li>Confirmation in writing from the accredited professional body, council or board recognised by SAQA or any relevant government Department confirming the skills or qualifications of the applicant and appropriate post qualification experience</li> <li>Proof of application for certificate</li> </ul>
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Figure 9 - Industrial Design as a Critical Skill

## Appendix E: R5K brief



Cape Peninsula University of Technology

Subject	Term	Lecturers	Project Introduction	Final Hand in Date
D4	All year	Johan vN Bart V	16th Feb 2015	8th June 2015 Report 17th November R5K

### Project Brief: ≤R5K

#### Requirements: What are we doing?

Welcome to the first brief of your fourth year of your ~~Baccalaureus Technologiae~~ (Degree) in Industrial Design.

You will be doing this project in groups of 5. This is a simulated company project, you will need to deal with any group politics using your lecturers as the CEOs for matters that can not be solved within the group.

The R5K Project is one where you will use the skills and theories you have gained over the last 3 years and implement them. You will be ~~conceptualizing~~, designing, marketing and selling an industrially designed product, the aim is to make at least R5000 profit (after all costs, loans etc are paid off)

This project is designed to give you real world experience as well as a viable product that you could use to 'kick-start' your career as an Industrial designer. Previous groups have taken the R5K group and formed a company which is still selling their products after 3 years

A basic guideline when pondering your possibilities are:

- What manufacturing processes can be used for relatively low runs?
- What products require a minimal number of materials and processes?
- What product requires the appropriate startup capital according to the groups' resources?
- What are the strengths and weaknesses within the group (don't design beyond your means)
- Where are you going to be selling this product?
- Who will manufacture, finish, assemble, package, market, sell, deliver and fix the product?

#### Rules

- Exorbitant sales to friends and family are not allowed
- Team work is essential
  - An equal distribution of tasks and workload (your will evaluate each other and it will affect your marks)
- Funds for this project cannot be a gift, they must form part of a business model i.e. be paid back
- 10% of your profit will go to the ID department and will be used for the following years social committee and student emergency float.
  - This is to be handed in at the final presentation; see it as paying it forward
- You will have until end of the year moderation to prove your profit. If the R5K is not achieved you will not be eligible to get more than 50% for the D4 part of this project
- One of each of your products will be retained by CPUT.
- Although profits are retained by yourselves while in 4th year you will have to get the IP of your project released by the TTO if you would like to produce further or collaborate with them to take your R5K products further

#### Objectives: Why are we doing it? What are you going to learn?

- You will take an idea from design to manufacture to marketing and then to gain the tools necessary to reach point of sale
- This prolonged teamwork will simulate a company structure with the positives and negatives that go with it
- You will produce an industrially designed product that will hopefully earn you income throughout the year and beyond.

Figure 10 - R5K Brief (Also see next page)

**Marking Criteria:** What you will be marked on. What are we looking for?

- Your intermediate presentations
- Your mid year presentation proving that you have a viable product that will sell
- Interdepartmental presentations
- Design Research Report (DRR)
- Working prototype / product
- Packaging of your product
- Peer assessment
  - You will evaluate the contribution of your team members
- R5000 Profit! (Proved via cash flow statement)
  - If >R5K then maximum possible mark will be 50%
- For every R5K extra profit you will get 10% added to the total mark

**Design Requirements:** What is to be handed in? Scale, Format etc

Note: Your product will not be marked or moderated unless all items below are handed in.

- A Design Research Report (DRR)
  - The body of your DRR (excluding cover, bibliography, appendices etc) should be +-5 000-7 000 words
  - Three bound black copies are to be handed in 2 soft bound
  - Two full colour soft bound copies
    - They can soft bind at Print On Demand - [www.printondemand.co.za](http://www.printondemand.co.za)
  - Print reports double sided
  - Technical drawings printed A3 and folded in and bound with DRR
  - The format can vary from the DRR guideline supplied depending on the architecture of your argument
    - This report is a comprehensive business and marketing plan
    - You will use your chosen research methodology to produce a project report fully recording the design process
    - Risk management (SWOT analysis)
    - Investigating the need
    - Target market / market segmentation. Geographic and demographic
    - 3 P's
    - Appropriate branding strategy
    - Remember new research builds on previous research.
- Advert, discuss with Johan if there are questions. See dropbox for template
- You will hand in the final working prototype at mid year moderation and present your proof of profit by the end of the year. Failure to produce evidence will impact on your marks
- At moderation you will start your presentation with a semi-professional 3-5min documentary
  - Introducing yourself and the problem,
  - Detail your process of research; understanding of the problem,
  - Detailing the resolution,
  - Summing the project up

### Important Dates

- |   |                          |
|---|--------------------------|
| 1. Concept Presentation                   | See Google cal for dates |
| 2. Presentation 2                         | See Google cal for dates |
| 3. Presentation 3                         | See Google cal for dates |
| 4. Report Due & Poster Due                | See Google cal for dates |
| 5. Moderation and final prototype hand-in | See Google cal for dates |
| 6. Proof of Profit                        | See Google cal for dates |

Good Luck  
Johan



## Appendix F: Thematic analysis workshop guide

<b>Researcher:</b>	Johan van Niekerk	
Office Telephone:	Cell:0823357920	e-mail:vanniekerkj@cput.ac.za
An industry-responsive model of Professional Practice for Industrial Design: a Work-Integrated Learning case study at a local University of Technology, Western Cape.		

- Thematic analysis workshop
- Time: +-90min
- Ethics form sign
  - Record session?
  - Photos?

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### Thematic analysis is....

A qualitative analytic method for: 'identifying, analysing and reporting patterns (themes) within data. It minimally organises and describes your data set in (rich) detail. However, frequently it goes further than this, and interprets various aspects of the research topic.' (Braun and Clarke, 2006, p.79)

### What constitutes a theme?

'A theme captures something important about the data in relation to the research question and represents some level of patterned response or meaning within the data set.' (Braun and Clarke, 2006, p.82.)

### Braun and Clarke's 'guide' to the 6 phases of conducting thematic analysis

- Becoming familiar with the data.
  - Go over the survey and interviews with participants
- Generating initial codes
- Searching for themes
  - Discuss the data and if the participants can find a theme within the data and codify that data
- Reviewing themes
  - Does the theme represent the survey and interview responses?
- Defining and naming themes
  - Finding a method of representing the data
- Producing the report

Figure 11 - Thematic analysis workshop guide

## Appendix G: Lists of all R5K projects and their projects and participants

**Table 3 - Lists of all R5K projects and their projects and participants**

Year	Group	Product	Members
2010	Think	Furniture	Taariq L
			Erwin J
			Jasper E
			Piers C
2010	The B-team	Bamboo wallet	Renier M
			Hester C
			Shaeema B
			Paul M
2010	Ghost	Laptop stand	Raoul DV
			Geoff B
			Katrin S
			Phillip F
2010	Mugo	Ceramic mug	Oriole B
			Elsje B
			Tanea T
2011	Left Right Design	Furniture	Jeannot B
			Gerhard C
			Emanuela D
			Johan F
			Dane K
			Silvia R
2011	SMAC Harry	Organizational shelf	Stefan F
			Andre S
			Catherine HS
			Marten F
2011	Frag Bag	Gaming Bag	Cliff B
			Brent I
			Jacques F
			Tyran C
2011	Five 45	Multi-use couch	Christof S
			Graeme Cuthbert
			Philip R
			Lize L-E
2011	Because 789	Flash stick	David R
			Max B
			Anine K
			Chris M
2011	Root Design	Defense Armband	Karl S
			Calvin B
			Glen C
2012	Bark	Notebook	Christopher H
			Tom V
			Dylan C
			Jon F
2012	Piece	Skim board	Brad I
			James E
			Daniel L
			Ryan S
2012	Afterdarx	Clubbing glasses	Caileigh P
			Charl V
			Philip V
			Matthew W
2012	Shoots	Bamboo headset	Craig P
			Philip vdM
			Angela L
			Bradley W
2012	MASS	Storage armband	Erne N
			Jarryd N
			Dean F
			Stephen G

			Kegan W
			Max N
2012	SES	Drinks Holder	Henning vA
			Raees A
			Naeem C
			Evan H
2013	Silver Acorn	Bag hook	Skye K
			Andrea R
			Ryan H
			Jean-Pierre V
2013	Plain Paper	Wallet	Evan H
			Chanel O
			Johannes J
			Wessel W
2013	Mint	First Aid Kit	Nica H
			Kalin O
			Angus C
			Michella C-W
2013	Lettuce	Monitor Stand	Timothy B
			Sam M
			Luciano W
			Rob B
2013	Spoked	Cork grips	Brian T
			Nico H
			Neil dV
			Jonty E
2013	three3one	Smores	Adriaan L
			Martina B
			Carla G
			Kari K
2014	Bees Knees	Keg Braai	Chris W
			Paisly B
			Cedric C
			Bianca C
2014	Hey Presto	Dehydrator	Carl V
			Nehanda M
			Justin N
			Chris S
2014	The Braai Tool	Braai tongs	Neo
			Khanya R
			Sebastian B
			SteHan B
2015	Lum	Inductive charging light for load sheading	Ale
			Sudipa B
			Ashton B
			Lala Q
2015	Pivot	Swiss army type key hoster	Carla B
			Lizanne B
			Jess K
			Shanee R
2015	White Bison	Small product light box	Raynor R
			Iska R
			Catherine S
			Matthew G
			Marli K
			Kyle T
			Devon vH
			Nicola V
			Mikhail W-A

## Appendix H: Gaps in the design system (Western Cape Government, 2013, p.13)

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1. Lack of support for design infrastructure and enabling environment
  - Fragmented industry made up of small unconnected micro enterprises
  - Absence of an overarching support body
  - Low levels of business acumen and business development capabilities
  - Design is not used in designing solutions for socio-economic development

2. Low levels of local product development activity in the Western Cape
  - High incidence of copying foreign-based product for Asian manufacture
  - Low use of local design practitioners to do design work
  - High imports of finished and semi-finished products
  - Low value-chain activities and synergy
  - Limited ability to scale up production of viable products

3. Low levels of innovation support and promotion
  - R&D low (less than 1% of GDP)
  - Declining number of patents
  - Low number of new inventions
  - Declining levels of design registration in universities
  - Innovative ideas are often exported for commercialisation

4. Low levels of collaboration between design and other sectors
  - Closed and controlled sector/industry value chains that work to exclude new entrants
  - The “missing middle” of small/medium sized businesses along value chains
  - Low value-chain synergy

5. Design education system not producing sufficient and appropriately skilled graduates
    - Limited capacity to deliver the school curriculum in under-resourced areas
    - Lack of appreciation of design as a viable career for talented people
    - Lack of understanding within education of industry resource and skill needs
    - Lack of appropriate design education delivery mechanisms and personnel
    - Limited demographic representation of design graduates
    - Limited co-ordination and synergy between tertiary institutions in the province
-

## Appendix I: Did the R5K project give you enough experience to start a company? (Comments)

- I have to say yes, because I did start a company thereafter, and have not yet gone completely bankrupt. Touch wood, which is also our business since we are running a woodworking workshop...haha
- yes, but only just enough. it gave me a good understanding of the basics but not of the intensity and commitment required to start a business and make it successful
- The groups are TOO BIG...I obviously got the job of doing things that is in my field of knowledge and strength, so I did not learn a lot of new things such as manufacturing in the real world
- The 5K provides you with a lot of challenges with regards to the business side of it but it teaches you how to deal with clients and pricing according to your target market. Yes you make mistakes but the best way to learn is when you still young and experimenting and that is why it is a fundamental project while you at university.
- Approach situations as we did, whilst doing the 5K
- To start a local business it gave you some pathways, but still a lot to learn to get up and going overall. Its a good starter...
- I think it is a good starting point for a company but one needs to understand more about the market they are going to enter as well as a greater understanding of the business world/company logistics - budget, registering a business, accounts, etc
- Looking back at the project it defiantly has the correct tools which young designers need in order to start up a business.
- Almost enough. But there is nothing better than experience. Also the business side of things was lacking a bit. Tax etc...
- It could focus more on the conditioning of a designer's struggles in a world that doesn't always tolerate radical creativity. How to balance oneself in an environment of people that harness different skills and how to extrapolate the needed feedback from it. When to believe in an idea and when to go back to the drawing board
- I am on the fence. I has opened up to me just how difficult it is to start something and it has shown me that having more members in a start-up does not make it less work. It has shown me that anything technology related is NOT a good choice to manufacture in Cape Town for a start-up. I have learnt a lot but now I know better than to start anything next year full time.
- In some aspects. Yes, but there is a lot more that goes into starting a company than just a product
- No, because each individual learned different things that contributes toward starting a company. If it were an individual project under the same criteria then the answer might have been yes
- Unrealistic elements. Such as free labor from group members.

## Appendix J: Can you give advice to improve or change the R5K project. (Comments)

- Put a much greater emphasis on the business aspect, finance, managing costs. At the end of the day, business, even design, is about managing budgets and lowering costs etc. I feel this portion was overlooked to a certain extent. My view is that the R5k project is 20% a design project, 80% a business project. There needs to be an emphasis on the legal issues RE starting a business, tax implications, proper bookkeeping, management structures.
- Give them some marketing training/exposure
- The introduction of more theoretical and practical management and strategy concepts
- Less members per group in order to give every member a change to try out the business side. We had too many people and not everyone could learn about the financials etc.
- Getting industry sponsorships
- I think a little more guidance could be given toward the business aspects of the R5k project such as developing a costing of the product, determining the right retail price (market segmentation). Also marketing channels etc. I know this is not our immediate field of expertise, but it is important to understand and to design accordingly if you are developing a product with the aim (requirement) of making R5000 profit.
- I would put more emphasis on outsourcing and getting products made by others. I would not allow self-manufacture, as that is covered (almost too much) in the first 3 years of study. Outsourcing and supplier management should be key focal areas of 5K in my opinion.
- Maybe more business lectures
- tell designers to try and not redesign the wheel. Go with something that works
- Bring business and marketing student in at the end. More industry tours to companies and
- talks with product design entrepreneurs. Lessons from previous 5K students about what they learnt, do's and don'ts
- Making the business side more prominent or getting some sort of finance/business foundation that offers some sort of training course that helps with the setting up of a business. The product design side is easy when looking back at the process, it's finding materials, people to make our stuff that we need (what could help students are manufacturers that could offer their services for these projects in terms of manufacturing items at a lower price), but ideally the business knowledge needed to keep a product afloat because if our project/item is only being sold for the duration of the academic year and it ends, we'll be equipped to use that experience and apply it to other products we could design. The possibility to start our own businesses.
- I had a good experience. the team worked well and we made our target. Happiness all round.
- Introducing the methodologies at an earlier stage in the Industrial Design course. People got caught up trying to 'fit' a methodology to their design problem, because they were unfamiliar with the very tool that needed to be their best friend. • With the exception of ProfPrac in our final year, the business aspect of the entire course (Yr1-3), was poorly facilitated. In most instances, not of

any practical relevance to what we would face in the industry or when starting our own business. This definitely affected how we approached our 5K and the choices we made, both in the 5K and later in industry.

- It needs an introductory project in third year already, the jump is too big. Business training should also be done by the same person from second or third year on. Our business training has been a joke up until last year but then we switched lecturers and had to start from scratch this year.
- I would keep project as is, but do groups of 3 people, not 4. This allows more involvement of all 3 people and better focus in the group. Other than that, a group of industries or categories could be used in the 5K project to streamline ideas, energy etc. into a certain direction, instead of being completely open. This may help people focus on real solutions vs anything that is easy to make quick profit on.
- 6 months is a short time to get a product market ready. This adds pressure which is good and accurate according to my current experience of the working world as deadlines given are rarely realistic. On the other hand, 5k projects tend to lean more towards craft than mass production where in depth experience of manufacturing processes such as injection moulding is not experienced (to my knowledge). 5k should be slowly built up from halfway through first year (mini 5k?). It could build into a fund that is realized by the BTEch year giving a better financial starting point?
- smaller groups would be so much more effective, like 3...not more!
- Help take project further, when leaving CPUT we need to pay off fees and gain income, there is little time to take a new project forward that won't pay for itself for a while
- I would perhaps make sure that the previous years leading up to the R5K project focus more on the business models and the management of group work.
- Force groups to aim at smaller products (hindsight of the First Aid Kit), emphasis on
- selling, getting your product to market as quickly as possible (insane time pressure). Maintaining some level of overseeing workload/distribution among team members.
- I would not change much, it is based on self learning both through failures and successes
- I would apply more Small Business thinking concepts, ideas and STRATEGY to the process. The current program is fundamentally product focused which is great, although there are so many other elements to starting a business / brand that need to support the product. There could be greater focus on those elements. Working with or gaining experience from Small Business owners could be very helpful. Marketing, Brand Support and Business Strategy support from the university / networks / successful people from the industry or business studies would also remove what is seemingly a university project and be able to compete in the big bad world of competitive business. Defining how cut-throat the industry is would prepare the students for what it is really like.
- In order to better succeed in the 5K project, business studies should play a much bigger part in ID constantly. When I was there, it hardly featured and was scattered. Also, get old students to come in as regularly as possible to speak to classes in general.

- Not really, as this project is about learning from experience
- give each person an equal chance
- Never start a Business with Friends
- Better theory and design thinking. I did not really understand until I started working
- I think cput's design program needs to have a far greater emphasis on manufacturing processes and material selection. This is something that once i started working at a industrial design studio i realized was a absolute massive gap in my education. Also i think the 5k project allows students to slightly skewer the design process in the hopes of getting better marks on the project itself. This is a little difficult to put into words but it results in choices being made during the design process that may look great op paper but that results in a product that is lacking in certain areas.
- In industry most things revolve around money made in order to keep the business up and running. The 5k is a great way to learn about business in a practical manner but it would be great if more emphasis could be placed on cutting costs, wastage, material choices and especially basic business (or start up) knowledge that would typically hamper such a start up.
- If groups were smaller for instance 4 in a group, it would allow each individual to play a significant role in the group and more focused role.
- Make it more competitive between groups. Create a clearer rubric to allocate marks to certain areas (eg. graphics, logo, marketing campaigns, research skills/methods).
- include some sort of "campaigning" project, where the groups are required to advertise their products through a video... or a single page magazine article... I just feel that there needs to be a stronger marketing element, since we were all product designers.
- It would be nice to have more cooperation from the TTO with getting R5K products IP's transferred over to the designers after the students have left BTech. A short beginners course in accounting and business management would be handy. Maybe just for a week or something. Otherwise it was great. Really helpful to have a business mentor. This helped a lot. Maybe getting a mentor who can give short classes on business subjects that the students feel they lack.
- I would recommend a contract between group members to be drawn up with the help of the lecturer
- Emphasize time to market to lower costs.
- Adequate funding support and guidance.
- Create a space that facilitates the great potential of the R5K project, a more business like room with access to rapid prototype machines and other such prototyping machines
- I think it was a fantastic project, and it taught me a lot of valuable skills, including not limiting myself to being employed forever :)
- the 5k project is probably one of the best aspects of the course as a whole. i would say better mentorship from lecturers.
- Teach learners more about marketing & press releases etc. (Using the press and marketing tools available for ones benefit).
- Only allow lecturers with lots of industry experience teach R5K! there is a lack of them at ID

- More Sketching, more concept generation! Have more involvement from industry veterans, talks, advice, mentors.
- Encourage people to broaden the design scope of their projects by considering possible future products or services beyond making 5k, as well as the materials & production (don't be afraid to get out of comfort zone), the focus of their design project and consider the potential for the product/business in the long term.
- Build up a REAL database of manufacturers / prototyping companies. Too much time is wasted trying to find the 'right' person. Grow this network and make it common knowledge as this lack of information is to the detriment of the industry. Needs to have an 'open source' approach.
- Making sure that the product chosen can definitely produce a future for the group (does not have to be that original)
- Takes up too much time in the year, would rather reduce it to smaller products that are on sale for one or two days - 'market day' type of products. Use time in the year for more personal portfolio projects
- I would allow students to work in the industry for at least half a year and after that start the 5K project. E.g. last half of third year is in field training, followed by 5K in Btech and then major thesis which still needs to include in field research. Also create a better professional practice and business studies syllabus, as from 1st year. We did not learn much in business studies from year 1 thru 3.
- I would consider a mixed approach in terms of understanding how different fields of design and technology influence one another. One example would be to suggest that students consider creating objects with a digital element. in turn some experience in software design could be had. One example would be to create objects for the IOT environment. of course, this cannot be forced onto students but it felt like the majority of projects were pretty one-dimensional in their approaches and it is very rare to work like that in the industry. I also think it would be great to combine cross-disciplinary teams where experts in hardware/software can be involved.
- Smaller groups of people, 3 people
- Seeing as material knowledge and manufacturing techniques are somewhat seldom taught I would suggest using an open discussion with the class about each product and how it can be manufactured in different ways and using different materials. That way the students can begin to have a practical application of the theory they are taught. It is easier to understand these things when there is a direction. It also might teach them a little bit more about the certain limitations found in manufacturing which is a lesson I had to fast learn in the industry



## Appendix K: What did you learn about yourself during the R5K project (Comments)

- That I could direct well yet found it demotivating when managing individuals that could not yet establish their comfort within a group. I.e. Accept their strengths and weaknesses as a designer.
- I learnt that if you have a good idea you should go for it, no matter what, and I think that's the most important skill I learnt at CPUT - being independent and taking action for oneself. Thank you Johan!
- Sometimes the best idea is not the most academically "wowing" one. Also, I learned a lot about what it means to be the leader of a long term project and to pull through no matter what. I learned to trust people more and to delegate tasks.
- I'm addicted to detail. So much so that I lose track of other tasks that need to be done.
- I learned that it is vital to work with other and spread the load of work equally in order to get the project done in time.
- Elements pertaining to team work
- That the current syllabus is not structure enough and lacks proper content that does not prepare you for such a project or for the real world of ID.
- I learned that I tend to prefer to lead so that I can set the pace (fast) and I can have all the information. People were often only interested in one part of the project (e.g. the designing of the product) whereas I needed to know what manufacturers and suppliers we were using, how we were planning on spreading the word, what our budget was and how much money we had so we would not go beyond our means.
- I'm not an island.
- Due to it being a group project, we split the work according to our strengths. Not a bad thing, keeping in mind the objective of the R5K project. But not a good thing for me personally. I have comfort zones, so sticking to my strengths made those stronger, but made my weaknesses even weaker. I have discovered over the years that I'm more of a peace-keeper and I don't enjoy confrontation. I took lead on the project and found that one can't make or keep everyone happy, or ensure that everyone is sticking to the schedule, without a certain amount of assertiveness: that was hard for me, considering these people were my peers too. I thoroughly enjoyed the project, my role in it and I had a fantastic group. I like to control my situation. Admittedly a poor quality. In the design world that is a direct contradiction to our methodologies. The 5K project was the closest thing to the real deal and our methodology, as well as working closely with others who in turn, each had their own ideas, was really challenging. It was however rewarding, in the long run...
- I often keep quiet and I was very reserved about my ideas in the beginning, but after a while I realised that I needed to speak up, and in the end, we implemented a lot of my suggestions. The 5k project was a huge turning point in my life. It gave me the courage to do the second thesis, for sure. I joined a group with some peers that I had a huge amount
- of admiration for, and who I am still very close with today. It totally opened me up as a person...
- I learned what it was to stand on my feet. Thank you Johan :)

- The 5k Project gave me the confidence to enter the design industry and not feel totally un-equipped for what awaited. It gave me independent thought, originality and great networking possibilities. If I felt more supported, I would have liked to have pushed it harder to make it into a more rounded business model. It is one thing to build a great product with a simple business plan, it is an entirely other thing to consider a fully functional long term business structure and strategy.
- That I need to voice my opinion more, especially with a domineering person in a team
- how to be a team player, and trust other people to do a job
- I can work well and understand people without money, but I have learned to have zero tolerance and sympathy for people with money!
- I learned that I have an entrepreneurial streak and that I enjoy working in a design team.
- Managing team members, constant communication and delegation
- I can and do enjoy working in a good team.
- I can easily maintain a self study position. Even when it comes to business related items, knowing what your part is and doing it without anyone asking is very important.
- Hard working in the real working environment
- How to work with different personalities. Communication skills with suppliers. Budget systems of a business.
- I need more guidance on how businesses work - I am clueless on what the fundamentals are to start a business.
- I learnt that starting and running a business is a lot of hard work and requires a lot of special attention and time. It is also extremely important to acquire positive relationships between yourself and your business partners as well as with manufacturers, suppliers and potential customers. Strong and constant communication is key to overall success and comprehensiveness. Although I say it was a lot of hard work and required a lot of time and dedication, I also see now that it is do-able, not exclusively to business orientated people but to anyone with a strong will, passion and drive
- I am naturally a leader but tend to easily back off to avoid confrontation, usually when I shouldn't as it has cost us dearly this year with group members who weren't interested in the project.
- Team work. Being wrong is ok! it takes a lot of work to have a good business! It was a great project!
- Confidence and presentation skills improved a lot.
- that I work well with others, and work well under pressure.
- Having patience, research is your best friend and learning to adjust to situations and maintaining them properly.
- Nothing new, it only highlighted certain things of which I was already aware.
- That I have different skills to what I thought I should have so made things more realistic.
- grounded me in reality, and the difficult process of bringing a mass produced product to market.
- Don't necessarily go into business with friends. There needs to be an established hierarchy, or established roles.
- to trust others in my team and to let go of perfectionism

- I learnt to look at how I work and why it is better and worse than that of others which has lead me to discover my true strengths, which I am now able to monetise.
- To try volunteer for tasks more. Be more positive in the group.
- That I can go alone and don't need to work for someone else :)
- That I could make a product, but I wasn't that confident to sell it or myself at that time. 5K was fine, the importance of it wasn't that great, looking back... working in a team teaches you some important qualities (responsibility, social skills,etc.), but I think it should be a holistic class, to look at the student (personality/confidence/salesmanship) and then the product side (processes/manufacturers/etc.) This approach I think will help set up kids who finish that course much better. I would say that I didn't learn much as a individual because teams force certain people in the group to take on particular sections, so not everyone gets exposed to all the processes, I was exposed to dealing with people which I've kept as a skill to this day, but that's about it.
- managing a team is fun and very difficult. you learn to mediate very well. I also learnt to appreciate how much you can acheive when working in a team. at the end of the project I had to pinch myself and say: Wow, we have actually achieved an astonishing amount!!
- Success is about consistency, one step at a time.
- I learnt that it is important to share the vision and make sure everyone on the team is passionate about what they need to do and the role they play in it. I also learned to let go of certain aspects of the project to allow others to take control of it.
- I have a very high tolerance for people's unsavory personality traits
- I didnt know that I could push myself that far, achived personnel goals
- I learnt what I was interested in designing and what kind of thing I would like to do when I left uni. I learnt a lot about how to communicate with team members and others. How to get your point across and how to be assertive for my opinions to be considered and so forth. I grew up a lot from BTech and I believe the BTech industrial design year is the most important year out of the full 3D course. It's completely necessary as I can imagine I would've been lost in terms of knowing what I wanted to do if I left in 3rd year. I'm looking forward to possibly doing my Masters in the future. This is one of the best projects I know about in a study course! Keep it up!
- Team dynamics and communication within a group, especially decision making.
- Group Work
- I can take on many different roles and have various skills, but focusing on one in a situation like this rather than a little bit of everything is perhaps better.
- Capable of project management/team leading, useless at distributing workload + teamwork.
- I learn't great deal, I learnt to manage myself and others. I learn't to be be sensitive and
- empathetic with the market, I learn't that at the end of the its not about you, its about your customer and user, that develops your idea
- the realities of mass production and production restrictions. We where always taught to push the creative boundries and innovate, while this does have its place and is of utmost importance the

reality of dealing with production restrictions and material option, manufacturing processes where never explained at great enough depth

Fields of interest and practical skills

# Appendix L: Industrial Design as a scarce skill

<p>12 No. 37716          GOVERNMENT GAZETTE, 3 JUNE 2014          No. 459</p>	<p>3 June 2014</p>	<p>IMMIGRATION ACT, 2002          (Act No. 13 of 2002)          [Sections 19(4), read with Regulation 19(5)]</p> <p><b>SKILLS OR QUALIFICATIONS DETERMINED TO BE CRITICAL FOR THE REPUBLIC OF SOUTH AFRICA IN RELATION TO AN APPLICATION FOR CRITICAL SKILLS VISA OR PERMANENT RESIDENCE PERMIT</b></p> <p>I, Mr MKN Gqigaba, MP, Minister of Home Affairs, hereby, in terms of sections 19(4) and 27(a)(i) of the Immigration Act, 2002 (Act No. 13 of 2002), determine the following skills or qualifications to be critical for the Republic of South Africa in relation to an application for a critical skills visa or permanent residence permit:</p>	<p>No. 37716 15</p>
<p><b>Classification of Education Subject Matter</b></p> <ul style="list-style-type: none"> <li>Agriculture, Agricultural Operations and Related Sciences</li> </ul>	<p><b>Occupation/Critical Skill</b></p> <ul style="list-style-type: none"> <li>Agricultural Engineer</li> <li>Agricultural Scientist</li> <li>Forestry Technician</li> </ul>	<p><b>Requirements</b></p> <ul style="list-style-type: none"> <li>Confirmation in writing from the accredited professional body, council or board recognised by SAQA or any relevant government Department confirming the skills or qualifications of the applicant and appropriate post qualification experience</li> <li>Proof of application for certificate</li> </ul>	<p>confirming the skills or qualifications of the applicant and appropriate post qualification experience</p> <ul style="list-style-type: none"> <li>Proof of application for certificate of registration with the accredited professional body, council or board recognised by SAQA</li> <li>Proof of evaluation of the foreign qualification by SAQA translated by a sworn translator into one of the official languages of the Republic.</li> <li>Proof of employment within 12 months after obtaining Critical Skills work visa in a form of an employment contract specifying the occupation and capacity in which the foreigner shall be employed.</li> </ul>
<p>Engineering</p>	<ul style="list-style-type: none"> <li>Energy Engineer</li> <li>Metallurgical Engineer</li> <li>Chemical Engineer</li> <li>Civil Engineer</li> <li>Electrical Engineer</li> <li>Electrical Installation Inspector</li> <li>Electronics Engineer</li> <li>Geologist</li> <li>Industrial and Production Engineers</li> <li>Industrial Designer</li> <li>Manufacturing Engineers</li> <li>Materials Engineer</li> <li>Mechanical Engineer</li> <li>Mining Engineer</li> <li>Production/Operations Manager</li> <li>Quality Systems Manager</li> <li>Research and Development Manager</li> </ul>	<p>confirming the skills or qualifications of the applicant and appropriate post qualification experience</p> <ul style="list-style-type: none"> <li>Proof of application for certificate of registration with the accredited professional body, council or board recognised by SAQA</li> <li>Proof of evaluation of the foreign qualification by SAQA translated by a sworn translator into one of the official languages of the</li> </ul>	<p>confirming the skills or qualifications of the applicant and appropriate post qualification experience</p> <ul style="list-style-type: none"> <li>Proof of application for certificate of registration with the accredited professional body, council or board recognised by SAQA</li> <li>Proof of evaluation of the foreign qualification by SAQA translated by a sworn translator into one of the official languages of the</li> </ul>

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